An Assessment of Growth Quality and Economic Structure: A Regional Perspective

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ABSTRACT— ***Qualitative characteristics of economic growth and structural changes in the economy are essential for setting development goals for national and regional economies and can be used for reliable diagnostics of the results achieved. They are also important for strategic planning of future actions, changes and achievements. The paper presents a research methodology for measuring and assessing the quality of economic growth and dynamics of structural changes in the region's economy. The application of the approach can help to assess the "path" of the economy and to choose and implement right solutions to economic problems.***

Keywords— National economic policy, Gross Regional Product, economic growth, productivity of factors, degree of industrialization, degree of servitization, dynamics of structure

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1. INTRODUCTION

Today, the Russian economy faces a number of problems some of which are considered to be systemic and cannot be solved by the efforts of business or government alone. These are the problems of the inefficient structure of the national economy and the low quality of economic growth as reflected not by the dynamics of GDP (or GRP) but by the dynamics of the genuine savings index used to measure the national savings and obtained by subtracting the value of resource depletion and pollution damages from net savings. The genuine savings index was first devised by D. Pearce and G. Atkinson in 1993, and further developed by the experts of the World Bank in 2000. However, the current system for assessing economic growth and dynamics of structural changes in Russia uses traditional methods to measure GDP growth and estimate the proportions of various sectors in GDP and GRP. The statistical indicators system that provides data for the assessment and decision-making within the national economic policy is also traditional.

2. NATIONAL ECONOMIC POLICY PRIORITIES

The national economic policy in 2015 showed that the national economy, its structure and growth trends strongly depend on the new model of globalization and world trade. A new macroeconomic (including the character of the monetary policy and economic growth potential) and institutional model of growth of Russia's economy is being formed now [1, p. 5]. The Russian democrats and authorities believe that the end of the global crisis does not necessarily mean improvement in the economy of the countries and regions affected by the crisis. The situation in these countries will depend on the ability of the authorities and elite of certain countries "to take advantage of the crisis", i.e. to find institutional decisions that can help adapt to the new realities – technological, economic, social, and even ideological [1, p. 6]. In this paper the national economic policy means:

- first, the totality of measures in the sphere of economic management aimed at sustainability and economic growth;
- second, the activities of the authorities aimed at achieving economic goals and reflecting economic structure of the country.

The present-day task for the Russian economy is to find its own institutional solutions aimed at making capabilities and recourses of the national and regional economies competitive and effectively used. For this purpose, the

joint efforts of business and authorities is a perfect path to success which requires a universal tool for measuring and diagnostics of structural changes and quality of economic growth.

If the country doesn't take advantage of the global economic crisis that might result in missed opportunities for Russia both politically and economically. Advanced world economies recover against the background (or at the expense) of further deepening of the crisis in developing countries. This is true first of all for the US Federal Reserve System which raised interest rates for the first time in ten years [1, p. 7]. This is so-called "flight to quality" (capital outflow from developing markets). Moreover, the advanced economies of the world are moving to innovation economy based on the new fifth and sixth technological stages. These developments together with globalization of economic processes bring the issue of improving Russia's economic policy up to date. This policy currently aims to create the conditions necessary for qualitative economic growth and better quality of life [2, p. 41].

Academician A.G. Aganbegyan noted that modernization of social production should develop in two main mutually consistent directions:

- modernization of production and technical facilities of the real sector of economy;
- modernization of the national economy's structure including its hierarchical links [3].

Since the industrial sector is a basis of mesoeconomy, elaboration of efficient economic policy is an important task aimed at making the region more competitive and at strengthening its human capacity. The development of industry segments is closely connected with the development of other sectors of regional economy. Thus, some directions of the current economic policy should be intersectoral. To assess the quality of economic growth and the dynamics of structural changes in the regional economy two sectors have been examined – the industrial sector and the services sector. This paper presents the results of the economic and statistical research of the outcomes of the national economic policy in the Volgograd region for the period 2000-2014.

In his works, Nobel laureate S. Kuznets showed the relationship between economic dynamics and structure and proved that real (potential) economic growth is based on long structural shifts (trend) determined by many factors. In his work "Economic Growth and Income Inequality" (1955) S. Kuznets proposed that as countries experience economic growth, the income inequality first increases and then decreases. The theory of the environmental Kuznets curve was adapted by G. Grossman and A. Krueger in the 1990s; they replaced "inequality" with "environmental degradation". They expected the same pattern as in the Kuznets model, i.e. at high-income levels economic growth leads to environmental improvement as there are more funds to invest in this sphere. However, the development of the world economy since 2000 has shown that this pattern is not valid in today's world economic system. In the last decade of the 20th century and in the 21st century, developed countries started to move "dirty" production to developing countries, which thanks to such direct foreign investments experience high economic growth and account for more than 50% of the world direct foreign investments, but there has been no reduction of pollution [4, p. 22]. Therefore, the development of the world economy hasn't yet reached the stage when economic growth yields not only high economic and social returns but ecological as well.

Referring back to the relationship between economic growth and development, which has been studied in the works of the modern Russian researchers [5, 6, 7 and 8], the authors conclude that qualitative economic growth is accompanied by progressive structural changes in the economy. Resources, technologies and institutions are seen as the main factors of these changes. The structure analysis of Russia's industry for 2000-2008 has shown that in the period there were no qualitative changes in the industry and its structure. Thus, the authors argue that the structural and economic policies didn't prove effective [6]. The choice of structural priorities for elaboration and implementation of efficient economic policy in the context of the global economic development strategy and monitoring of structural changes in the regional economy are topical theoretical and practical issues. This paper focuses on the relationship between the dynamics of the intersectoral structure and the economic growth based on the statistical data for the Volgograd region.

3. CHOICE AND MEASUREMENT OF THE TWO-FACTOR PRODUCTION MODEL

To assess the performance of the regional economic system which determines the size or scale of the economy *(V),* we use Gross Regional Product (GRP) – output.

As regional factors of production we use:

- fixed capital *(K)*;
- payroll *(L).*

Thus, we have a two-factor production model for all types of economic activities.

In order to avoid, wherever possible, size (cost) or scale effects, output *V*, factors *K* and *L* are expressed in relative units:

$$T_V = \frac{V}{V_0},\ T_K = \frac{K}{K_0},\ T_L = \frac{L}{L_0}, \qquad (1)$$

where T_V – relative size of the economy in the reporting period *(V)* in relation to the base period (V_0);

T_K and T_L – relative scale of the factors involved in production (scale of production).

Relative indices T_V, T_K and T_L are also the base growth rates and reflect the dynamics of the relevant values. Index T_V is used to characterize the economic growth in the region.

To assess the economic performance we introduce the aggregate or generalizing factor of production T_R calculated as the geometric mean of the relative factors T_K and T_L (in order to avoid the effect of full interchangeability of factors K and L):

$$T_R = \left(\frac{K}{K_0}\right)^{0,5} \times \left(\frac{L}{L_0}\right)^{0,5} = \left(T_K \times T_L\right)^{0,5} \qquad (2)$$

Index T_R characterizes the relative aggregate scale of use of production factors and is the mean of labour factor T_L and capital factor T_K measured in units L_0 and K_0, respectively, or the mean of the base growth rates of these factors.

Using formulae (1) and (2) we assess the relative efficiency of the economy E_e:

$$E_e = \frac{T_V}{T_R} \qquad (3)$$

The index of relative efficiency of the economy E_e demonstrates how many times the size of the economy T_V more (equal or smaller) as compared to the volume of the aggregate factor involved or the scale of production T_R as compared to the base period. In other words, index E_e is a growth rate of the absolute efficiency of the economy [7] in the current period $\frac{V}{(R)^{0,5}}$ in relation to that in the base period $\frac{V_0}{(R_0)^{0,5}}$, where $R = (K \times L)^{0,5}$ is the absolute aggregate factor of production as the mean of labour factor L and capital factor K. All the indices in the present paper have been calculated on the basis of the data published by the Federal State Statistics Service (Rosstat) for 2001-2015 [9]. The year of 2000 is considered as a base period because the year marked the beginning of a new political and economic cycle in Russia. The results are presented in Table 1 and Figure 1.

Table 1: The dynamics of the relative indices of output, factors and productivity in the Volgograd region (2000-2014), relative units

Period	*TK*	*TL*	*Tr*	*Tv*	*Ee*	*TPL*	*TPK*
2000	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2001	1.23	1.53	1.37	1.30	0.95	0.85	1.06
2002	1.58	2.00	1.78	1.64	0.92	0.82	1.03
2003	1.98	2.55	2.25	2.02	0.90	0.79	1.02
2004	2.07	3.11	2.54	2.42	0.95	0.78	1.17
2005	2.37	3.96	3.07	3.19	1.04	0.80	1.34
2006	2.73	4.99	3.69	3.95	1.07	0.79	1.45
2007	3.86	6.30	4.93	5.20	1.05	0.83	1.35
2008	4.60	7.74	5.97	6.53	1.10	0.84	1.42
2009	4.90	8.52	6.46	5.92	0.92	0.69	1.21
2010	5.27	9.36	7.02	6.80	0.97	0.73	1.29
2011	5.91	10.18	7.76	7.97	1.03	0.78	1.35
2012	6.42	11.94	8.75	8.96	1.02	0.75	1.40
2013	6.89	13.52	9.65	9.53	0.99	0.70	1.38
2014	7.91	14.40	10.67	11.21	1.05	0.78	1.42

* Calculated on the basis of the data published by the Federal State Statistics Service (Rosstat).

4. INTERPRETATION OF THE RESULTS

The decrease of economic efficiency E_e in the period 2000-2003 was accompanied by scale-up in production, i.e. economic growth T_V in the region can be characterized as ineffectively extensive and, within this system of indices, without progressive qualitative changes. In the next period, further scale-up in production was accompanied by the increase in economic efficiency which reached the value E_e = 1.07 in 2006. The economic efficiency increased by 7% as compared to the base period.

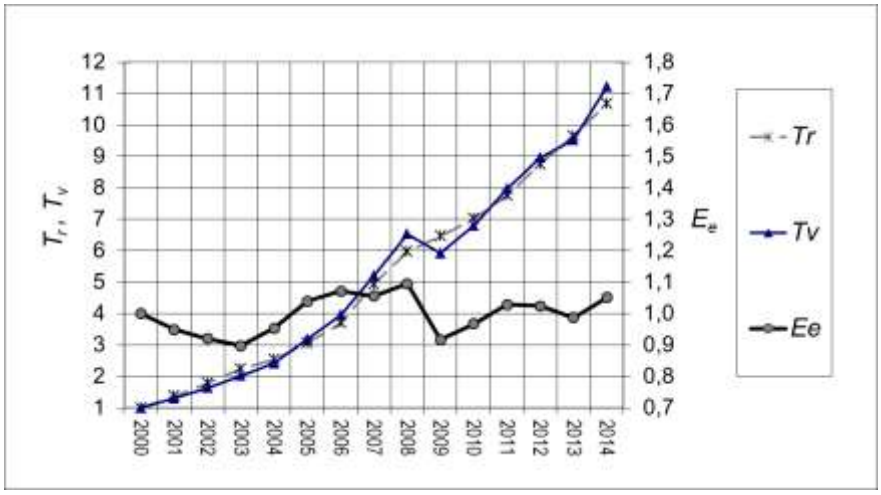


Figure 1: The dynamics of the aggregate factor of production T_r, relative size of the economy T_V and its relative efficiency E_e in the Volgograd region for 2000-2014 (calculated on the basis of the data published by the Federal State Statistics Service (Rosstat).

The economic growth in the regions of Russia in the period 2000-2014 was explained by favorable conditions in the raw materials market, involvement of idle facilities in production process and import substitution with domestic products. Actually, the economy did not grow and economic potential accumulated in the previous periods was used.

The weak positive trend in the dynamics of economic efficiency E_e in the period 2006-2008 as compared to the period 2004-2006 shows that before the crisis of 2008 the technological stage in the Volgograd region exhausted its capacities for qualitative economic growth.

In the post-crisis period 2009-2014 economic efficiency E_e, which dynamics was much the same as in 2003-2008, stood at the level of 2000. In 2004, the year when the anti-Russian sanctions were introduced, economic efficiency E_e reached the level of 2007 and was 105%.

To conduct an in-depth analysis of the relationships presented in Figure 1 we transform formula (3) into:

$$E_e = \left(\frac{T_V}{T_R}\right) = \left(T_{PK} \times T_{PL}\right)^{0,5} = C_{PF}, \qquad (4)$$

where $T_{PK} = \frac{T_V}{T_K}$ – the relative fixed capital productivity (yield on capital investment), or the base growth rate of capital productivity;

$T_{PL} = \frac{T_V}{T_L}$ – the relative labour productivity, or the base growth rate of labour productivity;

C_{PF} – the aggregate productivity of production factors, or the mean of the relative productivity of production factors.

Thus, it can be argued that when shifting to the relative indices T_V, T_K and T_L integral economic efficiency E_e has meaningful economic interpretation – it is expressed by the aggregate productivity of production factors C_{PF}. The aggregate or generalizing productivity of production factors C_{PF} as it follows from formula (4) is the geometric mean of the relative productivity of the fixed capital T_{PK} and labour T_{PL} or of the base growth rates of these factors' productivity. The increase of aggregate productivity C_{PF} with its maximum value in 2008 as compared to 2000 was only 10% for eight years. After the crisis year of 2008 the aggregate productivity $(C_{PF})_{2010}$ was 97% of that in 2000. The economic growth in the Volgograd region at the end of 2010 can be characterized as extensive and inefficient with the decreasing aggregate productivity of production factors (quality of growth). Below, we analyze the dynamics of productivity for each factor individually.

The relative labour productivity T_{PL} tended to decrease (see Table 1) in the period 2000-2010 and was characterized by the decreasing linear trend with approximation reliability $R^2 = 0.75$. The value of labour productivity $(T_{PL})_{2010}$ was 72% of that in 2000. This is explained by the fact that the wage growth rate of the employed in the economy T_L was constantly higher than the output growth rate (GRP) T_V. As a result, the share of the payroll of the employed in the economy of the Volgograd region was 51% in 2010 as compared to 37% in 2000. The number of the employed in the region's economy was 7% more than in 2000. Therefore, the labour productivity didn't grow during the analyzed period.

The relative yield on capital investment T_{PK} for the period 2000-2011 increased 1.29 times (see Table 1). This growth of the yield on capital investment was insufficient to compensate for the decline in the labour productivity for the same period. As a result, the integral economic efficiency E_e in 2010 decreased by 3% as compared to the base year.

5. ASSESSMENT OF THE STRUCTURAL CHANGES DYNAMICS

In the context of current economic developments, structural analysis of a regional economy becomes relevant. The research on the intersectoral structure of regional economic systems using coordination indices [10] makes it possible to use two structural characteristics to describe these systems:

$$t_\alpha = \frac{D_{ind}}{D_{agr}},\ t_\beta = \frac{D_s}{D_{ind}}, \qquad (5)$$

where t_α and t_β – the degrees of industrialization and servitization of the regional economy;

D_{agr} – the shares of agriculture (agriculture, hunting, forestry, fishing – ISIC A) in the total value added structure, respectively;

D_{ind} – the shares of industry (mining and quarrying, manufacturing, utilities – ISIC B-E) in the total value added structure, respectively;

D_s – the shares of services (ISIC G-P) in the total value added structure, respectively [11].

The indices or relative coordination indicators are used in statistics for quantitative characteristic of economic phenomenon structure [12]. The coordination index shows the proportion of parts in the whole, or how many units of one part correspond to one unit of the other part considered as the base of comparison. The industrialization degree t_α shows how many units manufactured in agriculture correspond to one monetary unit of gross value added as compared to those manufactured in industry. The same interpretation can be given to the servitization degree of the economy for various sectors.

The trajectory of structural changes in the regional economic system in the space of indices t_α and t_β for the period 1996-2014 is presented in Figure 2.

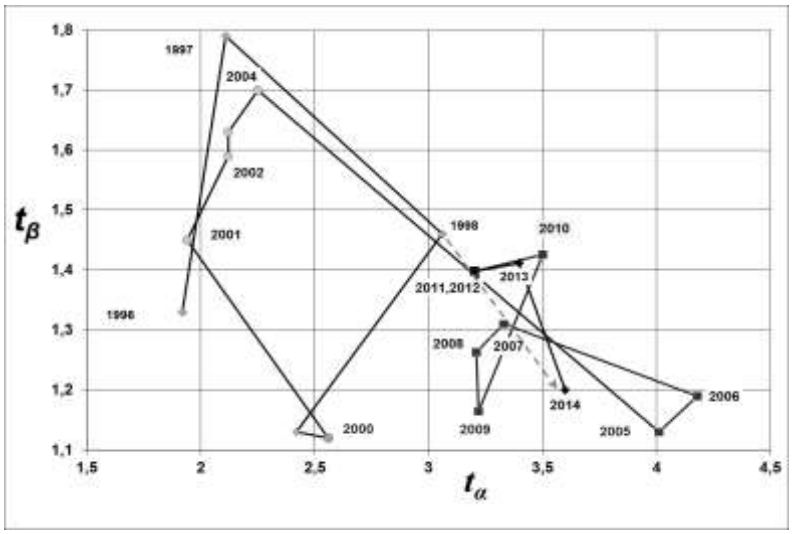


Figure 2: The trajectory of structural changes in the regional economic system in the space of indices t_α and t_β for the period 1996-2014 (calculated on the basis of the data published by the Federal State Statistics Service (Rosstat).

In terms of industrialization degree, the Volgograd region can be classified as an industrial region of Russia mainly with a weakly industrialized economy $t_\alpha \leq 3.5$ [11]. In comparison, the average industrialization degree in the German states is 20-25 taking into account the states of the former German Democratic Republic.

The regional economy development can be characterized by three phases (see Figure 2):

1) in the first phase (1996-2004) the sphere of services was developing considerably. The servitization degree of the economy grew by 52% for the period 2000-2004 and in its maximum value was t_β = 1.8. It should be noted that the average industrialization degree in the German states is between 3 and 4 [2]. The final deindustrialization of the region took place in the same phase. The industrialization degree t_α decreased by 12%. The structural changes were accompanied by the decline in the economic efficiency E_e and labour productivity T_{PL} (see Table 1). The dynamics of the indices in the transition period to a market economy reflects the post-Soviet industrial type of the regional economy under study.

2) in 2004 (at the bifurcation point) there was a de-evolution jump to the second stage of structural development (2005-2006) resulted in the sharp deservitization of the region's economy, i.e. the share of services in the GRP structure decreased. The servitization degree t_β decreased by 34% by the beginning of this phase. Such a dynamics of the t_β index characterizes the degradation of the market relations as the degree of services sphere development t_β can be considered as an indicator of the development of market institutions. When shifting from the first phase to the second one, a sharp reindustrialization of the economy occurs. The industrialization degree growth t_α was 78% as compared to the same value in 2004 (the end of the first phase). In the second phase, the industrialization degree of the Volgograd region reached its maximum value for the whole period under study: t_α = 4.5. This phase is characterized by the maximum value of the economic efficiency E_e and stagnation of labour productivity T_{PL} (see Table 1). This period of the regional economic development can be referred to medium industrial type of industrial development [9].

3) the final phase of the region's structural development can be divided into three stages: pre-crisis (2007-2008), crisis (2009) and post-crisis (2010-2014). The structural dynamics of indices t_α and t_β for this period can be characterized by the local structural "turbulence" made of small multidirectional structural changes. These structural changes are characterized by small, compared to interphase structural shifts, chaotic variations of the industrialization and servitization degrees. It means strengthening of non-linear character of the structural dynamics of the region's economy and its less determined behavior in the following periods.

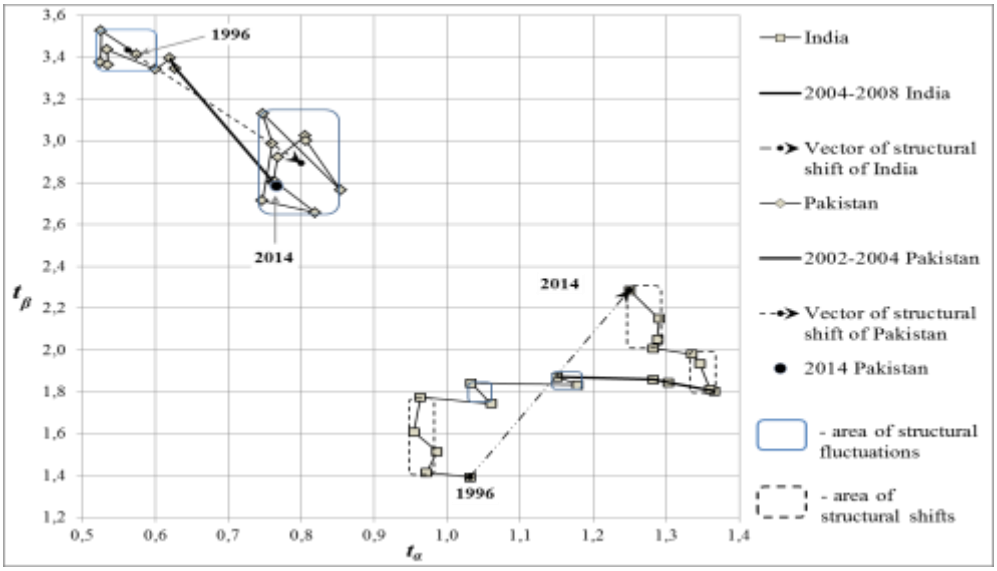
The eighteen years of structural development (since 1996) have resulted in the following: the industrialization and servitization degrees, as of the end of 2014, were comparable with the same values of the post-crisis year of 2010, and the servitization degree of the economy was less than in 1996, respectively. At present, the economy experiences global structural "turbulence". The structure of the regional economic system can be characterized by the chaotic cyclic behavior in some limited areas for indices t_α and t_β poorly correlating with the dynamics of the general economic characteristics (see Table 1 and Figure 1).

6. IMPLEMENTATION OF THE ASSESSMENT METHODOLOGY FOR ECONOMIC STRUCTURE AT THE MACRO- AND MESO-LEVELS

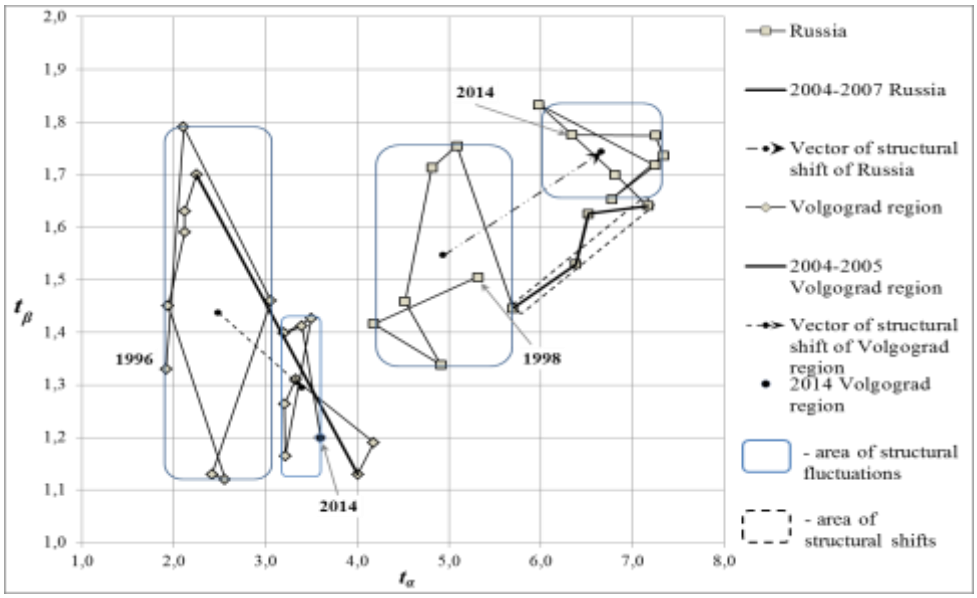
Below, we present the results of the research on industrialization and servitization degrees of the economies of India, Pakistan and Russia for further interpretation of the structural changes dynamics for the Volgograd region and generalization of the results obtained. The analysis of these characteristics at the macro- and meso-levels allows us to compare their dynamics for the Volgograd region with the trends typical of other Russian regions. The Volgograd region has the greatest industrial potential in the South Federal District of Russia but in the past six-eight years the economy of the region has demonstrated negative trends. Since India and Pakistan rank among world's largest developing economies, we think it would be appropriate to compare structural changes dynamics for these countries.

The dynamics of statistical indices t_α and t_β for the countries will allows us to reveal the general trends in the dynamics of Gross Value Added (GVA) structure for particular sectors of the economy. It should be mentioned that the scale of structural fluctuations generally depends on the spatial scale of the economy. However, relative characteristics of fluctuations can remain unchanged. To assess the degrees of industrialization and servitization for India, Pakistan and Russia we use the GVA data provided by the UN [11] and the Federal State Statistics Service (Rosstat) [13].

The dynamics of structural changes in the space of indices t_α and t_β for the period 1996-2014 for the economies of India, Pakistan, Russia and the Volgograd region is presented in Figure 3.



a) India and Pakistan



b) Russia and the Volgograd region

Figure 3. Comparison of the structural changes trajectories at the macro- and meso-levels in the area of indices t_α and t_β for the period 1996-2014.

The analysis of the statistical data allows us to characterize the dynamics by means of two types of structural changes: structural fluctuations and shifts.

It is worth noting that Western academics consider business cycles as fluctuations. I. Fisher wrote: "I see no more reason to believe in "the" business cycle. It is simply the fluctuation about its own mean" [14, p. 191]. This view is also shared by professor V. Zarnowitz: "Business cycles are defined as fluctuations in overall economic activity" [15, p. 6].

Russian researcher Ye.A. Yerokhina says: "The economy can neutralize fluctuation to a certain extent facilitated by sustainability of its structure in the evolutionary period, first of all, sustainability of its economic institutions. Vulnerability of the economy to fluctuations depends on diversification of its structure. However, the impact of diversification varies" [16, p. 127].

Therefore, fluctuations can be considered as business cycles [14, 15]. In the phase space of structural indices t_α and t_β the cycles look like closed or nearly closed very non-linear trajectories in some limited area of the space. Such type of sequence of elementary structural changes is considered in the present paper as the area of structural fluctuations of the economic systems analyzed.

An elementary structural change is understood as changes of structural indices t_α and t_β within one period of time (a year). The area of structural fluctuations is shown in Figure 3 by a round rectangle (solid line). The geometric parameters of the rectangle reflect the quantitative characteristics of the structural fluctuations scale.

In order to assess the scale of structural fluctuations of t_α and t_β, the structural fluctuations coefficient KSF_i has been determined:

$$KSF_i = \frac{R_i}{\frac{t_i^{\max} + t_i^{\min}}{2}}, \qquad (6)$$

where i – α or β;

$R_i = t_i^{\max} - t_i^{\min}$ – the scale of fluctuations of structural index t_i (length of the triangle sides marked with a solid line);

$t^{max}{}_i$ и $t^{min}{}_i$ – maximum and minimum values of structural index t_i, respectively.

According to the geometric model of the structural fluctuations areas, the center of the rectangle can be considered as the assessment of the mean value of fluctuating indices t_α and t_β. The mean value of the indices or the coordinates of the center of the structural fluctuations area are calculated as follows:

$$SFC = (< t_\alpha >, \ < t_\beta >), \qquad (7)$$

where SFC – the centre of structural fluctuations;

$<t_\alpha> = (t^{max}{}_\alpha + t^{min}{}_\alpha)/2$;

$<t_\beta> = (t^{max}{}_\beta + t^{min}{}_\beta)/2$.

The positions of *SFC* in the space of t_α и t_β are shown by black dots (·) in the center of the rectangle in Figure 3 and are connected by the vectors of structural shifts marked by dotted lines with arrows.

Structural shifts belong to the other group of structural changes which can be of two types:

- the first type of structural shifts is characterized by sharp changes of t_α and t_β as a result of the elementary structural change – a structural jump. This jump in the dynamics of t_α and t_β is accompanied by the evident exit of the system from the area of structural fluctuations. The change of at least one index of Δt_i should be commensurable or more than the scale of the R_i fluctuations.

- the second type of structural shifts is characterized by non-cyclic structural dynamics in the economic system with monotonic changes of indices t_α and t_β observed within two or more successive periods of elementary structural changes. There can be a situation when one of these structural indices shows small fluctuations along the structural shift of the other. The area of structural shifts is shown in Figure 3 by a round rectangle (dotted line) or a black heavy line.

The total change of at least one of the indices of Δt_i on the trajectory of the structural shift should be commensurable or more than the scale of fluctuations of R_i. This condition allows us to distinguish structural fluctuations from shifts.

It should be noted that on large time scale, macro-structural fluctuations can include structural jumps and shifts. The combination of different types of structural changes described above is presented in Figure 3.

The results of the study of GVA by means of indices t_α and t_β for India, Pakistan, Russia and the Volgograd region (subnational level of Russia's economy) are presented in Figure 3 and Table 2.

Table 2: Quantitative characteristics of structural fluctuations areas

Country/Region			Scale of fluctuations, relative units		Coefficient of structural fluctuations, %		Center of structural fluctuations area, relative units	
			R_α	R_β	KSF_α	KSF_β	*SFC*	
							$<t_\alpha>$	$<t_\beta>$
A	*B*	*C*	*1*	*2*	*3*	*4*	*5*	*6*
India	Area of structural fluctuations	1 (2001-2002)	0.028	0.098	2.7	5.5	1.031	1.392
							1996	
		2 (2003-2004)	0.028	0.037	2.4	2.0	1.250	2.287
							2014	
Pakistan	Area of structural fluctuations	1 (1996-2001)	0.076	0.184	13.4	5.4	0.562	3.435
		2 (2008-2014)	0.107	0.474	13.4	16.4	0.800	2.894
Russia	Area of structural fluctuations	1 (1998-2004)	1.517	0.416	30.7	26.9	4.940	1.546
		2 (2008-2014)	1.360	0.179	20.4	10.3	6.661	1.743
Volgograd region	Area of structural fluctuations	1 (1996-2003)	1.140	0.634	45.8	44.1	2.490	1.437
		2 (2007-2014)	0.398	0.261	11.7	20.2	3.401	1.295

The comparative analysis of the structural dynamics of the four economies has shown that the qualitative characteristics are similar taking into account the subnational character of the Volgograd region's economy. During the monitoring period, two areas of structural fluctuations have been revealed for the economies under study; the areas are divided by the period of structural shift marked by a black heavy line in Figure 3.

The beginnings of structural shifts for Russia and the Volgograd region coincide – the year of 2004. As for the Volgograd region, its structural shift can be defined as a jump, i.e. the structural shift developed within one year and ended in 2005. During this period, the sharp increase of the industrialization degree was accompanied by the sharp decrease of the servitization degree. The same dynamics of structural indices t_α and t_β was typical of Pakistan's economy in the period 2002-2004.

The next phase of structural changes was experienced by Pakistan's economy in 2004-2007 and can be characterized as a structural shift with the parallel growth of indices t_α and t_β. During the same period, the economies of India and Russia also experienced structural shifts.

The periods of constant growth of industrialization in India and Pakistan, which started in 2001 and lasted for eight years up to the world economic crisis in 2008, coincide. The growth rates of industrialization degree t_α for these countries were 128.3% and 142.2%, respectively, if we compare 2008 to the base year of 2001. The servitization degree t_β for India remained almost the same, while for Pakistan this index tended to decrease and the growth rate was 82.7%. The structural shift in the period 2004-2007 characterized by balanced development of industrial sector and services sector in Pakistan (simultaneous growth rates of t_α and t_β) was located in the area of structural fluctuations. The scale of fluctuation R_2 of this area exceeds the general change of t_α and t_β for the structural shift in the period 2004-2007.

The resulting vector of structural changes in the economy of Pakistan in the period 1996-2014 is shown in Figure 3 by a dotted line with arrow. These changes can be identified as a structural shift from one area of fluctuations to the other, at the same time the industrialization degree increased 1.42 times and the servitization degree decreased 1.19 times. In the second area, structural fluctuations coefficient KSF_β for index t_β increased more than 3 times (see Figure 2 and Table 2). Thus, increased level of industrialization resulted in unsustainable development of the services sector of Pakistan.

The dynamics of structural changes in Russia in the period 2004-2007 is characterized by balanced change of indices t_α and t_β with a structural shift from one area of fluctuations to the other. The degrees of industrialization and servitization for Russia increased 1.35 and 1.13 times, respectively, during all the period under analysis (dotted line with arrow, see Figure 3) while structural fluctuations coefficient KSF_i decreased considerably (see Table 2).

The dynamics of structural changes of India's economy differs significantly. The changes of indices t_α and t_β are presented by the sequence of structural shifts when one index is characterized by steady increase (see Figure 3) and the other remains almost the same or shows small structural fluctuations in the same period. Such a dynamics of t_α and t_β allows us to make a conclusion on "*step*" structural patterns in the development of India's economy: the current phase of industrialization changes into the next servitization phase. Comparing the servitization phases of the economy in the periods 1997-2001 and 2011-2014, the next phase of industrialization should be expected starting from 2015. The development of India's economy in the period 1996-2014 resulted in the increase of industrialization and servitization degrees (1.35 and 1.82 times, respectively). Therefore, throughout this period India's economy is characterized by balanced development of its industrial and services sectors.

Despite all qualitative and quantitative differences of structural dynamics for the countries under analysis, all of them experienced structural shifts in the period 2004-2008. In addition to structural indices t_α and t_β, the dynamics of GVA has been also analyzed [11]. The analysis has found that in the period 2004-2008 the GVA dynamics (both for macro-level (countries) and meso-level (the Volgograd region)) moved from one growing linear trend to the other with the linear growth coefficient exceeding that of the previous trend.

The structural analysis through indices t_α and t_β has proved to be sensitive to the "bends" of the GVA dynamics and has found peculiarities of the structural changes in these countries. In the pre-crisis period of 2004-2008, the world economy made a significant progress in its development resulted in growing demand for energy, merging interests and resources of advanced and developing economies, increasing globalization and dependence both in economic and political relations. Over that period, oil price rose from 29.2 dollars per barrel in January 2004 to 94.3 dollars per barrel in December 2007 (threefold increase for four years) together with global GDP growth to 5-5.3% in 2007. Russia's GDP growth increased from 7.2% in 2004 to 8.5% in 2007, India's GDP growth – from 7.6% to 10%, respectively, and only Pakistan showed decrease in GDP growth from 7.5% in 2004 to 6.8% in 2007 [17].

Therefore, general patterns in the dynamics of GVA, t_α and t_β have been influenced by the worldwide trend. It is worth noting that the structural shift in Pakistan's economy in the period 2002-2004 occurred only along with the linear GVA growth. Assuming that the shift was caused by internal reasons, we can expect structural shifts going back starting from 2014. The deindustrialization risk of Pakistan's economy is caused by its fluctuation character. The scale of structural fluctuations of R_α and R_β in the period 2008-2014 was maximal during all the period under study. Their values (see Table 2) allow the return of the economic structure to the situation of 2002. The same assumptions can be made about Russia and the Volgograd region.

7. RELEVANCE OF THE METHODOLOGY TO ECONOMIC POLICY

The results of the sectoral structure analysis undertaken in the paper show that the structural changes dynamics for India, Pakistan, Russia and the Volgograd region can be characterized as non-linear unlike general economic characteristics, for instance GVA. The dynamics is also characterized by structural fluctuations and shifts. The quantitative assessment of the structural changes allowed us to identify general and national patterns of industrialization and servitization of the economies of India, Pakistan, Russia and the Volgograd region.

The analysis has revealed the relationship between the GVA non-linear dynamics and structural sectoral shifts. Indices t_α and t_β "being the structural coefficients make an architectural image of the economy and determine how it will respond to some variations" [18].

The Volgograd region's economy grew but didn't develop in the period 1996-2014. Given that some countries are now moving from the fifth technological stage to the sixth one, we can characterize the Volgograd region's economy as relatively degraded.

In today's world, development has become a scarce resource which requires competition and financing. The lack of significant structural changes allows us to conclude that the third and partially forth technological stages dominate in the regional economy.

The economic policy should include structural policy as a basis for solutions for the Volgograd region to overcome structural stagnation. The system of general economic and structural indices presented in the paper can be used for goal-setting, monitoring and efficiency assessment of economic policy at regional level.

To solve all these problems the region needs a new industrial policy (aimed at guaranteed growth of t_α) and, with the adequate development, strengthening of market institutions (increase in servitization degree of the economy t_β) and their economic, political and ideological framework as a basis of the institutional matrix which provides the development or transformation of the formal and informal "rules of the game" for all participants of economic relations and their governance by the state by means of economic policy.

The results obtained may be of interest to experts in structural economic policy in their countries and regions and can be used for regulated impact on the factors that form an economic system in order to change its internal proportions.

The use of the methodology at the macro-level is particularly relevant for Russia, India and Pakistan in the context of growing economic integration (the planned accession of India and Pakistan to the Shanghai Cooperation Organization, SCO) as this would allow the countries to assess whether their economies develop in a balanced way in a globalized world, as well as the quality of their GDP growth. This can also help to elaborate a coordinated structural economic policy within the framework of SCO.

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