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# Identifying the Factors that Contribute to Sustainable Development of the National Economy

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***Abstract:***

*The structural imbalance is the main problem hindering the development of the Russian national economy. It leads to significant difference in economic efficiency of various industrial sectors. Moreover, the structural imbalance adversely affects the interaction between industries and hampers to foster an enabling environment that would accelerate economic growth consistent with the principles of sustainable development. The right balance between economic sectors provides favorable conditions for a successful interaction between industries.*

*The article suggests the methodology intended to identify the factors contributing to sustainable development of the national economy, to assess the status of the economy as well as to estimate the dynamics of economic growth. The methodology is a promising approach building a network of interactions between different industries to deepen the diversification of economic sectors. The authors propose a set of indicators - indicators of economic imbalances - that allow, based on primary statistical data, to quantitatively determine the degree of difference and the changing dynamics in economic, financial, technological and social characteristics of several economic sectors.*

*The paper details the developed system of monitoring and multi-criteria evaluation of growth in several economic sectors. The system makes it possible to estimate key factors affecting sustainable development of the economy as well as to get the right diagnosis of economic processes that shape the sectoral structure of the Russian economy.*

***Keywords:*** *Sustainable development, indicators of imbalance, coefficient of sustainability, factors of sustainable development, sectoral complexes, optimum structure.*

***JEL Code:*** *L51, L52.*

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## 1. Introduction

At present time, experts are guided by four paradigms when discussing the conceptual provisions of the model for achieving sustainable economic development goals:

- neoclassical theory (Galbacs, 2015) focusing on the economic system where individuals and legal entities (economic agents) involved in production, exchange and consumption interact in a free market in order to obtain maximum profit. Within the framework of this theory, algorithms are developed to achieve this goal. According to this theory, economic agents are considered to be “black boxes” that convert resources into products or provide services;
- an institutional model (Gruchy, 1987) is based on the axiom stating that the behavior of economic agents is determined by norms or institutions. This axiom implies that the optimal model of institutions is the main factor in development of the economy;
- evolutionary theory (England, 1994) which claims that economic agents should take into account special features in social and economic development of the country in which they run their business;
- a new institutional economic theory (Furuboth and Richter, 1997) combines the fundamental provisions of the all abovementioned paradigms and provides the theoretical foundations for conducting system studies of factors affecting the behavior of economic agents. The obtained results allow to estimate the expected risks stemming from different behavior of the economic agent in the market as well as to substantiate the mechanism of state regulation of market relations.

Neoclassical adherents (Idrisov, 2016) believe that to provide economic growth, the state's presence should be significantly reduced by privatizing government-owned corporations and streamlining the regulatory system, and it is also important to create a favorable business climate. But they do not take into account the fact that in developing countries it is in the government-run corporations that high-technology production facilities and the best national professional staff are concentrated. Moreover, at a certain stage of development, they become a real driving force for economic growth. This is proved by the experience of economic development of China, Korea, and Japan. Given the value of corporations and national business opportunities, in many developing countries such privatization would lead to transfer of the ownership to multinational corporations that will use the acquired production and technological complexes in their own interests and in many cases to the detriment of the national economy. Proponents of this approach believe that their recommendations regarding development of enterprises are universal in nature, and are valid irrespective of specifics of the national economy; the market would determine the optimal trends in economic development. Nevertheless, the analysis of crisis processes in developed countries and global economy over the past thirty years has shown the importance of state regulation of market processes to ensure a sustainable economic growth (Shekhovtsov *et al.*, 2017; Anureev, 2017).

Supporters of both institutional and new institutional economic theories are convinced that the main factor constraining development of the economy is the high transaction cost due to inefficient functioning of national institutions whereas in developed countries such institutions as state contract system, fiscal system, and system of interaction between state, business and civil society contribute to enhance entrepreneurial activity. However, this model does not address the structural problems of the national economy; hence, positive effects of implementing recommendations of those scholars are rather restricted. Despite well-developed institutional systems in the EU, the EU members do not always manage to avoid crisis processes. Many EU members have debts which amount to or even greater than their GDP. Huge debts are a major obstacle hampering the achievement of a sustainable development. From the authors' point of view, high debts are symptom of serious illness of the national economy.

Nevertheless, most studies explore the idea of growth rate. Based on the positive US GDP growth, experts conclude that the US economy has entered the path of sustainable growth while growing state and household debts point to aggravation of the crisis processes in the US economy. The value of money should be increased to limit the inflation. However, this measure will lead to a significant increase in the share of federal and state budget funds which are used to service debts and reduce public spending on social commitments. In addition, it may cause numerous bankruptcies of companies and households. The acute stage of the crisis can lead to political and social tensions. The methodology employed by the international agencies for assigning ratings does not use indicators that characterize the scale and quality of links between different segments of the national economy.

## 2. Literature Review

The analysis of dynamics of the developed economies (USA, Germany, Canada, Japan, Korea, Spain, Italy, Sweden, Finland, and Austria) over the thirty-year period 1970-2003 shows that their economic crises were caused by structural instability (Industrial Development Report 2016, 2016; Kleinknecht and Van der Panne, 2006; Prediction and simulation of crises and global dynamics, 2014; McMillan and Rodrik, 2011).

The structural instability, on the one hand, strengthens the impact of destruction factors in the phase of depression, but, on the other hand, it increases susceptibility to breakthrough innovative technologies in sectors that are crucial for building a balanced structure that favors economic growth. It should be noted that the values of indicators reflecting the contributions of different sectors to the countries' GDP are close in the abovementioned 10 developed countries; the variance of deviations of national economic structures' indicators from the corresponding values for these countries' structure averaged over the array is equal to two percent (Rodrik, 2008). Based on this fact, the authors qualify the averaged structure as "optimal". In authors' opinion, the optimal structure could be described as follows: financial sector - 25%, service sector - 22%, manufacturing sector - 20%. The authors of system studies in the report in 2013 prepared for the United Nations Industrial Development Organization (UNIDO) point out that the manufacturing sector is a major driving force for development of the national economy (Industrial Development Report 2013, 2013) Underestimation of its role can trigger crisis processes. It is shown that in the nineties of the last century the crisis in the US economy was caused by movement of industrial enterprises abroad. As a result, the contribution of manufacturing sector to GDP decreased from 23.4% in 1970 to 13.8% in 2003.

In Europe, the manufacturing industry plays a bigger role in Germany than on average in the EU in terms of value added (22.7% against 14.9% for 2009, respectively). In terms of value added, setting aside exports, Germany specializes in high-tech industries (production of motor vehicles, electricity distribution and instrumentation) and, to a lesser extent, in consumer goods industries such as production of transport equipment. In addition, Germany specializes in capital-intensive industries, for example, production of parts and accessories for motor vehicles. The highly specialized German industries featuring a high (or at least above average) level of innovation are such industries as mechanical vehicles, electronic and medical equipment, high precision and optical instruments. Nevertheless, Germany is not focused on industries that require a high education level because of the relatively low share of gross value added from financial services and software (Andrianov, 2012).

The manufacturing sector is a key imperative for the country's long- term economic growth only if it has a proper structure. System studies of the mechanisms of influence in the manufacturing sector show that they greatly depend on the economic development level (Industrial Development Report 2013, 2013). Moreover, the technological structure of this sector should be consistent with the level of development of the national economy. Currently, in order to ensure a sustainable economic growth, high-tech and medium-tech industries should occupy the leading positions in the manufacturing sector, 19% and 28%, respectively (47% in total) (Prediction and simulation of crises and global dynamics, 2014).

From the authors' point of view, the above-mentioned pattern of relationship between structure of the economy and sustainability of economic growth reflects the fundamental fact that an optimal labor division allows to attain the economic diversification level that guarantees a sustainable economic growth, high productivity and competitiveness of the national economy on the global scale. This fact must be taken into account when building a structure of non-resource model for the Russian economy. The established regularities imply that a new growth model should have a structure close by its characteristics to the optimal structure that creates stable links between different sectors of the economy. As to the Russian economy, the level of inter-sectoral interaction does not match that of developed countries. In contrast to developed countries, the needs of Russia's national economy in machinery, equipment, food, medicine, and other goods are largely met through imports (Russia and the countries of the world, 2012).

## 3. Methodology

The analysis of statistical data on the Russian economy structure shows that the main problem hampering economic development is structural imbalances. Significant differences in effectiveness of industries stem from the present state of the domestic economy; it prevents effective inter-industry interactions that are essential in creating favorable conditions for economic growth. Sectoral balance makes it possible to generate conditions for effective interaction between economic sectors. Thus, there is a need to devise a methodology enabling to diagnose challenges faced by the national economy, assess its status and dynamics in growth as well as identify opportunities for creating a network of inter-industry interactions in view to deepen the diversification of economic sectors.

The authors propose a set of indicators allowing, by using primary statistical information, to quantitatively determine the degree of difference and dynamics of changes in economic, financial, technological, social parameters of different economic sectors, i.e., a list of economic imbalance indicators. To characterize the dynamics in parameters, an indicator of parameters stability is introduced. This indicator permits to describe the nature of changes as monotonous or multidirectional in time. The developed methodology for assessing the impact of various factors on sustainable economic growth and diagnosing economic processes that affect the sectoral structure of the national economy allows to obtain data which, after analytical processing, are helpful to provide solutions to the issues listed below (Table 1). The issues are ranked according to their relative importance.

***Table 1:*** *Top Sustainability Issues Creating a Long-Term Orientation*

| Rank N | Issue to be addressed |
|---|---|
| 1. | Structural stability of sectoral complexes of the national economy |
| 2. | Economic effectiveness of sectoral complexes |
| 3. | Competitiveness of sectoral complexes on the labor market |
| 4. | Competitiveness of sectoral complexes on both domestic and global markets |
| 5. | Financial security of sectoral complexes |
| 6. | Production efficiency across different sectoral complexes |
| 7. | Potential of technologies to support development |
| 8. | Social efficiency of sectoral complexes |
| 9. | Factors affecting the sustainable development of sectoral complexes |

***Source:*** *Authors.*

The methodology for revealing challenges in economic development opens pathways to problem solving through an appropriate treatment of obtained data pertaining to the above-mentioned issues. For illustration purposes, we consider below three problems.

## 4. Findings and discussion

### 4.1 Structural stability of the Russian sectoral complexes

Structural stability of sectoral complexes is determined through analysis of the dynamics of gross value added (GVA) index. Gross value added by types of economic activity is summarized, and then used in GDP calculation by production method. GDP is a key measure of the country's economic performance and, therefore, describes the economy's status. In compliance with the term "optimal structure" defined above, the potential for structural instability in the current year t is determined by the degree of structural imbalance in the Russian economy against the core (i.e., basic sectors) in the optimal structure of developed economies as follows:

$$\Delta P_9(t) = (P_{9p}(t) - P_{9o})$$

$$\Delta P_7(t) = (P_{7p}(t) - P_{7o}) \qquad (1)$$

$$\Delta P_8(t) = (P_{8p}(t) - P_{8o})$$

where P9o, P7o, P8o denote, respectively, the share of manufacturing, financial and service sectors in the GDP for developed countries with optimal economic structure (Prediction and simulation of crises and global dynamics, 2014). We use the same numbering of industries as in Table 2 describing the optimal structure. The share of gross value added in the sectoral economic complex is calculated by the formula (2):

$$P_{ip}(t) = GVA_i(t) / \Sigma\ GVA_i(t) \qquad (2)$$

where GVAi(t) is the gross value added produced in sectoral complex i (structural unit of the gross domestic product in the Russian economy) in the year t ($2010 \le t \le 2014$); ΣGVAi is the total value added produced by the sectors of the Russian economy.

Relevant data on the Russian economy are reported in the Russian Statistical Yearbook in the section "System of National Accounts" (Andrianov, 2012). However, there is a discrepancy between the list of industries in the structure of the national economy and the list describing an optimal structure of the economy (Prediction and simulation of crises and global dynamics, 2014). These two lists should be brought into line and the list outlining the current structure of the national economy should be amended (Table 2).

***Table 2:*** *Optimal Structure of the Russian Economy*

| Optimum rank N | Industry |
|---|---|
| 1. | Agriculture, hunting, forestry and fishing |
| 2. | Mining |

| | |
|---|---|
| 3. | Electricity, gas, and water supply |
| 4. | Construction |
| 5. | Wholesale and retail trade, restaurants and hotels |
| 6. | Transport, warehouses and communications |
| 7. | Finance, insurance, real estate and business services |
| 8. | Services: individual, social and public |
| 9. | Manufacturing industry |

***Source:*** *Authors.*

The analysis of the trend of structural imbalance in the economy over a period (at least five years) will allow to determine how dynamics in sectoral complexes development influences country's economic growth in terms of direction and rate. In reality, either of the following situations may occur:

- the structure of national economy does not correspond to the optimal one and this trend is either constant in time or changes towards optimization or in the opposite direction;
- the structure of national economy is optimal and constant in time;
- during the whole period, destabilization of the optimal structure of national economy is observed.

### 4.2 The inter-industry interaction is an important factor for sustainable economic development

The inter-industry interaction or coherence of segments is an important factor for sustainable economic development. The inter-industry interaction leads to increased labor division, and, as a result, enhances labor productivity and extends diversification of product demand markets. If linkages in the economy are weak, sectoral complexes develop independently; therefore, the indicators of their economic growth do not correlate with each other or, in other words, are unbalanced. In statistics, the rates of economic growth of sectoral complexes are characterized by "quantum index of gross value added". The suggested method uses this indicator to depict dynamics in economic growth of sectoral complexes.

We determine the quantum index of gross value added in the sectoral complex over the five-year period i as follows in equation (3):

$$I_i(t; t+5) = I_i(t; t+1)\, I_i(t+1; t+2)\, I_i(t+2; t+3)\, I_i(t+3; t+4)\, I_i(t+4; t+5) \qquad (3)$$

where Ii (t; t+1) is the quantum index of gross value added i for the sectoral complex (economic type) in the year (t + 1) relative to the year t. Then we compare the values Ii (t; t+5) with the corresponding values Ie (t; t+5) as shown below in equation (4):

$$I_e(t; t+5) = I_e(t; t+1)\, I_e(t+1; t+2)\, I_e(t+2; t+3)\, I_e(t+3; t+4)\, I_e(t+4; t+5) \qquad (4)$$

where $I_e$ (t; t+1) is the quantum index of GDP in Russia in the year *(t+1)* relative to the year *t*.

According to the comparison results, we distribute sectoral complexes in three groups:

- the first group will include industries for which the quantum index is higher than for the economy as a whole;
- the second group will include industries for which the quantum index is nearly as high as for the economy as a whole;
- the third group will include industries for which the quantum index is lower than for the economy as a whole.

Thus, the distribution of industries in the above-mentioned groups allows us to determine the position of basic industries in the optimal structure in terms of economic growth. To describe the interaction between different segments of the economy, we introduce an indicator of structural instability (SI) of the economy over the period [t; t+5] as shown below in equation (5):

$$SI(t,t+5) = \sqrt{\frac{1}{9}\sum_{i=1}^{i=9}\left(I_{i.t}^{t+5} - I_{e,t}^{t+5}\right)^2} \qquad (5)$$

We sum up the equation (5) describing branches included in the optimal structure. Then we single out two subgroups of industries in a way that the first one will include industries for which quantum index of gross value added is higher than for the whole economy; the other one will include industries for which the quantum index of gross value added is lower than for the whole economy. Assuming that in each subgroup the variance D of the above values is equal, we obtain SI (t; t+5) = D. In this case, a noticeable structural instability in the economy is observed.

To determine the impact of the sectoral complex i on structural instability of the national economy, the growth dynamics coefficient (GDC) describing dynamics in sectoral complex economic growth is introduced as follows in equation (6):

$$GDC_i(t) = \begin{cases} 1 \; if \; \frac{P_i(t)}{P_i(t-1)} > 1 \\ -1 \; if \; \frac{P_i(t)}{P_i(t-1)} < 1 \\ 0 \; if \; \frac{P_i(t)}{P_i(t-1)} = 1 \end{cases} \qquad (6)$$

Where

$$GDC_i = \Sigma_t \frac{GDC_i(t)}{4}$$

In practice, GDCi (t; t + 5) = 0 if the value of corresponding relationship falls within the range 0.995 < 1 < 1.005. For monotonous dynamics over the five-year period, the average value of the GDCi is equal to 1. In the case of symmetrically multidirectional dynamics, the value is equal to 0; in other cases, the value ranges between 0 and 1. The result obtained in the problem 1 enables to estimate the degree of structural imbalances in the national economy as well as stability of the national economy for a given period. Other research tasks formulated in the methodology focus on determining the status of structural segments and dynamics in their growth in view to assess the factors influencing the effectiveness of interactions between industries.

### 4.3 Economic efficiency of sectoral complexes: Human capital

As a rule, the economic efficiency of sectoral complexes is determined by human capital and the state of fixed assets. The human capital is a highly important factor. New competencies and skills are developed, and the level of capitalization of sectoral complexes increases through the effective use of human capital. The role of human capital is recognized and reflected in numerous economic growth models. G. Mankew, D. Romer and D. Weyl demerge capital on physical and human capital and human one. They conclude further that the share of physical capital in income is 1/3, and the share of human capital varies from 1/3 to 1/2. The human capital is regarded as one of the main factors of production in modern Russia; this fact found its empirical confirmation: as much as 20% of the economic growth in Russia's regions between 1998 and 2003 is attributed to human capital (Mankiw *et al.*, 1992; Komarova and Pavshok, 2007; Shtertser, 2006).

Human capital efficiency (HCE) in the sectoral complex *i* is determined by the relationship (7):

$$HCE_i(t) = \frac{GVA_i(t)}{P_i(t)} \qquad (7)$$

where Pi is the number of people employed in the industry and GVAi(t) is the gross value added in the industry.

The human capital efficiency *(*HCE*)* index in the sectoral complex *i* is determined by the relationship (8):

$$I_i(t) = \frac{HCE_i(t)}{HCE_e(t)} \qquad (8)$$

where

$$HCE(t) = \frac{\Sigma GVA_i(t)}{\Sigma P_i(t)}$$

i.e., the indicator of human capital efficiency in the national economy as a whole.

In compliance with the value of index Ii(t) (higher than 1, equal to 1 or lower than 1), the sectoral complexes are divided into respective groups. The coefficient of stability in human capital efficiency (HCESC) in the sectoral complex *i* is determined as follows in equation (9) and (10):

$$HCESC_i(t) = \begin{cases} 1 \;\; if \;\; \frac{HCE_i(t)}{HCE_i(t-1)} > 1 \\ -1 \;\; if \;\; \frac{HCE_i(t)}{HCE_i(t-1)} < 1 \\ 0 \;\; if \;\; \frac{HCE_i(t)}{HCE_i(t-1)} = 1 \end{cases} \tag{9}$$

$$HCESC_i = \sum_t \frac{HCESC_i(t)}{4} \tag{10}$$

The intensive interaction between industries may occur only at close values of the index of human capital efficiency in industrial segments. To estimate the degree of imbalance in indicator values for sectoral complexes, we introduce an indicator as shown below in equation (11):

$$HCESC(t) = \sqrt{\frac{1}{9}\,\Sigma(\mathrm{HCE}_i(t) - HCE_e)t))^2} \tag{11}$$

where

$$HCE_e(t) = \frac{\Sigma GVA_i(t)}{\Sigma P_i(t)}$$

The coefficient of human capital efficiency stability (HCESC) in the Russian economy is described as in equation (12):

$$HCESC_e(t) = \begin{cases} 1 \;\; if \;\; \frac{HCE_e(t)}{HCE_e(t-1)} > 1 \\ -1 \;\; if \;\; \frac{HCE_e(t)}{HCE_e(t-1)} < 1 \\ 0 \;\; if \;\; \frac{HCE_e(t)}{HCE_e(t-1)} = 1 \end{cases} \tag{12}$$

where

$$HCESC_e = \sum_t \frac{HCESC_e(t)}{4}$$

The degree of imbalance in human capital efficiency HCEIC is determined as in equation (13):

$$HCEIC = \sqrt{\frac{1}{9}\,\Sigma_i (HCESC_i(t) - HCESC_s(t))^2} \tag{13}$$

## 4.4 Fixed assets

The efficiency of use of fixed assets (FAE) in sectoral complexes in the year *t* is determined by the relationship (14):

$$FAE_i(t) = \frac{GVA_I(t)}{FAV_i(t)} \tag{14}$$

Where

$FAV_i(t)$ is the value of fixed assets in the sectoral complex *i* in the year *t*.

The efficiency of machinery and equipment (MEE) use in sectoral complexes in the year *t* is described as shown in equation (15):

$$MEE_i(t) = \frac{GVA_i(t)}{ME_i(t)} \tag{15}$$

Where

$ME_i(t)$ denotes machinery and equipment cost in the year *t*.

The index of fixed assets efficiency (FAEI) in the sectoral complex *i* is determined as shown in equation (16):

$$FAEI_i(t) = \frac{FAE_i(2014)}{FAE_i(2010)} \tag{16}$$

The index of machinery and equipment efficiency (MEEI) in the sectoral complex *i* is determined by the relationship (17):

$$MEEI_i\ (t) = \frac{MEE_i\ (2014)}{MEE_i\ (2010)} \tag{17}$$

The coefficient of stability in fixed assets efficiency in the sectoral complex *i* (FAESC) is determined as shown in equation (18):

$$FAESC_i(t) = \begin{cases} 1 \;\; if \;\; \dfrac{FAE_i(t)}{FAE_i(t-1)} > 1 \\ -1 \;\; if \;\; \dfrac{FAE_i(t)}{FAE_i(t-1)} < 1 \\ 0 \;\; if \;\; \dfrac{FAE_i(t)}{FAE_i(t-1)} = 1 \end{cases} \tag{18}$$

The coefficient of stability in machinery and equipment efficiency (MEESC) in the sectoral complex *i* is determined as shown in equation (19):

$$MEESC_i(t) = \begin{cases} 1 \;\; if \;\; \dfrac{MEE_i(t)}{MEE_i\,(t-1)} > 1 \\ -1 \;\; if \;\; \dfrac{MEE_i(t)}{MEE_i\,(t-1)} < 1 \\ 0 \;\; if \;\; \dfrac{MEE_i(t)}{MEE_i\,(t-1)} = 1 \end{cases} \tag{19}$$

Imbalance in fixed assets efficiency index (FAEII) is determined as in equation (20):

$$FAEII(t) = \sqrt{\frac{1}{9}\sum\nolimits_i (FAE_i(t) - FAE_e(t))^2} \tag{20}$$

where

$$FAE_e(t) = \frac{\sum GVA_i(t)}{\sum FA_i(t)}$$

Imbalance in machinery and equipment efficiency (MEEII) is given by (21):

$$MEEII(t) = \sqrt{\frac{1}{9}\,\Sigma(MEE_i(t) - MEE_e(t))^2} \tag{21}$$

where

$$MEE_e(t) = \frac{\Sigma GVA_i(t)}{\Sigma ME_i(t)}$$

### 4.5 Financial security of sectoral complexes

The index of investment in fixed capital (FCII) for the sectoral complex *i* as a share of gross value added is determined as shown in eqution (22):

$$FCII_i(t) = \frac{FCI_i(t)}{GVA_i(t)} \tag{22}$$

where $FCI_i(t)$ represents investment in the fixed capital in the sectoral complex *i* in the year *t*.

Investment in machinery and equipment (MEI) in the sectoral complex *i* in terms of a share of gross value added is determined as in equation (23):

$$MEI_i(t) = \frac{MEI_i(t)}{GVA_i\ (t)} \tag{23}$$

where $MEI_i(t)$ represents investment in machinery and equipment in the sectoral complex *i* in the year *t*.

Investments in fixed capital (FCI) reduced to GVA in the sectoral complex *i* in the year *t* are described as shown in (24):

$$FCI_e(t) = \frac{FCI_e(t)}{\sum_i GVA_i(t)} \tag{24}$$

where $FCI_e(t)$ represents the amount of investment in fixed capital for the whole economy in the year *t*.

Imbalance in fixed capital investment (FCII) by sources of financing is determined by the relationship (25):

$$FCII(t) \ = \sqrt{\frac{1}{9}\Sigma_i(FCI_i(t) - \ FCI_e(t))^2} \tag{25}$$

Imbalance in machinery and equipment investment (MEII) in the sectoral complex *i* is determined as shown in equation (26):

$$MEII(t) = \sqrt{\frac{1}{9}\sum(MEI_i(t) - MEI_e(t))^2} \tag{26}$$

Where

$$MEI_e(t) = \frac{MEI_e(t)}{\sum_i GVA_i(t)}$$

The level of expanded reproduction (ERL) for the sectoral complex *i* in the year *t* is determined by the relationship (27):

$$ERL_i(t) = \frac{FCI_i(t)}{D_i\ (t)} \tag{27}$$

where $D_i(t)$ represents depreciation charges in the sectoral complex *i* in the year *t*, i.e., as shown in euation (28):

$$D_i(t) = \frac{LC_i(t) * VAR_i(D)}{VAR_i(LC)} \tag{28}$$

where $LC_i(t)$ represents labor costs in the sectoral complex *i* in the year t; and $VAR_i(D)$, $VAR_i(LC)$ are value added ratios associated with depreciation and labor costs, respectively.

The index of expanded reproduction (ERI) is determined as shown in equation (29):

$$ERI_i = \frac{ER_i(2014)}{ER_i(2010)} \tag{29}$$

The expanded reproduction sustainability (ERS) is determined by the relationship (30):

$$ERS_i(t) = \begin{cases} 1 \quad if \quad \frac{ER_i(t)}{ER_i(t-1)} > 1.005 \\ -1 \quad if \quad \frac{ER_i(t)}{ER_i(t-1)} < 0.995 \\ 0 \quad if \ 0.095 < \frac{ER_i(t)}{ER_i(t-1)} < 1.005 \end{cases} \tag{30}$$

***Note:*** *if the changes are within 0.5%, expansion in reproduction remains practically unchanged.*

## 5. Conclusions, practical application of findings

The developed methodology for monitoring sustainable growth of the national economy is an efficient tool that will help increase the reliability and validity of assessments of the effectiveness and sustainability of various industries, and, based on the multi-criteria evaluation results, identify existing opportunities and resources to develop industries and sectoral complexes as well as minimize risks.

It will permit to define more precisely the degree of structural imbalances in the national economy as well as characterize the nature of changes taking into account financial and economic processes at the sectoral level. The obtained data will make it possible to rank sectoral complexes according to their role in the national economy and then compare the obtained pattern against the optimal structure of the national economy. It is important to pay special attention to the role of basic industries in structural deviations and evaluate the degree of deviations from the optimal structure of the economy. The acquisition of these data will allow to formulate real structural problems to be addressed when building a new non-resource based model for development of the national economy. It should be pointed out that sectoral balance will create favorable conditions for effective interaction between economic sectors.

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