
Intensity of Socio-Economic Process Development in the Regions of Ukraine

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Abstract:

Purpose: The aim of the paper was to present the research methods that allow to compare the intensity of development of social, economic, and socio-economic processes in the regions of Ukraine.

Design/Methodology/Approach: In the introduction to this article, the justification of the need for research on the problem of research was presented, followed by the research methodology used by Polish and Ukrainian scientists.

Findings: The application of the selected research methods allowed to achieve the goal of the research and allowed to obtain more complete and reliable information on the development intensity of the regions of Ukraine to improve the level of development of socio-economic processes.

Practical Implications: The comparative analysis made it possible to indicate where the socio-economic processes are faster and where slower, to identify trends in regional development, identify problem regions and propose a strategy for their development to improve the socio-economic situation.

Originality/value: As a result of the research undertaken, using the methods presented in the paper, determined the intensity of development of social, economic, and socio-economic processes of the regions over time. After all, the basis of management decisions made by state governing bodies should be the information about the state of the object or management process at a certain point in time, trends in its development, and the rate of change that occurs in this object.

Keywords: Intensity, development, socio-economic process, region, statistical indicators.

JEL classification: A13, C13, C81, O12, O31, O57.

Paper Type: Research paper.

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1. Introduction

The establishment of market relations in the Ukrainian economic space is accompanied by transformational processes in society. Stable economic development is impossible without raising the living standards of the population, improving social welfare and social change. All these processes are closely interconnected. And the connections between them are quite complex, which is largely due to the contradictory nature of man. Therefore, it is advisable to study them together.

In the current conditions of the development of society and economy of Ukraine, the attention of the governing bodies of the state should be focused on the introduction of market relations in all spheres of the country and the solution to urgent social problems that have emerged recently. After all, not always competent reform of the domestic economy and the solution of social issues, periodic changes in approaches to this reform, some other managerial mistakes, led to a significant spread of poverty and property differentiation of the population, as well as other negative consequences.

Management decisions made by public authorities should be based on information about the state of the facility or management process at a particular point in time and the trends and rate of change that is taking place at that facility. Therefore, periodic surveys of these objects are required. You need to study the state of these objects, the direction of their changes over time, and the speed of these changes. This also applies to the management of socio-economic processes both in the country as a whole and in its regions.

Under socio-economic processes, we will understand the changes in society and economy, which are reflected in the living standards of participants in these processes, the stability of the political and economic situation in the country, security, and safety of its population. These processes cause social change, which reflects the socio-economic properties of political processes. These processes are closely related to the territories or activities of the economic entities in respect of which they are considered. It is necessary to study the scale or pace of change that occurs in regions, government systems, or the functioning of certain enterprises, i.e., at the meso-, macro-, or micro-levels.

The peculiarity of socio-economic processes at the current level of economic development and society is their complexity and special dynamism. In studying their dynamics, it is necessary to determine the rate at which changes occur, i.e., to assess the intensity of development of these processes. The complexity of this task is that socio-economic processes are characterized by not one but several primary factors. It is impossible to compare the values of several indicators at the same time. It is necessary to build based on several primary factors one, so-called generalized

indicator, on the size of which for different territories or different time intervals it is possible to make comparisons and certain conclusions.

Such indicators are actively used by scientists in their research. Thus, for international comparisons of the socio-economic situation in countries, scientists and practitioners use several integrated indicators, which are called indices (Kirichenko, 2017). In particular, the social sphere is characterized by the Human Development Index and the Social Progress Index. The state of the country's economy can be assessed using four indices: The Global Competitiveness Index, Ease of Doing Business Index, The Index of Economic Freedom, Economic Freedom of the World.

Interregional comparisons of the level of socio-economic development in the regions can also be performed using classical methods of multidimensional statistics. To do this, you need to build complex integrated indicators or use other methods of this analysis. To date, several such methods have been developed. In addition to foreign scientists, Polish scientists have made a significant contribution to the development of methods of multidimensional statistical analysis. Among them are such scientists as Chekanovsky (1913), Bukietynski (1969), Hellwig (1972), Pluta (1972; 1989), and many others. Research using these methods continues to this day. A scientific paper (Balcerzak, 2016), using Hellwig's method of taxonomic measure of development, assessed the quality of human capital in the European Union. The work of Roszkowska (2021) is devoted to the study of education in the European Union using the extended Hellwig's method.

Ukrainian scientists have also actively used these methods in their research. Thus, in the scientific article of Bogdan (2019) the methods of multidimensional analysis assess the strategic tourism potential of the regions of Ukraine. The monograph of Sadova (2000) constructs generalized indicators for the analysis of regional labor markets of Ukraine. Hrynkevych (2015) used the theory of taxonomic analysis to build a model for regulating the development of human capital. Other scientists have used these methods to perform analysis in their subject area.

It should be noted that no matter what area the study relates to, the values of the constructed generalized indicators are measured using an ordinal scale. That is, we can determine whether the condition of an object has improved or deteriorated over time. But it is impossible to determine the intensity of changes that occur in this object with the help of these generalized indicators. Developing effective management decisions requires research on the intensity of socio-economic processes in Ukraine. The governing bodies of the state will find useful information on the comparison of this intensity in the regions of the country. Having information on which regions socio-economic processes are faster and in which slower will help to make the right decision. This paper attempts to determine the intensity of socio-economic processes in the Ukrainian regions using a certain approach. Having the necessary statistics allows to perform such a study.

2. Research Method

To conduct a declared study of the intensity of socio-economic processes in the regions of Ukraine need to solve the following tasks:

- to determine the amount of input information that characterizes the development of socio-economic processes in the region;
- to propose an approach to the comparative analysis of the intensity of socio-economic processes in the regions of the country;
- perform for certain periods of time calculations of the corresponding integrated rate index of development of socio-economic processes in the regions of Ukraine.

As mentioned above, a comprehensive description of socio-economic processes in the region requires the use of several primary factors. To conduct this analysis, we limited ourselves to quantitative indicators, the values of which are taken from open literature sources and statistical collections for the regions of Ukraine for the period from 2013 to 2019. The selected system of indicators has 23 units. The first 10 of these indicators characterize the economic situation, and the other 13 - social. The number of these primary indicators satisfies two conditions. The first condition is that the system of these indicators makes it possible to characterize the intensity of the studied processes as much as possible. The second is that the number of indicators is minimized to optimize the calculation procedure itself.

Consider the indicators used in the calculations and briefly justify the need for their selection. To some extent, the general indicator of the level of economic development of the region is the indicator "Gross regional product". Therefore, it was selected as the primary indicator for analysis. Together with it, to characterize the level of development of industry, agriculture, and construction industry, the following indicators were selected: "Volume of sold industrial products", "Volume of agricultural production" and "Volume of construction work performed". Investments are relevant for the Ukrainian economy in modern conditions. They significantly improve and accelerate economic processes. Therefore, the system of economic indicators included indicators "Volume of capital investment" and "Volume of foreign direct investment".

Intensification of production is impossible without the introduction of various innovations and the latest scientific advances. In connection with the above, the list of primary indicators used for our study included the indicator "Share of sold innovative products in the total volume of sold industrial products". Given the significant competition in international markets, to win in which the proposed products must have some innovation, we have supplemented this indicator with the indicator "Volume of exports of goods".

The intensity of socio-economic processes in the region is also characterized by the movement of financial resources in it. Therefore, the indicators "Local budget

revenues" and "Capital expenditures of local budgets" were taken into the system of primary indicators used to assess this intensity.

Improving the welfare of the population has a positive effect on the processes we study. The faster this happens, the higher the intensity of socio-economic processes. Given the above, the list of primary indicators for assessing these processes included indicators "Disposable income", "Total housing area", and "Share of households with Internet access". The studied processes in the region are closely related to the processes taking place in the regional labor market. Indirectly, these processes affect the welfare of the population. This led to the use in the calculations of the indicators "Unemployment" and "Employment".

Social processes in the region are also determined by the health of the population. Many primary indicators can be taken to evaluate it. We chose three: "Average life expectancy at birth", "Planned capacity of outpatient clinics" and "Provision of the population with doctors of all specialties." In addition, to consider the level of social protection of the population and the general criminogenic situation, the system of primary indicators included indicators "Coverage of social services for people in difficult life circumstances" and "Number of detected crimes."

The main component of the country's economic development is human capital. Its quality is provided by education. Therefore, it is logical to use in the process of research the primary indicators "Coverage of children in preschool education", "Number of students, students of vocational education" and "Number of students in higher education".

Let us move on to consider the algorithm for constructing an appropriate generalized indicator, which can be used to assess the intensity of socio-economic processes in the regions of Ukraine.

As mentioned earlier, it is impossible to use the methods developed by Helwig for the construction of taxonomic indicators or their modifications, because the scale of order is used to measure the values of these indicators (Prymak, 2009). A different approach is needed to assess the intensity of development of socio-economic processes in the region. The basis for such an assessment can be proposed in (Dolishniy, 2002) an integrated indicator, which its authors used to determine the rate of economic growth of Ukraine and its administrative regions. However, we modify it a bit. In the process of modification, it is necessary to consider the priority of primary factors and divide them into stimulants (positively affect the development of socio-economic processes) and disincentives (negatively affect the development of these processes).

Consider the algorithm for constructing a summary indicator, based on which we will assess the intensity of development of the studied processes in the region. Let us call it an integral rate index of the development of socio-economic processes.

Moreover, its value will show the intensity of development of the studied processes in a certain period (year), compared with another period (year). Another period can be preliminary to the calculated or basic (the first period for which the initial data are set). In the first case, this index will be called chain, and in the second - basic. The first stage of this algorithm is the calculation of primary indices of the rate of development of socio-economic processes by the formula:

$$I_{ij}^{sk} = \left(\frac{x_{ij}^k}{x_{ij}^s} \right)^p, \quad (1)$$

where I_{ij}^{sk} – the primary index of rates of development of social and economic processes of the i -th region ($i = \overline{1, I}$) in the k -th period (year) ($k = \overline{1, T}$) of the s -th period ($s = \overline{0, T-1}$), defined by the j -th primary indicator ($j = \overline{1, J}$); x_{ij}^t – value of the j -th primary indicator ($j = \overline{1, J}$) of the i -th region ($i = \overline{1, I}$) of the t -th period ($t = \overline{1, T}$).

Here I – number of regions, J – number of primary indicators, $T + 1$ – number of time intervals. Period at $t = 0$ is basic. If j -th the primary indicator is a stimulant, then in the formula (1) $p = 1$, and if a destimulator, then $p = -1$. To calculate the basic primary indices of the rates of development of the studied processes in formula (1) instead of s we substitute zero, and chain – $(k - 1)$.

The second stage of the used algorithm is the calculation of chain or basic integrated rate indices of development of socio-economic processes according to the formula:

$$I_i^{sk} = \sqrt[\alpha]{\prod_{j=1}^J (I_{ij}^{sk} + 1)^{\alpha_j}} - 1, \quad (2)$$

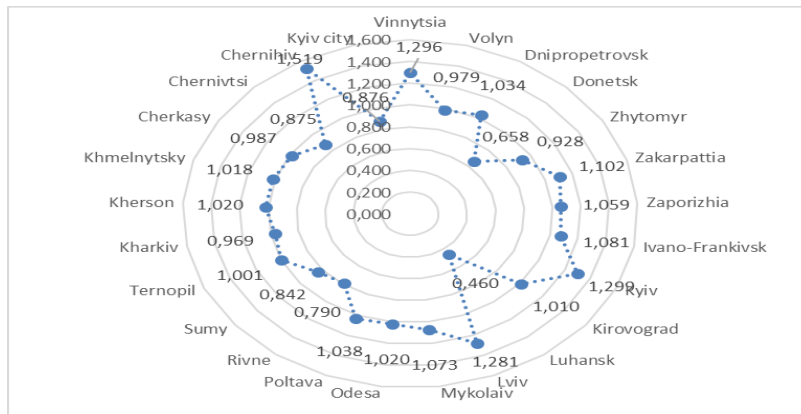
where I_i^{sk} – integral (basic at $s = 0$ and chain at $s = k - 1$) rate index of development of socio-economic processes of the i -th region in the k -th period before the s -th period; I_{ij}^{sk} – primary index of rates of development of social and economic processes of the i -th region ($i = \overline{1, I}$) in the k -th period ($k = \overline{1, T}$) of the s -th period ($s = \overline{0, T-1}$), defined by the j -th primary indicator ($j = \overline{1, J}$); α_j – priority factor of the j -th primary indicator ($j = \overline{1, J}$); $\alpha = \sum_{j=1}^J \alpha_j$.

3. Results of Numerical Calculations

The calculations were performed to estimate the intensity of economic, social, and socio-economic processes. Moreover, the calculations consider that all indicators have the same priority. Besides, the indicators Unemployment rate and the number of detected crimes is de stimulants, and all others - stimulants.

First, consider the economic processes. The results of the calculation of economic processes in 2019, compared to 2013 are presented in Figure 1. From 2013 to 2019, the total value of this indicator in Ukraine is in the range of 0.4-1.52. The situation in Luhansk and Donetsk regions has deteriorated the most during this time. This is due to part of the temporarily occupied territories. The information developed according to the central executive bodies for these regions is formed only based on data on enterprises, institutions, and organizations that reported to the state statistics bodies, so we will not take them into account when describing the results of comparative analysis. The value of the basic integrated rate index of development is also low in Rivne, Sumy, Chernivtsi regions, and the Kyiv city. The state of development of economic processes during this period has improved in Kyiv, Vinnytsia, Lviv, and Zakarpattia regions. The best situation in 2019 was in Chernihiv region.

Figure 1. Basic integrated rate index of economic processes in 2019, compared to 2013



Source: Own study.

To estimate the intensity of economic processes in each region and each year compared to the previous year calculated their chain integrated rate indices of development according to the considered algorithm. The results of the calculations are presented in Table 1.

Table 1. The value of chain integrated rate indices of economic processes in the regions of Ukraine in 2014-2019

Name of the region	The value of the index for the year					
	2014	2015	2016	2017	2018	2019
Vinnytsia	0,975	1,011	1,039	1,102	1,125	1,051
Volyn	1,000	1,007	0,939	1,001	0,889	1,230
Dnipropetrovsk	0,958	1,069	0,988	1,051	0,970	1,116
Donetsk	0,666	0,880	1,063	1,022	1,124	0,940
Zhytomyr	0,951	0,803	1,168	1,077	0,925	1,022
Zakarpattia	0,953	1,070	0,934	1,048	0,933	1,099

Zaporizhia	0,902	1,089	1,144	1,100	0,962	0,989
Ivano-Frankivsk	0,972	0,962	0,887	1,064	0,946	1,169
Kyiv	0,905	1,196	1,028	1,058	1,030	1,137
Kirovograd	0,939	0,879	1,100	1,030	0,954	1,221
Luhansk	0,514	0,892	1,377	0,905	0,830	1,190
Lviv	0,937	1,143	1,100	1,046	0,945	1,101
Mykolaiv	0,997	1,086	1,014	0,982	1,115	1,042
Odesa	0,928	0,977	1,053	1,113	0,814	1,178
Poltava	0,835	1,066	1,120	1,046	0,889	1,133
Rivne	0,989	0,930	0,863	1,054	0,884	0,848
Sumy	0,795	1,338	1,073	1,022	0,890	1,011
Ternopil	0,880	0,920	1,059	1,048	0,938	1,161
Kharkiv	0,894	0,973	1,150	0,942	0,965	1,071
Kherson	0,891	1,001	0,994	1,082	0,949	1,136
Khmelnysky	0,948	0,938	0,981	1,096	0,944	1,004
Cherkasy	0,901	0,913	1,077	1,028	1,079	1,086
Chernivtsi	0,896	0,969	1,017	1,010	0,933	0,979
Chernihiv	0,967	0,912	1,058	1,213	1,061	1,200
Kyiv city	0,744	0,994	0,683	1,282	0,736	0,954

Source: Own study.

As can be seen from Table 1, from 2013 to 2019 the greatest intensity of growth of the level of development of economic processes took place in 2017 and 2019. In 2019 the most intensive changes in economic processes took place in Volyn, Chernihiv, Odesa, Ternopil, Kyiv, Kherson, Poltava, Dnipropetrovsk, Lviv, Zakarpattia, Cherkasy, and Kharkiv regions. During 2019, the lowest value of the studied chain index was in the Rivne region.

To study the level of development of social processes, the values of chain and basic integrated rate indices by regions of Ukraine in 2013-2019 were similarly calculated. The data are presented in Table 2.

Table 2. Chain and base rates of growth of the level of social processes in the regions of Ukraine for 2014-2019

Name of the region	Chain integrated rate indices of development						Basic integrated tempo index (2019/2013)
	2014	2015	2016	2017	2018	2019	
Vinnitsia	1,006	1,015	1,004	1,011	1,027	1,028	1,100
Volyn	1,023	0,975	0,968	0,974	1,074	0,967	0,978
Dnipropetrovsk	0,997	1,003	0,995	0,997	1,033	1,011	1,043
Donetsk	0,667	0,429	0,447	0,457	0,402	0,385	0,346
Zhytomyr	0,995	0,983	0,995	1,007	1,011	0,997	0,987
Zakarpattia	0,988	1,002	1,023	0,981	1,028	0,995	1,016
Zaporizhia	0,972	0,976	0,981	1,036	1,042	1,005	1,009
Ivano-	1,016	1,006	1,003	1,020	1,028	0,985	1,073

Frankivsk							
Kyiv	1,009	0,979	0,995	1,009	1,029	1,035	1,053
Kirovograd	0,950	0,978	1,002	1,013	1,012	1,014	0,970
Luhansk	0,654	0,449	0,443	0,462	0,410	0,399	0,400
Lviv	0,983	0,971	0,998	1,031	0,997	1,007	0,990
Mykolaiv	0,958	0,981	1,003	1,003	1,004	0,999	0,948
Odesa	0,973	1,004	0,975	0,943	1,133	1,040	1,016
Poltava	0,966	0,983	1,001	1,000	1,020	1,030	1,000
Rivne	1,017	0,999	0,973	1,000	1,060	1,003	1,066
Sumy	1,002	1,005	1,009	1,017	1,040	1,016	1,100
Ternopil	0,989	0,986	1,023	0,986	1,028	0,992	1,010
Kharkiv	1,011	0,991	0,994	1,030	1,040	1,017	1,083
Kherson	1,008	1,003	0,991	1,003	1,009	1,019	1,034
Khmelnysky	0,978	0,964	1,010	0,987	1,043	0,999	0,981
Cherkasy	0,984	0,982	0,986	1,021	1,028	1,014	1,013
Chernivtsi	0,969	0,966	1,013	1,016	1,023	1,011	1,007
Chernihiv	0,984	0,967	0,994	1,006	1,010	1,011	0,978
Kyiv city	0,957	0,964	0,984	1,000	1,022	1,020	0,946

Source: Own study.

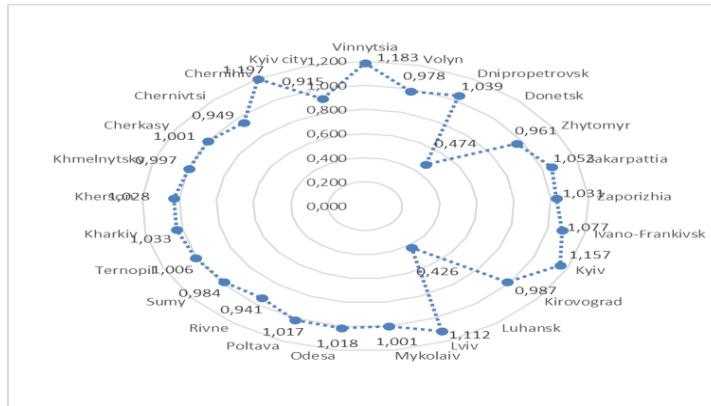
From 2013 to 2019, the value of the basic integrated rate index is in the range of 0.4-1.1, which is lower than the integrated rate indices of economic processes. The situation in Kyiv city and the Mykolaiv region has deteriorated the most during this time. The state of development of social processes during this period has improved in Vinnytsia and Sumy regions. As can be seen from Table 2, from 2013 to 2019, social processes improved most intensively in 2017-2018, i.e., a year later, compared to economic processes. The social situation in 2019 compared to other regions improved the most in Vinnytsia, Kirovograd, Mykolaiv, Poltava, Chernihiv regions, and in Kyiv city. Deterioration occurred in Ivano-Frankivsk and Volyn regions.

To assess socio-economic processes, the basic integrated rate index of development in 2019 was also calculated, compared to 2013 (Figure 2). Calculations showed that the lowest value of the indicator in Kyiv city, except for the Luhansk and Donetsk regions. The best situation is in Vinnytsia and Chernihiv regions. The situation has improved in Kyiv, Lviv, Ivano-Frankivsk, and Zakarpattia regions.

Examining the intensity of the level of development of socio-economic processes in the regions of Ukraine for 2013-2019 based on chain integrated rate indices, we see positive changes since 2016 (Table 3). At the end of 2016, the most intensively developed socio-economic processes in Kyiv city, Chernihiv, Khmelnytsky, Rivne, and Zaporizhia regions. In 2017, the intensity of development increased in Cherkasy, Vinnytsia, and Mykolaiv regions. In 2019, the baton of the intensity of development of socio-economic processes passed to Kirovograd, Odesa, Chernihiv,

Kyiv, Volyn, Poltava, Kherson, Ternopil, Ivano-Frankivsk, Dnipropetrovsk, Lviv, Cherkasy, Kharkiv, Zakarpattia regions (the order of regions is presented by the growth of the chain, tempo indices). Thus, during the study period, the intensity of development fluctuated, but in general, in 2019 there were positive changes in the development of socio-economic processes in all regions except Rivne.

Figure 2. Basic integrated rate index of development of socio-economic processes in 2019, compared to 2013



Source: Own study.

Table 3. Chain growth rates of the level of socio-economic processes in the regions of Ukraine for 2014-2019

Name of the region	Chain integrated rate indices of development					
	2014	2015	2016	2017	2018	2019
Vinnytsia	0,993	1,013	1,019	1,050	1,069	1,038
Volyn	1,013	0,989	0,955	0,986	0,991	1,078
Dnipropetrovsk	0,980	1,032	0,992	1,020	1,005	1,056
Donetsk	0,666	0,610	0,688	0,680	0,679	0,604
Zhytomyr	0,976	0,903	1,069	1,037	0,973	1,008
Zakarpattia	0,973	1,032	0,984	1,010	0,986	1,039
Zaporizhia	0,941	1,025	1,050	1,063	1,007	0,998
Ivano-Frankivsk	0,997	0,987	0,952	1,039	0,992	1,063
Kyiv	0,963	1,070	1,009	1,030	1,030	1,079
Kirovograd	0,945	0,934	1,044	1,020	0,987	1,102
Luhansk	0,592	0,627	0,793	0,640	0,579	0,700
Lviv	0,963	1,044	1,042	1,038	0,974	1,047
Mykolaiv	0,975	1,026	1,008	0,994	1,051	1,018
Odesa	0,953	0,992	1,009	1,015	0,988	1,099
Poltava	0,908	1,019	1,052	1,020	0,962	1,074
Rivne	1,005	0,968	0,925	1,023	0,982	0,934
Sumy	0,909	1,143	1,037	1,019	0,973	1,014
Ternopil	0,941	0,957	1,039	1,013	0,989	1,064
Kharkiv	0,959	0,983	1,060	0,991	1,007	1,040

Kherson	0,956	1,002	0,992	1,037	0,983	1,069
Khmelnysky	0,965	0,953	0,997	1,033	0,999	1,001
Cherkasy	0,947	0,952	1,025	1,024	1,050	1,045
Chernivtsi	0,937	0,968	1,015	1,013	0,983	0,997
Chernihiv	0,977	0,943	1,021	1,094	1,032	1,091
Kyiv city	0,861	0,977	0,847	1,118	0,892	0,991

Source: Own study.

4. Summary and Concluding Comments

The application of the selected research methods allowed us to achieve the goal of the study - to compare the intensity of social, economic, and socio-economic processes in the regions of Ukraine according to the list of proposed factors.

Selected factors, including incentives and disincentives, characterize various aspects of socio-economic processes, namely: economic efficiency of the region, investment, and innovation development, financial self-sufficiency, labor market efficiency, availability and quality of health and education services, social protection, and security. The selected list of factors, in our opinion, allows you to maximize the intensity of the studied processes. The number of indicators is minimized to optimize the calculation procedure itself.

The use of the methods considered in the article allowed to obtain more complete information about in which regions the socio-economic processes are faster and in which they are slower, to determine whether the condition of a particular region has improved or deteriorated over time.

The analysis makes it possible to develop a strategy for the development of regions, to determine the priorities and directions of distribution of public funds, the introduction of appropriate strategic measures by the regions to improve the level of development of socio-economic processes.

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