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RESEARCH PAPER

Efficiency of Decentralization as an Important Instrument of Ukraine's Socio-Economic Development

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ABSTRACT

The paper suggests methodological approaches to the complex evaluation of the efficiency of decentralization reform, which can be used for monitoring and adjusting decisions at any of its implementation stages. The suggested methodological approaches contribute to narrowing the results of the analysis of diverse phenomena and processes down to a single unified system of standardized parameters, thereby developing a single monitoring model and simplifying the decision-making process. The fact that the decentralization process has primarily 3 interrelated and interdependent directions is taken into account in forming the methodological approaches to evaluation of the ongoing reform efficiency. The indicators of analysis of the reform implementation efficiency across the organizational-administrative, budgetary, and socio-economic components are systematized in order to be used both for determining the average reform implementation paces in the country and comparing the respective structural changes. The set of mathematical tools to evaluate them is suggested. The efficiency of the decentralization reform implementation is comprehensively analyzed across Ukrainian regions. The major accomplishments and bottlenecks to be addressed at the current stage are determined. The comparative analysis of the efficiency of the decentralization reform implementation across Ukrainian regions has shown that, currently, there isn't any consistent relationship between the organizational, budgetary, and socio-economic results of the reform in the regions. The abovementioned processes remain to be unbalanced due to slow reform implementation in some regions, available unresolved controversies, some duplicated managerial functions, and lacking sufficient level of residents' confidence in authorities.

KEYWORDS: *Decentralization; Structural changes; Socio-economic efficiency; Organizational efficiency; Budget efficiency.*

1. Introduction

It is impossible to make and implement efficient decisions to boost economic growth and social development of a country without the available reliable and comprehensive information in the form that is the most appropriate for analysis and evaluation. Sufficiency and correspondence to the objective and goals of decisions, capacity to reflect direct and reverse links between the legal and executive authorities and consequences of decisions in regions and sectors are other important features of the relevant information.

Since the decentralization processes have only recently begun in Ukraine, the methodological approaches to evaluation of their introduction and implementation efficiency are lacking. Therefore, evaluating the efficiency of decentralization as a significant tool of Ukraine's socio-economic development is quite relevant and important.

Development of the instruments to evaluate the efficiency of transformation processes to improve

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their controllability towards securing the sustainable economic and social development of the country is one of the most important issues at the current stage of transformation of the national socio-economic system and managerial institutes under the impact of geopolitical changes, globalization processes, and implementation of decentralization reform.

The selection of methodological approaches in order to narrow the results of the analysis of diverse phenomena and processes down to a single unified system of standardized parameters, thereby developing a single monitoring model and simplifying the decision-making process, is an important stage of evaluation of socio-economic development level.

2. Literature Review

Many scientific studies address the features of the implementation of organizational, financial, and social aspects of the reform, as well as their legal, economic, and social evaluation. In particular, the complex analysis of decentralization processes at all managerial levels is considered from various angles. I. Hrytsyak defines the decentralization of public governance as an activity of the independent local governments due to transferring them the liabilities of the state, in particular as a process of expansion and strengthening of rights and liabilities of administrative-territorial units or lower authorities and organizations with simultaneous reduction of rights and liabilities of the respective center [1]. N. Nyzhnyk [2] argues that the process is a specific way to reproduce decentralization that is manifested in its opposite side. Decentralization is peculiar to public governance and is the phenomenon stipulated by objective and subjective factors that is a certain opposite side of centralization and kind of a way to reflect centralization. H. V. Oleksyuk et al. [3] consider the decentralization process from the viewpoint of research of main approaches to modeling of consolidated territorial communities' endogenous capacity and development of the planning scheme based on the elaborated general plans of settlements and inventory of resources and assets of territorial communities as one of the ways to carry out efficient planning and achieve strategic goals of the communities' development in conditions of decentralization. H. V. Voznyak et al. [4] research the process of financial decentralization and argue that financial decentralization reform aims to secure efficient use of budget funds and thus create proper financial conditions for local authorities to perform their liabilities and form their financial capacity. J. Boex and B. Edwards [5] examine the impact of decentralization in 25 countries worldwide and conclude that decentralization reservedly impacts the economic growth of states. They explain it by such factors as the inertia of local governments' decision-making, inefficient distribution of financial resources, and the growing impact of local elites on the process of reforms acceptance. B. Edwards, Y. Serdar and J. Boex [6] analyze the decentralization processes in Sierra-Leone and emphasize that after a long period of conflicts, the reforms have finally managed to partially strengthen the economy and democracy in the Republic. K. Patytska et al. [7] and I. Irtyshcheva et al. [8] examines the main ways to boost entrepreneurship environment in territorial communities in conditions of decentralization and emphasizes the main goals of the entrepreneurship environment boosting. V. Bondarenko et al. [9] outline the conceptual foundations of the growing capacity of territorial communities under the decentralization processes based on the efficient use of their endogenous capacity. M. Harytonchuk [10] characterizes decentralization as a gradual delegation of permanently growing share of liabilities to regional, urban, and rural authorities. K. Lynyov [11] and O. Ilyash et al. [12, 13] interprets decentralization as a process of transferring responsibility for planning, realization, and distribution of resources from central public authorities to lower public bodies and local governments. P. V. Zhuk [14] and Z. Siryk [15] and M. Stehnei et al. [16, 17, 18] suggests a range of directions to successfully finalize the administrative-territorial and budgetary-financial reforms in Ukraine. A. Matviyenko [19], I. Koshkalda et al. [20] and S. Zakharin et al. [21] interprets decentralization as multiple transfer of liabilities from public authorities to local governments and complex process. The theoretical-methodological approach to evaluating the structural changes based on the system of umbrella indicators is demonstrated by J. Stewart [22]. To evaluate efficiency, they use the DEA-analysis method, which is considered among the successful methods to evaluate the efficiency of companies' performance in general. The methodology of application of this method stipulates determining separately the productivity and efficiency of production for each economic entity [23]. Since most methodological approaches to efficiency evaluation are conducted on the micro level (economic entity),

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there is a need to develop the approaches for meso level (region, territory) in conditions of decentralization.

However, the lack of single criteria to carry out the complex evaluation of the efficiency of decentralization processes in Ukraine reduces the level of controllability of the reform implementation and makes the scientific research in the direction especially relevant.

In the research, we hypothesize that using some methodological approaches, it is possible to analyze the efficiency of the decentralization reform implementation in Ukraine, which can be used to make adjusting decisions at any stage of the reform implementation.

3. Materials and Methods

The fact that the decentralization process has primarily 3 interrelated and interdependent directions should be taken into account in forming the methodological approaches to evaluation of the ongoing reform efficiency. The directions are the following:

- Organizational-administrative, which provides the reorganization of the territories' management system based on their disintegration (consolidation) and redistribution of managerial responsibilities. The paces of territorial communities' consolidation and their acquiring of responsibilities according to the reform concept are the criteria of efficiency of organizational-administrative processes.
- Financial, which stipulates redistribution of budgetary flows towards the expansion of financial base for the organization of socio-economic development at regional and territorial levels. The expected criteria of the budget decentralization efficiency are the growing autonomy and self-sufficiency of regional and territorial budgets in the context of opportunities of funding the directions covered by them, the reduced subsidiarity level, and the improved investment activity.
- Socio-economic, which determines the impact of decentralization processes on the level of the regions' socio-economic development, the paces of economic growth, investment attractiveness, innovative activity, employment, and improvement of the living standards in the region as a result of upgraded decision-making system, improved business climate and expanded competences of local authorities.

Based on the mentioned directions, the following groups of parameters to evaluate the efficiency of decentralization processes are suggested:

1. Organizational-administrative efficiency:

1.1. Indices of structural changes regarding the consolidation of territorial communities in regions:

$$\mathrm{I}_{CTC}(\%) = S_{CTC}^{t_b} - S_{CTC}^{t_c} \quad (1)$$

I_{CTC} - Index of structural changes regarding the consolidation of territorial communities;

$S_{CTC}^{t_b}$ - Share of consolidated territorial communities in their perspective number in basic period;

$S_{CTC}^{t_c}$ - Share of consolidated territorial communities in their perspective number in the comparative period

1.2. Indices of structural changes regarding the increased number of population that belongs to a certain community:

$$\mathrm{I}_{P}(\%) = S_{P}^{t_b} - S_{P}^{t_c} \quad (2)$$

$S_{P}^{t_b}$ – Share of a region's population in the consolidated territorial communities in the basic year;

$S_{P}^{t_c}$ Share of a region's population in the consolidated territorial communities in the comparative year;

1.2. Indices of structural changes regarding the area of consolidated territorial communities:

$$\mathrm{I}_{A}(\%) = S_{A}^{t_b} - S_{A}^{t_c} \quad (3)$$

$S_{A}^{t_b}$ – Share of a region's area in the consolidated territorial communities in the basic year;

$S_{A}^{t_c}$ - Share of a region's area in the consolidated territorial communities in the comparative year.

The indices contribute to determining the paces of structural organizational-administrative changes in the regions in the context of the reform implementation.

2. Budget efficiency of the reform implementation constitutes, in the first place, the forming of financially capable communities and respective budgets able to not only guarantee the funding of social liabilities but also accumulate investment resources for the economic growth of the territories. The experts define the following indicators of budget efficiency in a region in the context of decentralization:

2.1. Coefficient of communities' income growth exceeding the index of transfers from state budget growth. The indicator shows the efficiency of economic development and the level of financial capacity of a region. It is calculated by the formula:

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$$K_{CF} = \frac{I_{CI}}{I_{BT}} \times 100 \quad (4)$$

where, K_{CF} – index of region's income growth compared to the central budget transfers;
I_{CI} – index of region's income growth;
I_{BT} - index of budget transfers growth.
The level of budget independence is achieved when $I_{BT} > 1$.
2.2. Index of local budgets' autonomy growth that characterizes structural changes in regional budgets in the context of the region's and attracted funds:

$$I_{BA}(\%) = S_R^{t_b} - S_R^{t_c} \quad (5)$$

where, I_{BA} - index of regional budgets' autonomy;
$S_R^{t_b}$ – Share of region's resources in budget revenues in the basic period;
$S_R^{t_c}$ - Share of region's resources in budget revenues in the comparative period.
2.3. Index of capital investment in regional development shows the ratio of the share of capital investment funded by local budgets and capital investment funded from state budget. It is calculated by the formula:

$$I_c = \left(\frac{S_{RI}}{S_{SI}}\right)^{t_b} - \left(\frac{S_{RI}}{S_{SI}}\right)^{t_c} \quad (6)$$

3. Socio-economic efficiency defines the impact of decentralization processes on the level of the region's socio-economic development, economic growth paces, investment attractiveness, innovative activity, employment, and on the improvement of living standards of the region's population.
It is worth mentioning that the level of socio-economic activity can be measured by a very broad spectrum of indicators, most of which are analyzed in annual Regional Development Reports. Under such conditions, the selection of the most relevant indicators to characterize the efficiency of structural changes in the socio-economic domain of the region is a hard task, which mainly depends on the research objectives.
In the context of the reform oriented at strategic development of a region, the following are, according to the author, the most generalizing indicators that characterize the growing level of business activity and improvement of the business climate and residents' social position:
3.1. Index of the growth of the GRP share in the country's GDP shows the comparative paces of a region's economic growth, %;
3.2. Index of the growth of the capital investment weight in the GRP characterizes the efficiency of investment capacity forming in condition of the reform, %;
3.3. Index of the growth of a region's share in the attracted foreign investment in Ukraine shows the condition of business climate, %;
3.4. Index of the growth of the share of profitable enterprises in a region indirectly shows the improving business climate in a region, %;
3.5. Index of the employment growth shows the paces of jobs increase in a region as one of criteria of efficient regional policy.
The Indices are suggested to be calculated similar to the previous groups of indicators by the formula of linear structural changes:

$$I_{CE_i} = \Delta S_i^b - \Delta S_i^c \quad (7)$$

Normalization of indicators and calculation of the complex efficiency indicators across socio-economic, organizational, and budgetary efficiency is an important stage of determining the efficiency of the decentralization processes that reveals the reform paces in each oblast against the best rate achieved within the sample. It is calculated by the formula:

$$N_{I_k} = \frac{I_k^i}{I_k^{max}} \quad (8)$$

where, N_{I_k} – normalized index by the k criterion;
I_k^i – index of the k criterion of the i region;
I_k^{max} – maximum value of the index of the k criterion within the sample.
It is also important to define the complex indicator of efficiency of the reform implementation in the regions. For calculation, the formula of simple weighted sum is suggested:

$$ED = \sum_{k=1}^{i} \left(N_{I_k} \times w_k\right) \times 100 \quad (9)$$

where, ED – the efficiency of the decentralization reform implementation;
w_k – weighting factor of the criterion in the complex indicator (determined by expertize).
The suggested mathematical apparatus is based on a combination of structural changes coefficients in the economic and social domains of the regions under the impact of decentralization processes with the rating approach. It contributes to not only determining the paces of changes and their efficiency but also to comparing the results of various regions and determining their strengths and bottlenecks. The

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selection of such an approach is explained by the fact that structural changes characterize the decentralization process and the relevant changes in socio-economic systems under their impact the most objectively.

It is worth mentioning that, according to the suggested methodological approaches, the normalized values and the complex indicator of socio-economic development of Ukrainian regions are calculated based on the data of the State Statistical Service of Ukraine, the Ministry of Finances of Ukraine, and the Ministry of Regional Development, Construction, and Housing.

4. Results and Discussion

The mentioned indices contribute to determining the paces of structural organizational-administrative changes in the regions in the course of the reform implementation. Since the decentralization reform started in 2014, 2015 is suggested as the reference year for comparison because the gradual reform implementation in the regions started only in 2015. Table 1 offers the reform implementation parameters across Ukrainian regions in 2015 and 2018.

Tab. 1. Relative indicators of organizational efficiency of the decentralization processes in Ukrainian regions

Indicators, %	Share of consolidated communities in their perspective number		Share of the region's population in consolidated territorial communities		Share of the region's area in consolidated territorial communities	
	2015	2018	2015	2018	2015	2018
Vinnytska	1.0	17.7	5	43	2	18.2
Volynska	5.4	53.9	6	35	12	55.6
Dnipropetrovska	13.9	55.5	10	18	13	58.5
Donetska	11.2	37.2	3	8	1.5	2.70
Zhytomyrska	11.5	65.0	15	67	17	67.3
Zakarpatska	2.0	5.9	0.5	6	1.2	5.10
Zaporizka	8.8	62.9	4.1	29	6.3	67.0
Ivano-Frankivska	2.8	26.6	1.2	28	1.3	26.6
Kyivska	1.3	16.4	0.8	22	0.9	18.9
Kirovohradska	1.5	14.9	0.1	15	0.3	20.4
Luhanska	10.9	48.9	2	8	2.5	32.5
Lvivska	8.7	23.1	9	13	7.2	22.3
Mykolayivska	1.6	45.4	3.5	26	10.1	49.5
Odeska	7.9	27.6	7.1	14	8.6	31.0
Poltavska	9.2	33.6	6.3	27	9.7	32.1
Rivnenska	5.0	31.0	5.9	26	6.3	32.9
Sumska	1.4	39.9	3.2	64	4.6	43.9
Ternopilska	25.4	45.9	12	50	16.7	48.8
Harkivska	0.0	17.2	0	12	0	20.9
Hersonska	1.3	35.2	0.8	28	2.4	34.0
Hmelnytska	28.8	57.5	14	44	16.3	59.2
Cherkaska	2.1	36.7	2.6	27	5.8	40.7
Chernivetska	13.6	43.5	9.8	38	11.7	46.2
Chernihivska	7.8	57.6	8.2	48	7.3	59.4

Source: calculated by the authors

The data in the Table shows different levels of decentralization processes intensity in Ukrainian regions. Hmelnytska oblast was the leader by the number of consolidated territorial communities in 2015, where 28% of all perspective communities covering 14% of the population and 16.3% of the area consolidated during the first year of the reform. Yet, in 2018, the region lost leading positions. Meanwhile, considering the relative indicators, the best results were achieved in Zaporizka oblast, where about 63% of communities covering 29% of the population and 67% of the area had been consolidated by the end of 2018. The lowest paces of territorial communities consolidation both in 2015 and in 2015-2018 were in Zakarpatska, Kyivska, and Harkivska oblasts.

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Considering the indices, they are suggested to be normalized to calculate the efficiency of the reform paces in each oblast against the highest value achieved within the sample by the following formula (8):

It is also important to calculate the complex parameter of organizational efficiency of the reform implementation in the regions. The formula of simple weighted sum is offered for its calculation (9):

Using the data in Table 1 and formulas 8-9, the complex parameter of organizational efficiency of the decentralization processes implementation in 2015-2018 across Ukrainian regions is calculated (Table 2).

Tab. 2. The complex parameter of organizational efficiency of the decentralization processes implementation in Ukrainian regions in 2015-2018

The country's regions	Structural changes indices			Normalized indices			Complex parameter of organizational efficiency*
	I_{CTC}	I_P	I_A	$N_{I_{CTC}}$	N_{I_P}	N_A	ED
Vinnytska	16.7	38.0	16.2	0.3	0.6	0.3	40.3
Volynska	48.5	29.0	43.6	0.9	0.5	0.7	77.1
Dnipropetrovska	41.6	8.0	45.5	0.8	0.1	0.7	57.8
Donetska	26.0	5.0	1.2	0.5	0.1	0.0	36.2
Zhytomyrska	53.5	52.0	50.3	1.0	0.9	0.8	94.9
Zakarpatska	3.9	5.5	3.9	0.1	0.1	0.1	7.8
Zaporizka	54.1	24.9	60.7	1.0	0.4	1.0	82.3
Ivano-Frankivska	23.8	26.8	25.3	0.4	0.4	0.4	44.1
Kyivska	15.1	21.2	18.0	0.3	0.3	0.3	30.0
Kirovohradska	13.4	14.9	20.1	0.2	0.2	0.3	24.7
Luhanska	38.0	6.0	30.0	0.7	0.1	0.5	52.2
Lvivska	14.4	4.0	15.1	0.3	0.1	0.2	20.7
Mykolayivska	43.8	22.5	39.4	0.8	0.4	0.6	67.8
Odeska	19.7	6.9	22.4	0.4	0.1	0.4	28.9
Poltavska	24.4	20.7	22.4	0.5	0.3	0.4	41.8
Rivnenska	26.0	20.1	26.6	0.5	0.3	0.4	43.6
Sumska	38.5	60.8	39.3	0.7	1.0	0.6	79.8
Ternopilska	20.5	38.0	32.1	0.4	0.6	0.5	45.3
Harkivska	17.2	12.0	20.9	0.3	0.2	0.3	28.2
Hersonska	33.9	27.2	31.6	0.6	0.4	0.5	57.3
Hmelnytska	28.8	30.0	42.9	0.5	0.5	0.7	52.0
Cherkaska	34.6	24.4	34.9	0.6	0.4	0.6	56.8
Chernivetska	29.9	28.2	34.5	0.6	0.5	0.6	52.6
Chernihivska	49.8	39.8	52.1	0.9	0.7	0.9	84.1

* – weighting factors to calculate the complex parameter were determined by expertize and they amount to:

$N_{I_{CTC}} = 0.4$; $N_{I_P} = 0.3$; $N_A = 0.3$

Source: *calculated by the authors*

Therefore, taking into account the complex efficiency parameter, the highest structural changes level in terms of the reform implementation (over 70%) is peculiar to Zhytomyrska, Chernihivska, Zaporizka, Volynska, and Sumska oblasts. The lowest rates (30%≤) are achieved by Zakarpatska, Lvivska, and Kyivska oblasts.

Table 3 shows the share of own revenues in the structure of regional budgets in 2015 and 2018, their Autonomy Growth Index calculated by the formula 7, and its normalized value (by the formula 8).

The results of calculations show that in 2015-2018, the share of own revenues in the structure of regional budgets increased in all oblasts, excluding Luhanska. The highest Autonomy Index growth paces were in Odeska oblast (12.7%), where the share of own revenues in 2018 was 54.76%. The highest level of oblast budget dependency on the central one (over 65%) was observed in the oblasts of the Western Region, namely in Ternopilska, Ivano-Frankivska, Rivnenska, Zakarpatska, and Volynska oblasts.

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Table 4 shows the share of regional capital investment to capital investment in the region from the state budget ratio, the Index calculated, and normalized indicators.

In 2018, the share of investment from the regional budget on average exceeded the share of capital investment directed to the regions from the state budget. It exceeded 1.05 p.p. in 11 oblasts, where the leading positions belong to Luhanska (2.50), Sumska (1.65), Vinnytska (1.55), and other oblasts. Compared to 2015, the number of oblasts with prevailing regional investment increased by 6, which indicates some positive results of the decentralization reform implementation.

Tab. 3. Calculation of the Regional Budget Autonomy Growth Index

Ukrainian regions	2015	2018	Autonomy Index, %	Normalized values, N_{BA}
Vinnytska	33.6	39.89	6.3	0.49
Volynska	27.8	34.67	6.9	0.54
Dnipropetrovska	50.1	53.58	3.5	0.28
Donetska	42.8	46.26	3.5	0.28
Zhytomyrska	31.0	36.42	5.5	0.43
Zakarpatska	24.6	32.89	8.3	0.66
Zaporizka	44.1	48.48	4.4	0.34
Ivano-Frankivska	26.3	29.84	3.6	0.28
Kyivska	45.1	52.77	7.6	0.60
Kirovohradska	34.4	40.43	6.1	0.48
Luhanska	39.9	39.37	-0.5	-0.04
Lvivska	34.8	41.48	6.7	0.53
Mykolayivska	36.4	43.54	7.1	0.56
Odeska	42.0	54.76	12.7	1.00
Poltavska	43.5	46.3	2.8	0.22
Rivnenska	25.8	31.08	5.3	0.42
Sumska	34.6	40.58	6.0	0.47
Ternopilska	25.7	28.68	2.9	0.23
Harkivska	42.7	48.36	5.7	0.45
Hersonska	32.4	38.57	6.2	0.49
Hmelnytska	31.7	36.01	4.3	0.34
Cherkaska	35.9	39.45	3.6	0.28
Chernivetska	27.2	30.47	3.3	0.26
Chernihivska	33.8	38.29	4.5	0.35

Source: calculated by the authors based on the data [24].

Tab. 4. Calculating the Index of the Capital Investment for Regional Development

Ukrainian regions	2015	2018	Ic	N_c
Vinnytska	0.3	1.55	1.25	0.94
Volynska	0.27	0.76	0.49	0.37
Dnipropetrovska	0.97	1.64	0.67	0.50
Donetska	1.29	1.28	-0.01	-0.01
Zhytomyrska	0.12	0.65	0.53	0.40
Zakarpatska	0.40	0.81	0.41	0.31
Zaporizka	0.70	0.46	-0.24	-0.18
Ivano-Frankivska	1.05	0.81	-0.24	-0.18
Kyivska	5.68	0.72	-4.96	-3.73
Kirovohradska	0.30	0.89	0.59	0.44
Luhanska	1.17	2.50	1.33	1.00
Lvivska	0.97	0.63	-0.34	-0.26
Mykolayivska	0.78	1.47	0.69	0.52
Odeska	1.10	0.60	-0.50	-0.38

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Poltavska	0.8	0.89	0.06	0.05
Rivnenska	0.4	0.76	0.40	0.30
Sumska	0.4	1.65	1.24	0.93
Ternopilska	0.2	1.10	0.91	0.68
Harkivska	0.7	0.94	0.27	0.20
Hersonska	0.2	1.26	1.02	0.77
Hmelnytska	0.7	1.05	0.32	0.24
Cherkaska	0.7	1.11	0.42	0.32
Chernivetska	0.5	0.79	0.27	0.20
Chernihivska	0.4	1.09	0.68	0.51

Source: developed by the authors based on the data [24].

Meanwhile, in some regions (Kyivska, Donetska, Zaporizka, Ivano-Frankivska, Lvivska, and Mykolayivska), the Capital Investment Structural Changes Index is of negative value. These rates testify to either additional resources directed to the region from the state budget in 2018 (in particular, road infrastructure development) or falling volumes of local development funds. The situation is different in each oblast, which shows the ambiguity and lack of unified financial decentralization methods equally efficient in different regions.

Following the logic of suggested methodological approaches, we calculate the complex parameter of structural changes efficiency in the financial-budgetary domain of the regions under the impact of decentralization processes by the formulas 4-5. Fig. 1 shows the calculation results.

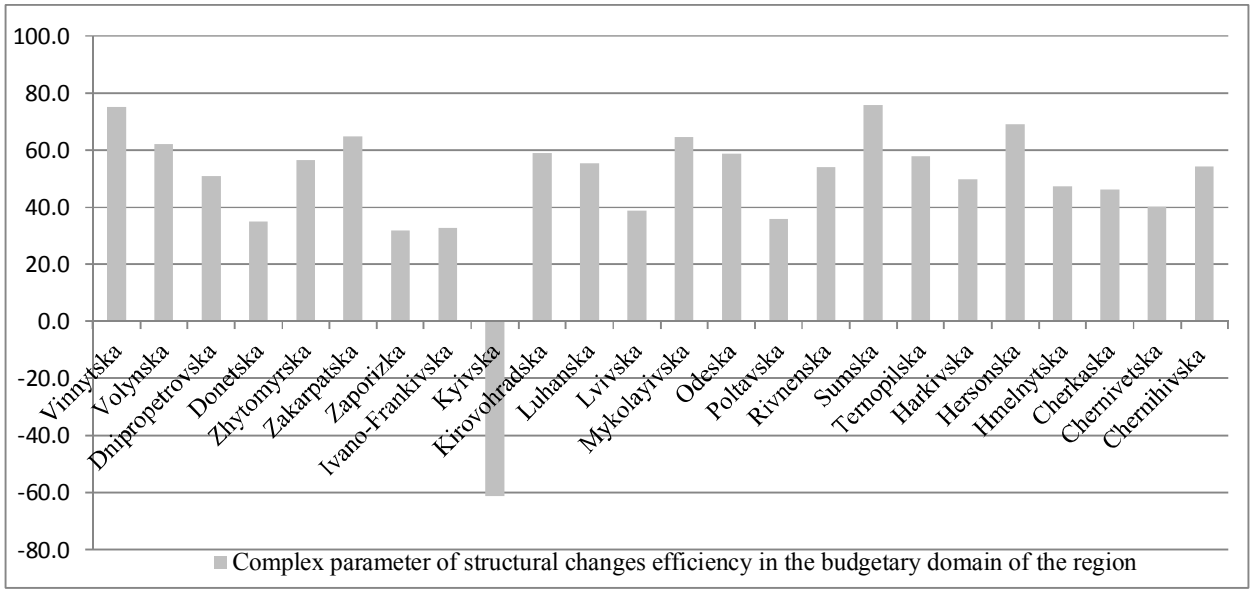

Fig. 1. Complex parameter of structural changes budget efficiency in 2015-2018 across Ukrainian regions, %

Source: Calculated by the authors based on the data in provided that the weighting factors to calculate the complex parameter were determined by expertize and amounted to: N_{FC} = 0.3; N_{BA} = 0.4; N_C = 0.3

The results of calculations show that Kyivska oblast demonstrates the negative rate in 2018 against 2015. The negative rate is caused, in the first place, by a significant fall in the share of capital investment from the regional budget at the background of growing capital investment in the region from the state budget. It can indicate not only low budget efficiency level but also the funding of large-scale public projects of national importance at the territory of the region. The comparative efficiency of structural changes in other regions ranges from 20 to 80%, which overall can indicate some growth of the regions' budget autonomy in the analyzed period and growing own development resources.

Based on the data and formula 9, the indices of structural changes in the socio-economic development of regions in 2015-2018 are calculated. Table 5 shows the results of the calculations.

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Tab. 5. Indices of structural changes in the socio-economic developemtn of Ukrainian regions in 2015-2018

Ukrainian egions	Index of the growing GRP share in the country's GDP, %	Index of the growing capital investment share in the country's GDP, %	Index of the growing share of the region in attracted foreign investment, %	Index of the growing share of profit-making companies in the region, %	Index of the growing share of employed, %
Vinnytska	0.1	6.76	0.05	0.2	0.3
Volynska	0.1	-2.75	0.09	1.3	-3.0
Dnipropetrovska	-0.3	7.17	-3.41	0.9	-1.7
Donetska	-0.2	8.99	-2.52	4.6	0.5
Zhytomyrska	0.2	3.70	0.04	1.2	4.2
Zakarpatska	-0.1	4.38	0.16	1.1	-1.0
Zaporizka	-0.1	3.31	0.68	0.5	1.9
Ivano-Frankivska	-0.2	-6.24	0.45	0.9	1.0
Kyivska	0.1	2.51	0.46	3.7	1.1
Kirovohradska	-0.1	2.99	0.04	-2.0	1.3
Luhanska	-0.2	1.99	-0.12	2.3	2.1
Lvivska	0.1	5.53	0.08	-0.8	2.0
Mykolayivska	-0.1	2.13	0.06	-1.1	0.4
Odeska	0.0	5.90	0.09	0.6	1.2
Poltavska	0.3	3.65	0.48	0.3	1.6
Rivnenska	-0.2	2.51	-0.21	-0.3	2.0
Sumska	-0.2	4.90	-0.11	-0.4	3.6
Ternopilska	0.1	6.19	0.00	5.2	2.0
Harkivska	0.0	3.56	-2.35	4.6	3.0
Hersonska	0.0	8.85	0.15	-1.4	2.8
Hmelnytska	0.0	1.08	0.05	0.0	3.4
Cherkaska	-0.1	6.36	-0.28	-0.4	2.3
Chernivetska	0.1	-2.06	-0.04	-1.7	3.2
Chernihivska	0.0	6.23	1.10	1.2	3.3

Source: calculated by the authors.

The analysis of the data in the table shows that substantial changes across parameters of regions' socio-economic development in 2015-2018 didn't occur, since the changes range within +/- 6%.

When examining the change of the GRP's share in Ukrainian GDP, it is worth specifying that the shares of some regions (Kyivska, Poltavska, Lvivska, Zhytomyrska, Vinnytska, and Volysnka oblasts) have increased at the background of falling shares of other oblasts, including Rivnenska, Sumska, Luhanska, Dnipropetrovska, Ivano-Frankivska, etc. Yet, the changes are insignificant, within 0.1-0.2%. The positions of other regions haven't changed.

In the period under research, the growing share of capital investment compared to the GRP was observed in most oblasts, excluding Chernivetska, Ivano-Frankivska, and Volynska oblasts. On average, the share of capital investment ranges within 12-20% and increased by 2-8% in 2018 against 2015. It shows the growing investment activity in the regions that creates preconditions for further economic growth.

It is worth mentioning that the analysis and monitoring of various aspects of the decentralization reform implementation and socio-economic development level of Ukrainian regions are carried out by national ministries and agencies, departments of the State Statistical Service of Ukraine, scientific institutions and organizations. Moreover, insufficient attention is paid to the complex analysis to define and compare organizational, financial, and social results of the reform at various implementation stages. Therefore, the suggested methodological approach to the evaluation of the reform efficiency is based on the combination of structural changes methodology and integral analysis (Table 6).

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Tab. 6. Indicators of analysis of the efficiency of forming of CTCs' natural resources capacity in Ukraine

Ukrainian regions	Index of the growth of the GRP share in the country's GDP	Index of the growth of the capital investment weight in the GRP	Index of the growth of a region's share in the attracted foreign investment	Index of the growth of the share of profitable enterprises in a region	Index of the employment growth	Complex indicator of socio-economic development
Vinnytska	0.3	0.8	0.0	0.0	0.1	24.8
Volynska	0.3	-0.3	0.1	0.3	-0.7	-7.1
Dnipropetrovska	-1.0	0.8	-3.1	0.2	-0.4	-70.7
Donetska	-0.7	1.0	-2.3	0.9	0.1	-19.1
Zhytomyrska	0.7	0.4	0.0	0.2	1.0	46.9
Zakarpatska	-0.3	0.5	0.1	0.2	-0.2	5.5
Zaporizka	-0.3	0.4	0.6	0.1	0.5	24.0
Ivano-Frankivska	-0.7	-0.7	0.4	0.2	0.2	-10.8
Kyivska	0.3	0.3	0.4	0.7	0.3	40.1
Kirovohradska	-0.3	0.3	0.0	-0.4	0.3	-0.8
Luhanska	-0.7	0.2	-0.1	0.4	0.5	7.8
Lvivska	0.3	0.6	0.1	-0.2	0.5	26.9
Mykolayivska	-0.3	0.2	0.1	-0.2	0.1	-3.2
Odeska	0.0	0.7	0.1	0.1	0.3	22.8
Poltavska	1.0	0.4	0.4	0.1	0.4	45.6
Rivnenska	-0.7	0.3	-0.2	-0.1	0.5	-3.2
Sumska	-0.7	0.5	-0.1	-0.1	0.9	11.2
Ternopilska	0.3	0.7	0.0	1.0	0.5	50.0
Harkivska	0.0	0.4	-2.1	0.9	0.7	-2.8
Hersonska	0.0	1.0	0.1	-0.3	0.7	30.4
Hmelnytska	0.0	0.1	0.0	0.0	0.8	19.5
Cherkaska	-0.3	0.7	-0.3	-0.1	0.5	11.8
Chernivetska	0.3	-0.2	0.0	-0.3	0.8	10.1
Chernihivska	0.0	0.7	1.0	0.2	0.8	54.2

Source: Calculated by the author with weighting factors for complex indicator selected by expertize amounting to 0.2.

The results of calculations show that Chernihivska (54.2%), Ternopilska (46.9%), Poltavska (45.6%), and Hersonska oblasts have achieved the best results in the complex structural changes in socio-economic development. The negative comparative dynamics are observed in Dnipropetrovska (-70%), Donetska (-19%), Ivano-Frankivska (-10%), and Volynska oblasts.

While comparing the results of evaluation of organizational, budgetary, and socio-economic efficiency of regions' development in 2015-2018 in conditions of the reform (see Fig.2), it is worth mentioning the lack of close relationship between these processes.

The conducted research on the decentralization reform in the European countries shows that there aren't positive decentralization effects in the short-term period. Moreover, certain negative effects are possible in the transitional period that lasts from 5 to 7 years, like crises, conflicts, and temporary economic stagnations, etc.

Since the parameters of the determined structural changes indicators are changeable, it is not reasonable to use the sensitivity analysis. The sensitivity analysis technique provides for the change of selected parameters in certain limits, provided that other parameters remain unchanged.

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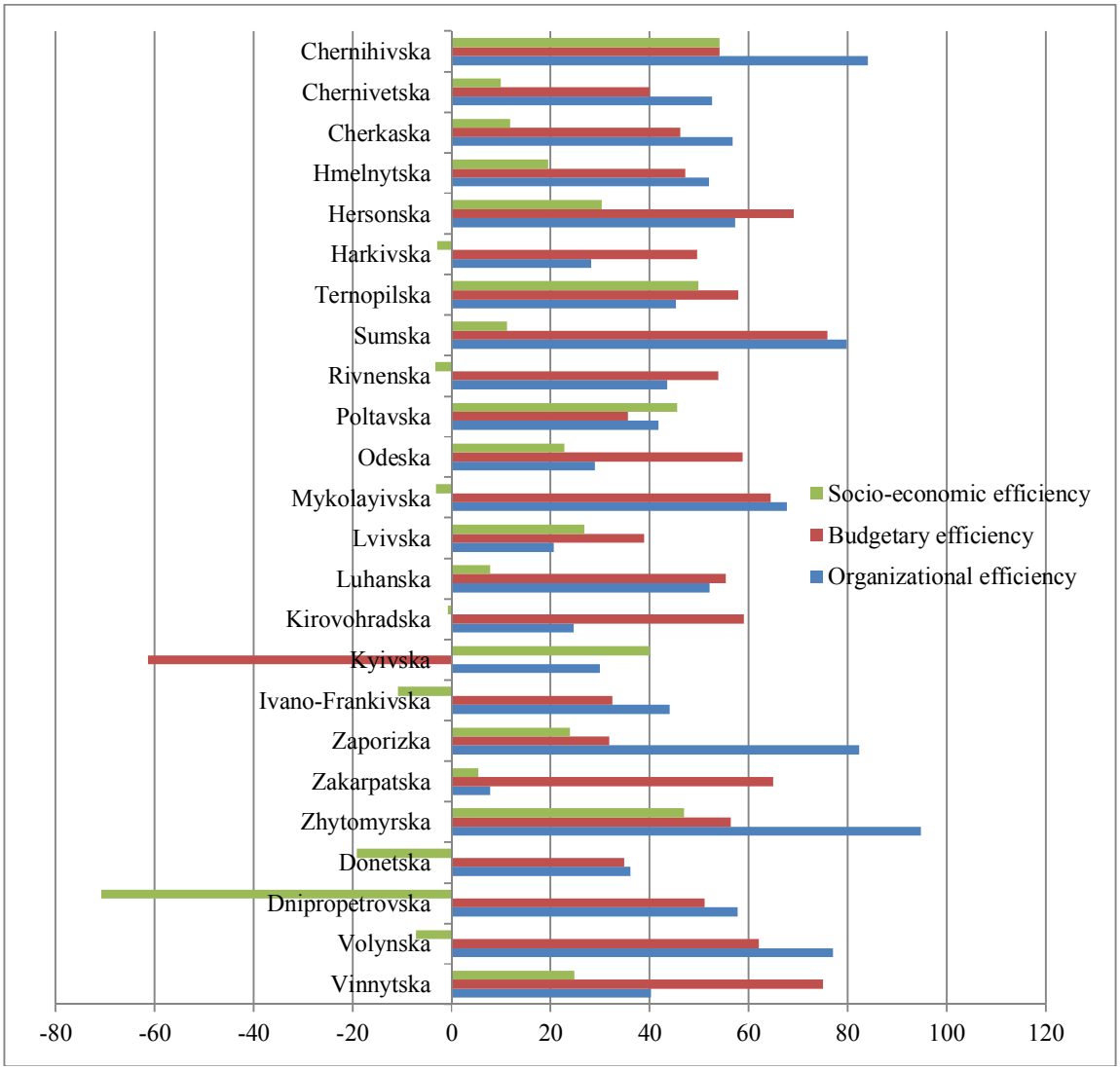

Fig. 2. Complex comparative indicators of structural changes efficiency under the decentralization reform in 2015-2019

Source: calculated by the authors [24].

Traditional approaches to monitoring of socio-economic development used in reporting of authorities and the Cabinet of Ministers are based on nominal statistical data, which do not take into account the change in the exchange rate. Such calculations show that the Ukrainian economy is growing by most parameters, which is seen as a positive phenomenon that is in the core of prognoses and decision-making. However, in our opinion, the objective monitoring system, unlike the one used nowadays, should contain the inflation component, while the main macroeconomic indicators should be calculated per capita. In such a way, the conclusions and prognoses of the economic development level are much more reliable, and the relevant indicators are compared both in dynamics and at various aggregation levels (country, region, territorial community). Moreover, the monitoring should be based not only on the indicators in dynamics but efficient management of economic processes, which is displayed in certain regulatory (target) indicators defined in respective planning documents.

Analysis of the previous research shows the following flaws of the traditional socio-economic development monitoring system used in Ukraine:

1) lack (but for few macroeconomic indicators) of the target-oriented basis (objectives tree) to determine the level of socio-economic development in the context of efficient public and regional management;

2) calculation of the dynamics of economic processes without the inflation index or the national currency rate, which hinders the

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objective conclusions on the economic growth level;

3) incomparability of social and economic development indicators due to the use of different units of measurement;

4) lack of efficiency mechanisms of decision-making in case of substantial deviations of socio-economic development form the planned trends based on consideration of the relationship between socio-economic processes and phenomena.

It is obvious that there is a need to develop and use the methodological approaches that would help to define the integral picture of socio-economic development and the trend vectors and misbalances of securing the social and economic results at the evaluation moment.

To overcome these flaws, we suggest improving the methodological approaches to evaluation of the efficiency of structural changes in the socio-economic development of regions under decentralization that is based on determining comparative integral evaluations of the organizational-administrative, budgetary, and socio-economic components. It is important to use dynamic coefficients of the socio-economic development of the national economic system at various territorial levels rather than the discrete ones.

5. Conclusions

In the context of addressing the controversial issues, the authors suggest improving the methodological approaches to evaluation of the reform efficiency based on the combination of structural changes and integral analysis methodologies. The suggested mathematical apparatus is based on a combination of structural changes coefficients in the economic and social domains of the regions under the impact of decentralization processes with the rating approach. It contributes to not only determining the paces of changes and their efficiency but also to comparing the results of various regions and determining their strengths and bottlenecks. The selection of such an approach is explained by the fact that structural changes characterize the decentralization process and the relevant changes in socio-economic systems under their impact the most objectively.

According to the suggested methodological approaches, the normalized values and the complex indicator of socio-economic development of Ukrainian regions are calculated based on the data of the State Statistical Service of Ukraine, the Ministry of Finances of Ukraine, and the Ministry of Regional Development, Construction, and Housing.

The results of calculations show that Chernihivska, Ternopilska, Poltavska, and Hersonska oblasts have achieved the best results in the complex structural changes in socio-economic development from the viewpoint of structural changes efficiency in the regions' socio-economic development. The negative comparative dynamics are observed in Dnipropetrovska, Donetska, Ivano-Frankivska, and Volynska oblasts.

The methodological approaches to the complex estimation of the decentralization reform suggested in the paper can be used for monitoring and making of adjusting decisions at any of its implementation stages. The complex analysis provides the evaluation of structural changes across 3 components that systemically characterize the achievement of main reform goals in the regions, namely organizational-administrative (reforming of the territorial-administrative structure and optimization of regional management), budgetary (forming of independent balanced regional development budgets), and socio-economic (economic development maintenance, economic growth in a region, and improved residents' wellbeing).

The calculations represented in Tables 1-6 and graphic materials in Figures 1 and 2 show that the evaluation of organizational, budgetary, and socio-economic efficiency of regional development in the period under research in the ongoing reform reveals the absence of a close relationship between these processes.

The comparative analysis of the efficiency of the decentralization reform implementation across Ukrainian regions has shown that, currently, there isn't any consistent relationship between the organizational, budgetary, and socio-economic results of the reform in the regions. The abovementioned processes remain to be unbalanced due to slow reform implementation in some regions, available unresolved controversies, some duplicated managerial functions, and lacking sufficient level of residents' confidence in authorities.

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