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RESEARCH PAPER

Assessment of Efficiency of the Use of Natural Resources Capacity by Territorial Communities in Conditions of Administrative-Territorial Reform in Ukraine

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ABSTRACT
The problems of efficient use of natural resources capacity in conditions of administrative and territorial reform affect the local level in the first place, in particular due to the fact that most communities do not have information about what resources they possess and how to use them properly for the development of Consolidated Territorial Communities (CTCs). The paper provides the calculations of integral index of CTCs' natural resources capacity, which includes a certain group of sub-indices, namely the budget efficiency of the use of natural resources capacity; concentration of natural resources; provision of population with resources; rent payment. The analysis of the use of natural resources capacity to fill a CTC's budget is conducted; concentration of natural resources at a CTC's territory is determined; provision of a CTC's population with natural resources is calculated; main aspects of rent payment that provides most revenues to local budgets are researched; the reserves of increase of communities' natural resources capacity are revealed. The fact that community residents' participation in control of the use of natural resources at their territory is essential for the community's development is established.

KEYWORDS: *Administrative and territorial reform; Budget; Authorities' decentralization; Consolidated territorial communities; Natural resources capacity; Rent.*

1. Introduction

Ukrainian territory has unique natural resources that can constitute the foundation for securing of sustainable development of consolidated territorial communities (CTCs) in conditions of administrative-territorial reform. Currently the extensive type of economy development is preserved in the country, leading to irrational use of natural resources both at local and regional as well as national levels caused by certain scientific-technical and technological retardation. It contributed to growing anthropogenic and man-made load on natural resources capacity. In such conditions there is a need to solve a range of tasks related to forming and development of CTCs, contributing to optimization of nature management and improvement of environmental condition at local level.

2. Literature Review

The issue of the nature of forming and proper use of natural resources capacity has gained broad research in modern economic literature. Thus, the issue of the use of natural resources capacity and evaluation of losses from environmental pollution were examined by A. Davydova [1], L. Emerton [2], I. Kvashyn [3], O. Sukhina [4], L. Mayer [5]; Yu. Maksymiv [6], G. Meng [7], Y. Razovskyi [8], I. Koshkalda [9].

More specific characteristics of the natural resources capacity are outlined by P. Zhuk, who argues that natural resources capacity is an ability of natural resources to meet the needs of the process of production of financial, cultural and spiritual benefits in the form of goods and services to secure human living activity and growth of their welfare [10]. L. Shevchuk, V.

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Pavlov and S. Lukin consider natural resources capacity as factors of location and development of productive forces and define them as a set of reserves of all natural components (mineral resources, raw materials, water, land, forests and climate resources, etc.) at a certain territory in a certain period of time [11], [12]. Y. Dmytrievskyi deems that natural resources capacity is a set of natural resources at a territory available for the use at a certain level of technology development and economic relations [13]. B. Danylyshyn et al. define the natural resources capacity as a set of natural resources and natural conditions in certain geographic boundaries that contributes to the meeting of economic, ecological, social, cultural-recreational and aesthetic needs [14].

The detailed analysis of condition of methodological maintenance of natural resources capacity evaluation and evaluation of losses from environmental pollution based on ecosystem approach is conducted in the works of O. Balatsky [15], I. Kramarenko [16], A. Yakymchuk [17], V. Boldyrev [18]; V. Yakubiv [19].

However, most of research concerns large territories, i.e. a region or a country in general. We aim to research the structure of CTCs' natural resources based on suggested methodics and to determine its hidden reserves.

3. Materials and Methods

Analysis of natural resources capacity aims to detect and natural resources capacity of CTCs as well as to form directions and activities of its increase.

In order to achieve the objective, the following tasks have to be accomplished:

1) to conduct analysis of the use of natural resources capacity to fill a CTC's budget;

2) to determine the density of natural resources at the CTC's territory;

3) to calculate the provision of the CTC's population with natural resources;

4) to examine the major aspects of rent payment as main revenue to local budgets;

5) to reveal the reserves of the increase of the CTC's natural resources capacity.

Efficiency of forming of CTCs' natural resources capacity can be analyzed by assessment of the range of indicators that form certain groups of sub-indices: budget efficiency of the use of natural resources capacity; budget efficiency of the use of natural resources capacity by rent payments; territorial concentration of raw materials and mineral resources; provision of population with land resources (Table 1).

Each of sub-indices consists of the range of indicators that together contribute to detecting of certain problems or revealing the reserves of increase of natural resources capacity of the CTCs.

Thus, sub-index of budget efficiency of the use of natural resources capacity is calculated by normative-monetary assessment of each type of lands under research, land fee rate and availability of lands of various purposes. The sub-index shows the efficiency of the use of natural resources capacity by each CTC and provides opportunities to define future perspectives to fill budgets by including the data on land fee established at the territory of the CTC, %.

The concept of forming of the sources of differential rent is applied grounded on the range of methodics of application of sub-index of budget efficiency of the use of natural resources capacity based on rent approach. Therefore, depending on quantitative and qualitative features, the resources of one type bring different income (differential rent) per unit of costs. Current methodical approaches stipulate its calculation according to the principle of marginal cost a society or an owner (producer) is ready to bear in order to obtain a unit of production using the given nature resource, when further growth of costs becomes inefficient.

Tab. 1. Indicators of analysis of the efficiency of forming of CTCs' natural resources capacity in Ukraine

№	Components of natural resources capacity	Nature of indicator's impact
1	Budget efficiency of the use of natural resources capacity	
1.1	Agricultural lands, ha	Stimulator
1.2	Lands for residential and public construction, ha	Stimulator
1.3	Forestry lands, ha	Stimulator
1.4	Land fee rates established at the CTC's territory, %	Stimulator
1.5	Normative-monetary assessment of residential construction (UAH*, sq.m.)	Stimulator

1.6	Normative-monetary assessment of agricultural lands (UAH, ha)	Stimulator
1.7	Normative-monetary assessment of forestry lands (UAH, ha)	Stimulator
2	Budget efficiency of the use of natural resources capacity by rent payments	
2.1	Rent payment for the special use of forest resources, UAH	Stimulator
2.2	Rent payment for the use of subsurface deposits, UAH	Stimulator
2.3	Rent payment for the use of subsurface deposits to extract oil, UAH	Stimulator
2.4	Rent payment for the use of subsurface deposits to extract natural gas, UAH	Stimulator
2.5	Rent payment for the use of subsurface deposits to extract gas condensate, UAH	Stimulator
2.6	Rent payment for the use of subsurface deposits to extract amber, UAH	Stimulator
2.7	Rent payment for special use of water, UAH	Stimulator
3	Territorial concentration of raw materials and mineral resources	
3.1	Oil reserves at the territory of the community, mln t./km^2	Stimulator
3.2	Gas reserves at the territory of the community, mln m^3/km^2	Stimulator
3.3	Wood reserves at the territory of the community, thous. m^3/km^2	Stimulator
3.4	Peat reserves at the territory of the community, mln m^3/km^2	Stimulator
3.5	Construction sands reserves at the territory of the community, mln m^3/km^2	Stimulator
3.6	White and grey clay reserves at the territory of the community, mln m^3/km^2	Stimulator
3.7	Crushed stones reserves at the territory of the community, mln t./km^2	Stimulator
4	Provision of population with land resources	
4.1	Level of provision with agricultural lands per capita, ha	Stimulator
4.2	Level of provision with lands for residential and public construction per capita, ha	Stimulator
4.3	Level of provision with forestry lands per capita, ha	Stimulator
4.4	Level of provision with lands for industry, transport, communication, energy, defense and other designation per capita, ha	Stimulator
4.5	Level of provision with water lands per capita, ha	Stimulator
4.6	Level of provision with recreational lands per capita, ha	Stimulator
4.7	Level of provision with other types of land per capita, ha	Stimulator

* national currency of Ukraine, Ukrainian hryvnya
Source: authors development.

In our methodics we consider the sub-index as one of main sources to fill local budgets of CTCs that have the reserves of raw materials and mineral resources at their territories and can fill budgets in case of their skillful use.

In order to analyze the density of natural resources or territorial concentration of raw materials and mineral resources of CTCs, available indicators can be used in the formula:

$$K = \frac{S_r}{S_R},$$

where: K – density coefficient; S_r – type of resources; S_R – area of a CTC.

It is worth mentioning that density coefficient shows natural type of the CTC's territory. The closer the value of the coefficient is to 1, the higher is the concentration of a certain type of resources at the territory of the CTC.

The next no less important indicator of calculation of CTCs' natural resources capacity is determining of provision with resources, which helps detecting available natural resources the CTC possesses in a certain time period calculated per capita according to formula:

$$P_{nt} = \frac{W}{V},$$

where: P – provision with resources; n – type of resources; t – years; W – reserves; N – population.

The comparison can be calculated across the values of each type of natural resources per capita in the CTC, which shows the level of self-provision of the CTC with a certain resource. It also helps forming the correct policy of resources management with outlining of priorities of the use of internal reserves or support of the policy of own capacity increase.

Therefore, the use of the methodics of analysis of CTCs' natural resources capacity forms the complex research of natural resources of communities and also provides an opportunity to

suggest activities and directions to increase the natural resources capacity.

4. Results and Discussion

There is a socially justified limit of expenditures for growing resources of production received in the course of exploitation of land, water, forest or other raw materials and mineral resources in conditions of administrative-territorial reform in Ukraine. It is obvious that establishment of ceiling values of expenditures for each type of resources or consumption of respective products in the CTCs and their production would contribute to substantial simplification of economic grounding of technical and production-organizational activities regarding the increase of the volumes of production and capitalization of natural resources through selection of optimal parameters of exploitation of land, forest, water, raw materials and mineral resources 0.

Natural resources capacity of a CTC is a set of natural resources and natural conditions within certain geographic networks that secure meeting of economic, ecological, social, cultural, health improving and aesthetic needs of population at this territory. Therefore, analysis of efficient use of endogenous natural resources capacity of each community gives the CTCs the understanding of their opportunities for their further use, preservation and increase.

The endogenous natural resources capacity of CTCs is assessed using the suggested methodics with calculation of integral index of a CTC's natural resources capacity. The integral index is also analyzed across the range of indictors that form certain groups of sub-indices: budget efficiency of the use of natural resources capacity; budget efficiency of the use of natural resources capacity by rent payments; territorial concentration of raw materials and mineral resources; provision of population with land resources.

Figure 1 shows the integral index of natural resources capacity among the CTCs with the volumes of own income per capita within UAH 1000-4000. The highest average rate of integral index of provision with natural resources in 2018 was recorded in communities with risky and acceptable subsidiarity – 0.107. Namely, the index value was above average in Oleksandriyivska, Novoushytska, Povorska, Kytaihorodska, Holobska, Ustyluzka and Vysotska communities, which is caused by the range of factors, including high budget efficiency of the use of natural resources capacity by the communities and high provision per capita with land resources.

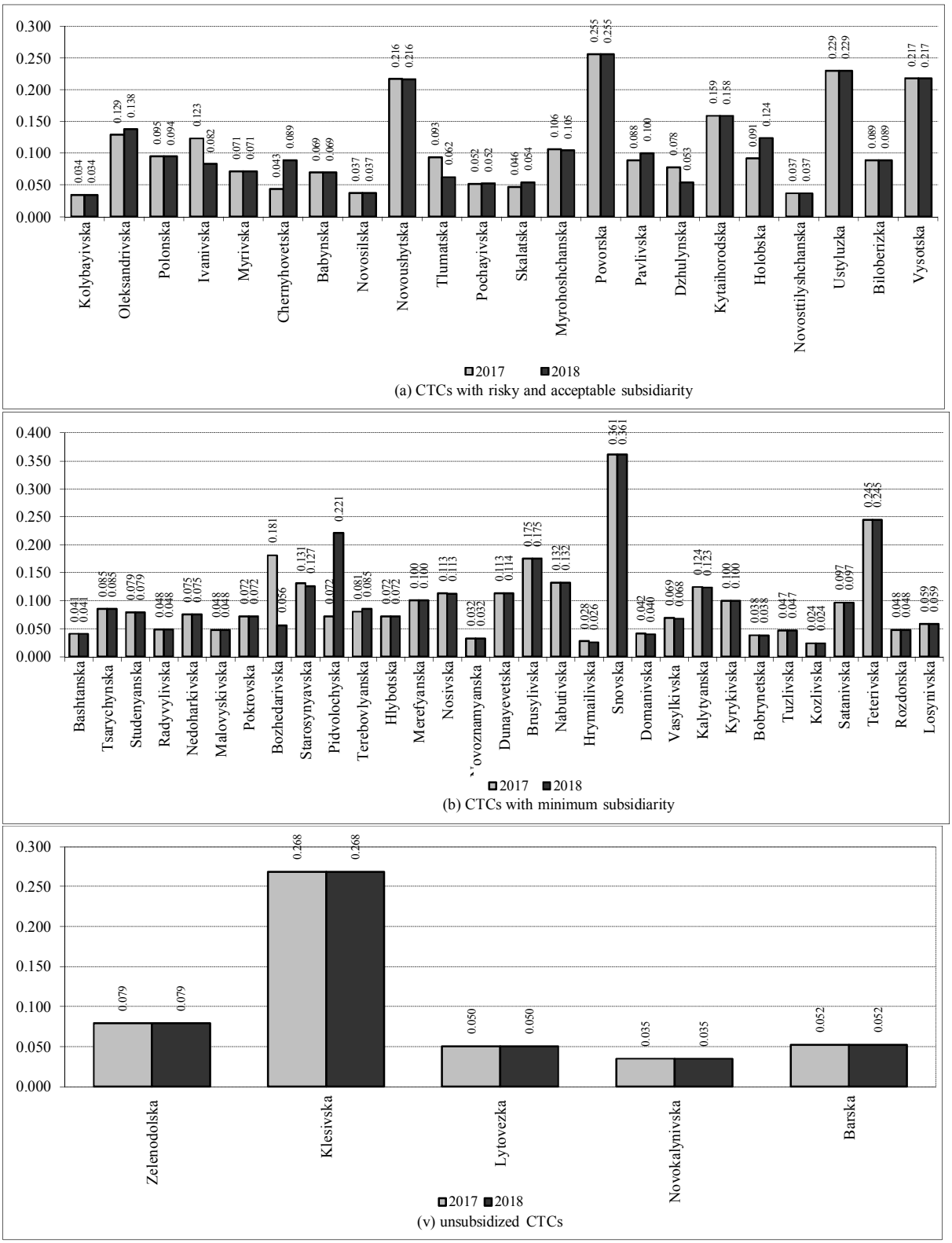

Fig. 1. Integral index of natural resources capacity of CTCs with own income per capita within UAH 1000-4000

Source: calculated and developed based on responses to public inquires of representatives of respective CTCs.

The highest value of index of provision with natural resources among the CTCs with minimum subsidiarity was recorded in Snovska, Pidvolochyska and Teterivska communities. It is

worth mentioning that average rate for this group of CTCs in 2018 amounted to 0.095, testifying to the fact that the index value in leading communities is twice and even three times above average. While in Snovska and Teterivska CTCs the index value is caused by such high sub-indices as budget efficiency of the use of natural resources capacity and budget efficiency of the use of natural resources capacity by rent payments, in Pidvolochyska CTC – by high sub-indices of territorial concentration of raw materials and mineral resources and provision of population with land resources. The highest integral index value in unsubsidized CTCs with own incomes per capita within UAH 1000-4000 was in Klesivska CTC, which is 0.171 points above average. It is worth mentioning that Klesivska community has the highest values in its group of communities across all sub-indices under research, which have formed its place in the rankings. We should note that the two-year period of analysis in case that longer research is impossible is not sufficient to comprehensively show the changes in the dynamics of the use of CTCs' natural resources capacity. However, the period shows the current condition of development and use of the capacity by a community.

Groups of CTCs shown in Figure 2 represent the value of integral index of natural resources capacity among the CTCs with own budget income per capita within UAH 4000-7000.

As we can see, Shyryaivska and Omelnytska CTCs are the leaders among those with minimum subsidiarity. Large area of the community is the factor that contributed to growing integral index in Shyryaivska community, subsequently improving the budget efficiency of the use of natural resources capacity, where the sub-index value amounted to 0.483. Instead, in Omelnytska community, which is among the five territories with the smallest area, integral index grew due to other sub-index, namely the sub-index of territorial concentration of raw materials and mineral resources, which amounted to 0.834.

The level of integral index in unsubsidized communities of the group of CTCs with own income per capita within UAH 4000-7000 in average is the same in most communities. Only Kiptivska CTC has the highest value of integral index of natural resources capacity – 0.244 formed due to sub-index of provision of population with land resources. Kiptivska community belongs to large communities by its area (29475,90 ha), although it is one of the smallest by population (3278 persons), therefore, these two factors caused the value level.

Analysis of the abovementioned sub-indices for Vesnyanska community with the lowest value of integral index shows that it has the lowest values both by budget efficiency of the use of natural resources capacity and by budget efficiency of the use of natural resources capacity by rent payments.

Area of CTCs plays an important role in assessment of their natural resources capacity, therefore, we analyze two sub-indices, namely of budget efficiency of the use of natural resources capacity and of budget efficiency of the use of natural resources capacity by rent payments across ten communities with the smallest areas and ten communities with the largest (Figure 3).

The figure shows that Vesnyanska CTC has the lowest value among the communities with the smallest area. It is caused by the fact that the CTC has small reserves of raw materials and mineral resources as well as insignificant land area to secure the budget efficiency of the use of natural resources capacity. Sub-index of budget efficiency of the use of natural resources capacity shows the efficiency of its use by each CTC and provides an opportunity to outline further perspectives of filling the budgets by inclusion of the land fee rate at a CTC's area, therefore such a low result is reasonable, because this group of CTCs has the lowest level of provision with land resources.

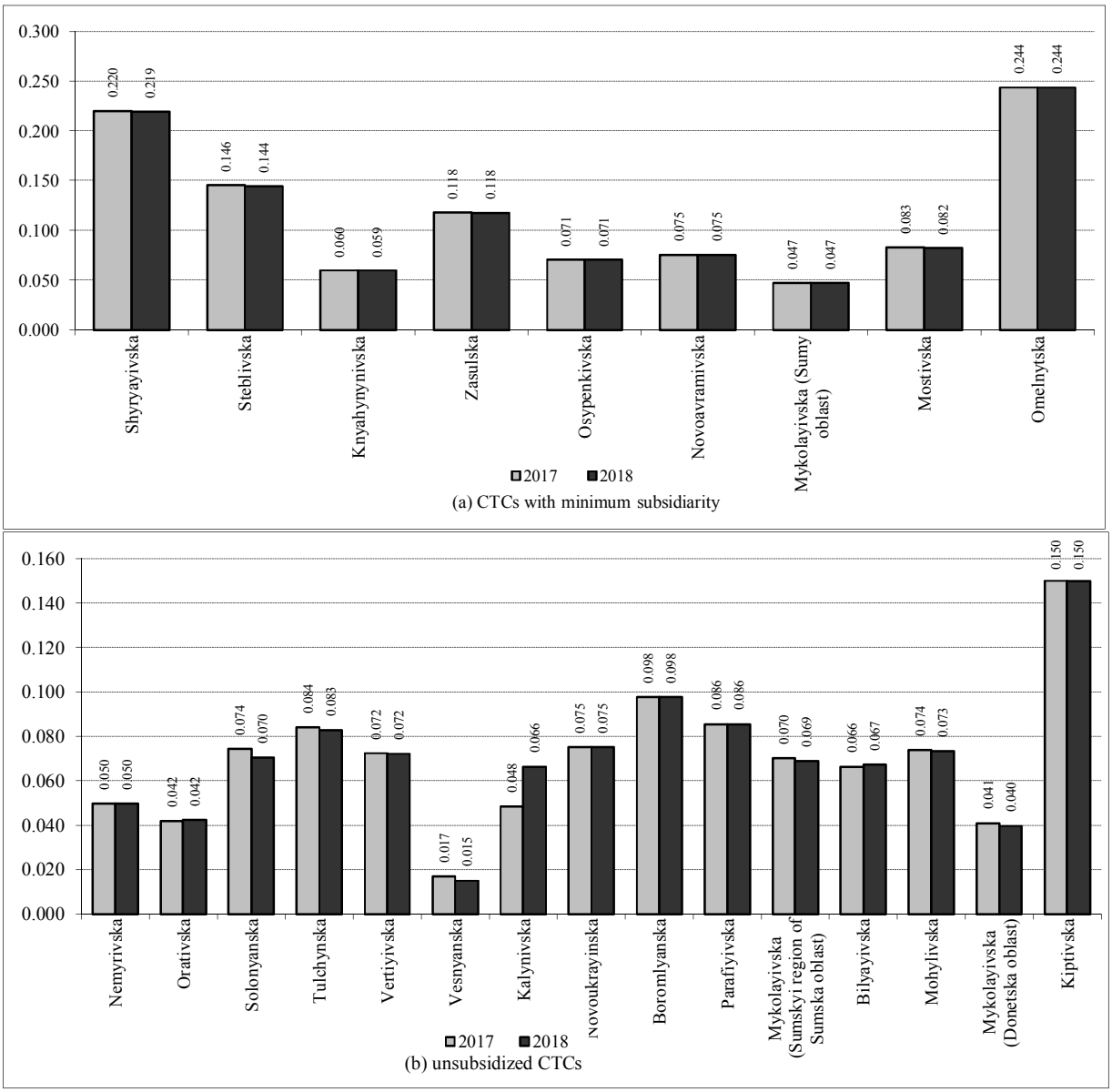

Fig. 2. Integral index of natural resources capacity of CTCs with own income per capita within UAH 4000-7000

Source: calculated and developed based on responses to public inquires of representatives of respective CTCs

Meanwhile, the value of sub-index of budget efficiency of the use of natural resources capacity by rent payments depends on the deposits of raw materials and mineral resources on the communities' territories. The highest value of this sub-index is observed for 2918 in Chernyhovetska CTC due to high rent for the use of deposits to develop minerals of local importance. The level of this sub-index in all other communities of the group directly depends on their provision with forest resources, because the rent for the special use of forest resources is payed to the communities' budgets.

Opposite situation is in the group of communities that belong to the communities with the largest area. Substantially high level of sub-index of budget efficiency of the use of natural resources capacity that directly depends on a CTC's area is observed across all the communities under research. The larger is a CTC's area, the larger will the sub-index value potentially be. However, we should emphasize that normative monetary land assessment is another important component of the sub-index. Therefore, it is important for what purposes can the land at a CTC's territory be used.

Regarding the second sub-index, it is the highest in Brusylivska and Snovska CTCs. It is worth mentioning that these two CTCs belong to forested regions, namely Brusylivska CTC – to Zhytomyrska oblast and Snovska CTC – Chernihivska oblast, which is the reason, why the sub-index is high, i.e. due to substantial provision with forest resources and subsequent filling of local budgets of the communities by crging the rent payments for special use of forest resources.

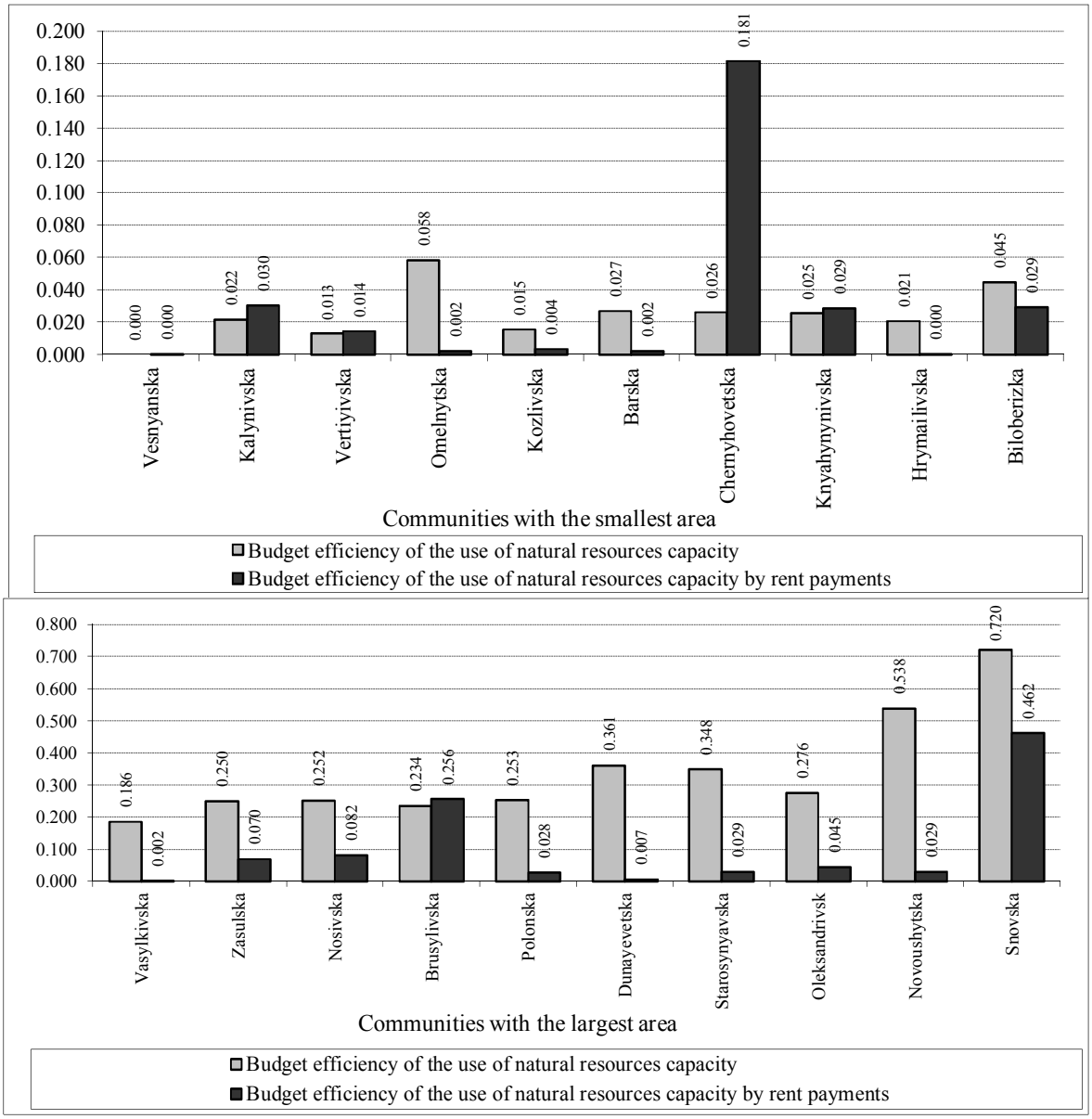

Fig. 3. Assessment of sub-indices of budget efficiency of the use of natural resources capacity and budget efficiency of the use of natural resources capacity by rent payments

Source: calculated and developed based on responses to public inquires of representatives of respective CTCs

The type of CTC is of no less importance in the use of natural resources, namely if it is rural, town or municipal. In the research, we have selected ten communities of each type, of which the first five have the smallest area and the next five – the largest (Figure 4).

Analysis of rural areas shows that the level of provision of population with resources is of high importance for Omelnytska CTC, which is among the communities with the smallest area, as it was explained earlier, while budget efficiency of natural resources capacity by rent payments is of the least importance, because the community

has insignificant deposits of raw materials and mineral resources.

Meanwhile, Snovska CTC, which is the rural CTC with the largest area, stands out in this group, as indicated by high values of sub-indices of budget efficiency of natural resources capacity and of budget efficiency of natural resources capacity by rent payments, because it has substantial forest resources. Provision of population with land resources is also of much importance in this CTC, because the community has large area, which is the basis for such provision. Regarding the rest of communities in this group, we can see that the first two sub-indices are much lower for those belonging to small ones by their area than for those belonging to large ones.

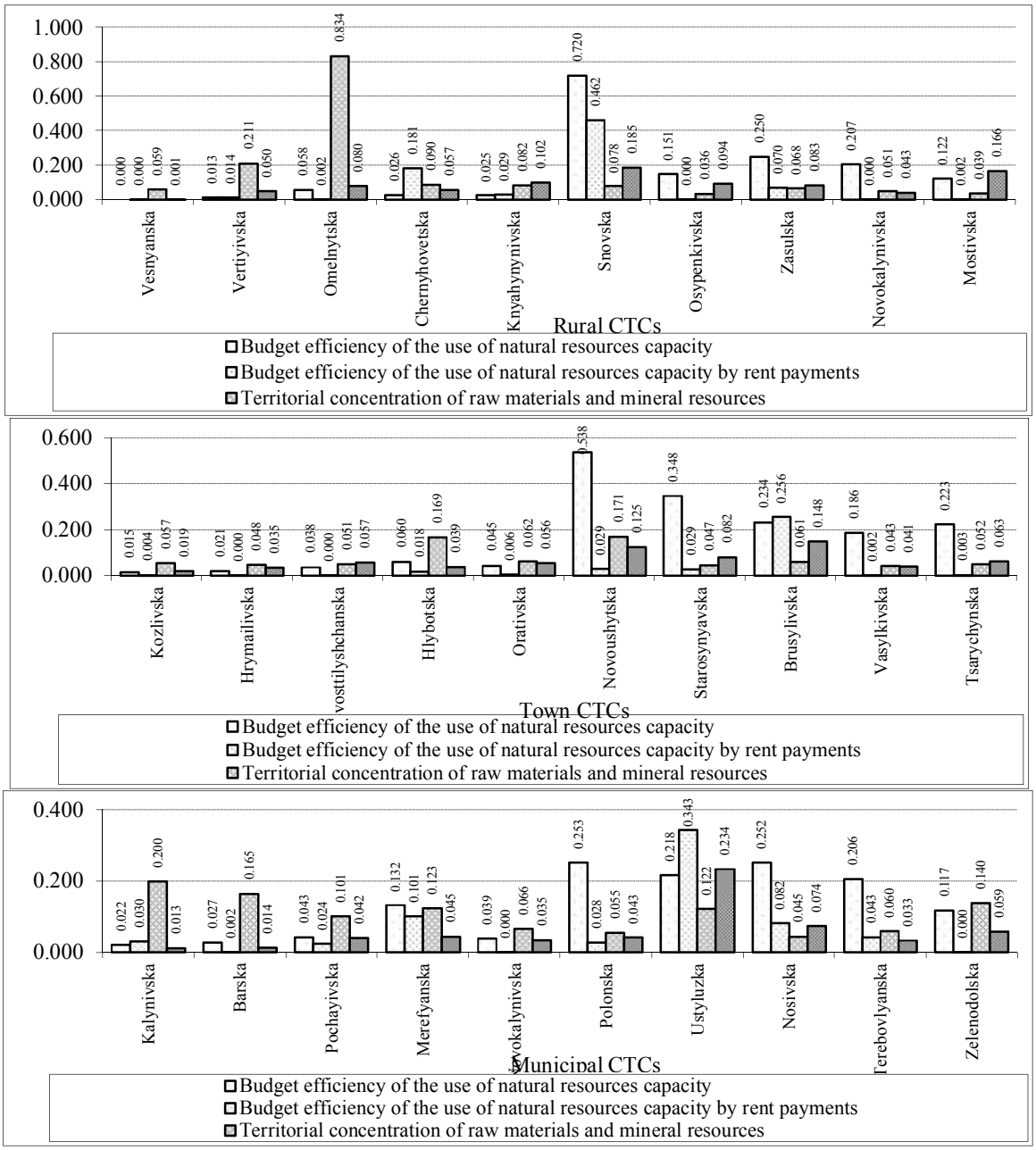

Fig. 4. Assessment of sub-indices of CTCs' natural resources capacity based on the type of the territory

Source: calculated and developed based on responses to public inquires of representatives of respective CTCs

Analysis of the second group of communities – town CTCs – shows that the communities' area directly impacts the efficiency of the use of natural resources capacity. Indeed, all sub-indices are quite low in the first five CTCs belonging to small ones by their area.

Only in Hlybotska CTC the sub-index of territorial concentration of raw materials and mineral resources is somewhat higher due to larger reserves of forest resources compared to other communities. On the other hand, the second five communities clearly stand out by high value of sub-index of budget efficiency of natural resources capacity peculiar to all large CTCs. It is also worth singling out Brusylivska CTC with high value of sub-index of budget efficiency of natural resources capacity by rent payments caused by the community's provision with forest resources, which the rent is charged for.

Regarding the municipal CTCs, it is worth mentioning that here the area plays an important role as well. Kalynivska, Barska and Pochayivska CTCs stand out among the communities with small area by the sub-index of territorial concentration of raw materials and mineral resources. Merefyanska community has comparatively high values of all sub-indices, except for sub-index of provision of population with land resources, due to large population and small area.

Ustyluzka CTC stands out among the communities in the second group of five by all sub-indices. It has one of the largest territories (41369,8 ha), is well provided with forest resources and has comparatively low number of population (7551 persons), so all sub-indices are high.

Polonska, Nosivska and Terebovlyanska CTCs have high sub-index of budget efficiency of the use of natural resources capacity that depends on the area. Meanwhile, Zelenodolska CTC has the lowest value of sub-index of budget efficiency of the use of natural resources capacity by rent payments, testifying to lacking or undeveloped deposits of raw materials and mineral resources at its territory.

5. Conclusion

Therefore, establishing the level of provision of population with endogenous natural resources helps the communities develop their plans regarding the use of their resources by minimization of costs of their purchase from outside, or, on the other hand, by preservation of their reserves of natural resources for further perspective.

Functioning and development of CTCs nowadays depends on provision with resources, intensity of the use of natural resources capacity and opportunities of its reproduction. By the criterion of revitalization, natural resources can be divided into renewable (water, soil, flora and fauna) and non-renewable (minerals), exhaustible (mineral fuel resources) and inexhaustible (energy of sun, wind, seas and oceans). Moreover, there are also replaceable (types of mineral, organomineral raw materials and fuel) and irreplaceable (water, air) resources used for production or potentially perspective for production. Based on these factors each CTC should develop and use the natural resources that not only provide an opportunity to earn additional money for the community's budget, but make the community more attractive for investors, providing in such a way its residents with job.

Nowadays CTCs are characterized by unique natural conditions and resources capacity that can secure their transition to intensive sustainable development foundations. Administrative and territorial reform promoted the breakdown of centralized natural resources management, which had caused excessive anthropogenic burden on environment and had become the reason of its partial aggravation. Therefore, search for optimal conditions to secure the efficiency of the use and preserving of natural resources became the major task of the conducted research, in particular the elaboration of methodical foundations of economic assessment of natural resources capacity and perspectives of economic and social development of CTCs.

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