

3D Model of Managing the Sustainable Development Process of a Territorial Community



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ABSTRACT

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The main purpose of the article is to present a model for managing the process of sustainable development of a territorial society. Based on the analysis of existing approaches and technologies for managing the sustainable development of territorial communities in the practice of public administration in Ukraine, the article proposes a novel model which is grounded on a complex interpretation of the continuums of the economic, social, and environmental conditions of these criteria in the Cartesian coordinates and allows making management decisions regarding plans, programs, and projects for community development which result from the comparative analysis and assessment of the set goals, tasks and expected outcomes, taking into account their compliance/non-compliance with all three criteria at the same time. The research methodology involves the use of the modeling method. The information-gene model of sustainable development of regional social systems is used. Of the novelty, it should be noted the rethinking of the essence of modeling. The graphic-analytical method allows you to systematically establish quantitative and qualitative relationships between the individual elements of the object of study.

1. INTRODUCTION

An important and topical issue in modern conditions remains that it is connected with ensuring the development of socio-economic systems at different levels - the state, regions, cities, and enterprises. It is development, not growth that is the priority goal and a special task of numerous subjects of management. In our opinion, stated in the work, economic growth is a prerequisite for development, it: characterizes the goals of the economic system; means expanding the scope of activities; manifests itself in the specific dynamics of the quantitative increase in the manufactured product and the factors of production used. At the same time, while trying to achieve economic growth, the problem of qualitative positive shifts and changes in the socio-economic system, which is designed to ensure development itself, remains unresolved [1, 2].

It should be stated that ensuring the sustainable development of the territorial community is a multilateral process, when, on the one hand, the sustainability of the city directly depends on the sustainability of socio-economic systems of a higher level (region, state), and on the other hand, the sustainability of the community affects the possibility of implementing the principles. Sustainable development of these systems directly depends on the stability of all the constituent elements that make up the socio-economic system (economic entities, non-state institutions, numerous associations of various forms of ownership, and organizational form).

A characteristic feature of the sustainable development of the city is the complexity and interdisciplinarity. The contribution of specialists to the development of the concept

of sustainable development of the territorial community consists in the formation of research areas that eventually turned into separate areas of knowledge: ecology, environmental economics, regional economics, spatial economics, innovative economics, social economics, geography, geoeconomics, urban planning, and geoplanning. The use of a synergistic approach to the study of the problems of managing the sustainable development of a territorial community makes it possible to identify inter-environmental integration patterns of self-organization of the development of a city as a complex socio-economic and environmental system.

The governing bodies of domestic territorial communities encounter hundreds and hundreds of issues, tasks, and problems of various scales and importance every day which requires professional solutions, especially in times of war, growing competition, significant differences in spatial parameters, characteristics, and provision of natural resources, historical and cultural, industrial and socio-economic heritage. This encourages the search, creation, and use of innovative methods, technologies, and tools of public administration that would meet the modern needs of managing intellectualized and democratized human resources of the territorial community on the way to its sustainable development, proper interaction with the state, attraction of internal and external investments, development of infrastructure and communication, providing for the needs of the population, etc.

That is why territorial communities should be interpreted as the primary socio-economic elements (subsystems) or basic links of the national economic system, which will determine the overall state of the country's economy, its competitiveness, and attractiveness to the world.

Innovations are presented as a rationale for the feasibility

and specifics of the original 3D model of strategic management of the trajectory of its sustainable development and demonstrate the benefits of its use by leaders and functionaries of territorial communities.

2. LITERATURE REVIEW

The problems of ensuring the proper governance and development of a number of territorial communities have not only been influenced by international and domestic organizations for the dissemination and practical use of international experience in sustainable development management, of methods, methodological instructions, and recommendations [1-3] but have also become an important topic for scientific analysis, development, approval and effective use of the results of these, research work, methodological developments and practical recommendations of domestic scientists and expert practitioners.

We would like to note that the publication of numerous findings on improving the management of various aspects of the territorial community activities demonstrates the direct interest of public administration researchers in the problems of activating the processes of decentralization and establishing new models for independent and self-sufficient management of the life activities of basic human communities, which were uncharacteristic of Ukraine earlier. At the same time, there is a sufficiently strong scientific and theoretical justification for its practical approval and use in dissertations and monographic studies, as well as in the results of numerous surveys which give recommendations on the necessity and feasibility of managing territorial communities “in a new way” with the use of program-target management, project management, innovative management [4-6], investments management [7, 8], marketing [9, 10], strategic, participatory, and intellectualized management [11] of their development under the sustainability criteria [12].

However, we consider it necessary to emphasize that the use of all the above-mentioned management technologies by the management bodies of the territorial community should be aimed at achieving the tasks and goals of sustainable development which are common for all the community members, and draw attention to the fact that until recently there was no uniform management model and technology for all communities of the country, which would simultaneously allow evaluating the position of a community in the context of the criteria, goals, and objectives of its development based on the unique characteristics and needs of each community.

3. METHODOLOGY

The governing bodies of any territorial community face a very specific task of ensuring its sustainable development within the framework, conditions, and available resource characteristics of its location, region, and state.

The first Principle of the Rio Declaration on Environment and Development, adopted by the UN Conference in 1992, states that “Caring for people is a central concern to ensuring sustainable development. People have the right to live a healthy and productive life and be in harmony with nature”. At the same time, the Sustainable Development Goals adapted for Ukraine should become the basis for the integration of efforts aimed at ensuring economic growth, social justice, and rational use of natural resources.

Therefore, it becomes quite obvious that the implementation of the strategy of sustainable development goals within the framework of the state, its regions, and the needs of all territorial community members requires the governing bodies (managers, deputies, officials) not just to “take care” of development problems, but also “to put in the effort” to “integrate” and “ensure” the cooperation of the population in achieving their economic, social and environmental well-being.

Taking into account the fact that each territorial community is unique in terms of its needs, problems, difficulties, resource opportunities, and people from all walks of life, we should note that local self-government requires the generation and implementation of a set of balanced management decisions, plans, programs, projects and tasks of sustainable development, grounded on available local resources, knowledge, initiatives and interests of people in power, in business and in the community.

However, the array of currently known technologies for managing territorial communities does not satisfy the need for methods and models of planning their development based on the simultaneous and comprehensive consideration of all three criteria of sustainable development. Today, the technologies of strategic planning suggest developing the so-called “component plans”, where the “components” are separate plans for economic development, social development, and environmental protection, each of which is developed by separate focus groups within the framework of a single strategy. In this regard, separate goals of certain projects and programs of different component plans often contradict each other, since at the very stage of their development there is no possibility to coordinate and harmonize the goals and objectives of separate component plans, and at the initial stages of planning all possible goals and objectives of the future strategy can hardly be analyzed under all criteria characteristic of sustainable development.

This shortcoming is particularly evident at the level of a territorial community since the attempts of the local self-government body to harmonize the interests of the country, the region, large enterprises, medium and small businesses, households and the population often end up making decisions where the requirements for sustainable development are put on scales with the interests of certain influential participants.

Since the Sustainable Development Strategy “Ukraine 2020” presented this process as the process of state development is grounded on the coordination and harmonization of economic, social and environmental components to meet the needs of present and future generations, for proper “coordination and harmonization” of these three components at the territorial community level, it is quite appropriate to create such a model that would provide this possibility at the very stage of development and comparative analysis of individual “component plans”. After all, the well-known planar flat interpretations of the components set of sustainable development; to illustrate the interrelationship of the component criteria of this process, however, do not provide any opportunities for conducting analytical research for the purpose of formulating proposals, recommendations, and conclusions, as well as making managerial decisions.

Basically, the simulation method is used in our methodology. For these purposes, the information-genic model of sustainable development of regional social systems proposed which we reinterpreted on the basis of the following considerations, can be successfully used.

Thus, using the graphical-analytical modeling method, we can achieve our goal. The graphic-analytical method allows you to systematically establish quantitative and qualitative relationships between individual elements according to the object of study. The data were obtained and used by the authors of the article according to the methodology and analysis performed.

4. RESULTS OF RESEARCH

4.1 Formation of the model

The proposed original interpretation of the graph-analytical 3D model of the sustainable development management of the territorial community is based on the main assumption that the country-weighted average values of economic $E_{con0}=0$, social $S_{oc0}=0$ and environmental $E_{nvir0}=0$ indicators of the well-being of the population should be used as a starting point (0) when planning the necessary changes in the life activity of a territorial community.

Under this condition, for any territorial community in the country, positive (> 0) or negative (< 0) changes in these indicators and their current values achieved or planned by its governing body will be reflected in the coordinates of the corresponding continuums (Table 1).

Table 1. Coordinates of the corresponding continuums

Elements	Characteristics
$-X \leftarrow 0 \rightarrow +X$	Changes in the state of economic well-being
$-Y \leftarrow 0 \rightarrow +Y$	Changes in the state of social well-being
$-Z \leftarrow 0 \rightarrow +Z$	Changes in the state of environmental well-being

The same approach to determining the starting point of the reference system is not a valid zero, represented by a digit and a number (0), but the weighted average value of certain indicators is demonstrated in many analytical studies in Ukraine and its regions. Thus, for example, in order to monitor, assess and plan appropriate changes in the economic, social, and environmental components (which act as criteria for sustainable development), it is recommended to be used:

- when determining the distribution of positions of Ukrainian regions according to the gross regional product (GRP) in, or as measures of “economic well-being of households” in, or “efficiency of resource use”;
- when assessing the level of “well-being of the population at the local level” in;
- when determining the ecological ratings of regions and others.

Consequently, the given examples indicate the possibility and practically justified expediency of joint use as a starting reference point (0) of the weighted average indicators of E_{con0} of the continuum ($-X \leftarrow 0 \rightarrow +X$), S_{oc0} of the continuum ($-Y \leftarrow 0 \rightarrow +Y$) and E_{col0} of the continuum ($-Z \leftarrow 0 \rightarrow +Z$), which in the Descartes coordinate system form a 3D model of managing the sustainable development process of a territorial community, as shown in Figure 1.

In this regard, the abscissa axis displays a continuum of assessments of the economic conditions as a result of the territorial community activities within the range of “economical efficiency (+X) - E_{con0} - economical inefficiency (-X)”, the ordinate axis presents a continuum of assessments of the standard of living and social well-being within the range of “above the national average (+Y) - below the national

average (-Y)”, and the applicative axis shows a continuum of assessments of its ecological state within the range of “environmentally clear (+Z) - environmentally polluted (-Z)”.

Since any point in Cartesian space is described by a triplet of real numbers, each of which is nothing but the value of the components of the overall score, it makes it possible to assert that in the space of the 3D model any point with coordinates (X_i, Y_i, Z_i) or vector $0S_i$, starting at point 0 with coordinates (X_0, Y_0, Z_0) and ending at point S_i with coordinates (X_i, Y_i, Z_i) , will reflect the integral assessment of the current state of sustainable development of a territorial community as a result of its life activities according to the goals and criteria are chosen by its governing body and the population.

Then, for example, the process of planning a series of intended management actions to gradually change the state of sustainable development of a territorial community under its performance indicators from a dangerously unsatisfactory position S_i in the octant $[(-X)(-Y)(-Z)]$, which corresponds to the unsatisfactory state of its sustainable development with all the indicators “below average” (< 0), to the S_i position in the octant $[(-X)(+Y)(+Z)]$, then to the S_i position in the octant $[(-X)(+Y)(-Z)]$ and finally to the S_i position in the octant $[(+X)(+Y)(+Z)]$ with all indicators “above average” (> 0) (Fig. 1), will require the leadership and functionaries of an administrative entity to have the ability and skills to set justified strategic goals, develop strategies, programs, plans, projects, objectives and implementation measures for their achievement, taking into account the impact on each of the criteria of sustainable development.

This will allow evaluating, analyzing, and making decisions on strategic plans, programs, and projects for the sustainable development of a territorial community by identifying, analyzing, and comparing expected, projected, or real current assessments of changes in the sustainable development of the community as a result of their implementation.

4.2 Interpretation of the 3D model of sustainable development management

The graphic interpretation of the 3D model of sustainable development can be transformed into a tabular one (Table 2), which will allow either making prompt informed management decisions on the projects, programs, plans, and initiatives proposed by the state, business, the public, and individuals or evaluating the consequences of community management according to the expected, forecasted or real assessments of the economic, social and environmental impacts of certain activities of the community.

Obviously, achieving a positive assessment of the state of sustainable development of the territorial community can be guaranteed by finding the coordinates of the S_i point in octant 1, where, due to good management, all the components of sustainable development ($E_{con} > E_{con0}$, $S_{oc} > S_{oc0}$, and $E_{nvir} > E_{nvir0}$), and all further decisions and actions will be directed towards maintaining and improving the situation in the community.

The positioning of point S_i in octants 2, 4, and 5, where, due to the satisfactory management, economic, social, or environmental problems with sustainable development are observed in only one of the three components, can be considered transitional in the process of achieving the necessary level of sustainability in the territorial community, and it is recommended that the main decisions and actions of the management body should be concentrated on the problem areas of its activities.

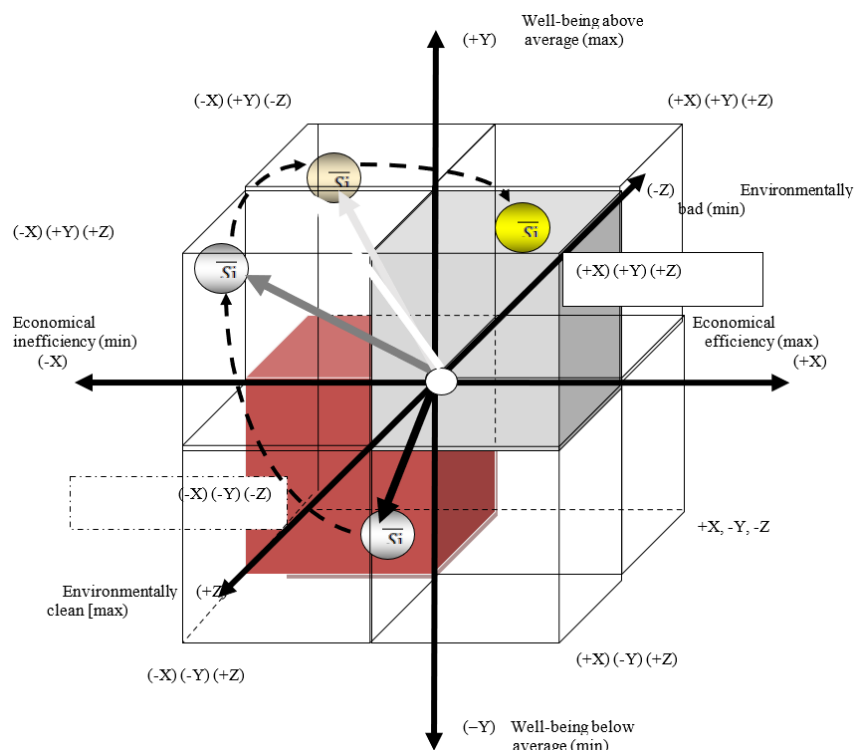


Figure 1. 3D-model of performance assessment and management of the territorial community activities and its development process as a defined set of N, households, business, and individuals entities (authors' interpretation)

Table 2. Tabular interpretation of the 3D model of sustainable development management

Octant #	Sustainable Development Goals	Characteristics of the actual state of sustainable development of a territorial community	Number of problematic criteria	Assessment of management level
I	+X, +Y, +Z	Economically efficient, with a high level of well-being, and environmentally friendly	0	Good
II	+X, +Y, -Z	Economically efficient, with a high level of well-being and some environmental issues	1	Satisfactory
III	-X, +Y, -Z	Economically inefficient, with a satisfactory level of well-being and environmental issues	2	Unsatisfactory
IV	-X, +Y, +Z	Economically inefficient, with a satisfactory level of well-being and environmentally friendly	1	Satisfactory
V	+X, -Y, +Z	Economically efficient, with a dissatisfactory level of well-being, environmentally friendly	1	Satisfactory
VI	+X, -Y, -Z	Economically efficient, with a dissatisfactory level of well-being and environmental issues	2	Unsatisfactory
VII	-X, -Y, +Z	Economically inefficient, with a dissatisfactory level of well-being and environmental issues	2	Unsatisfactory
VIII	-X, -Y, -Z	Economically inefficient, with a dissatisfactory level of well-being and environmental issues	3	Criminal

The positioning of point S_i in octants 3, 6, and 7 should be considered a consequence of poor management of the territorial community activities, the absence or neglect of a range of necessary management decisions, and the imperfection or unprofessionalism of the management and functionaries of the administrative body.

The positioning of the point S_i in octant 8, where the current values of the components relate as $E_{con} < E_{con0}$, $S_{oc1} < S_{oc10}$ and $E_{envir} < E_{envir0}$, indicates that there are elements of criminal neglect of managers and functionaries of their duties, their unprofessionalism, and even malicious intent in the processes of managing the TG activities.

In the process of strategic and operational management of sustainable development, based on expected, forecasted, calculated, etc. assessment criteria, the positioning of a

territorial community into the space of the proposed 3D model using its tabular interpretation will allow making reasonable, agreed, and coordinated management decisions regarding:

- evaluation of the actual state and place of a territorial community in the space of the model of the sustainable development of the country, region, and other territorial communities with a control purpose;
- acceptance, rejection, or elaboration of proposed plans, projects, and strategies of the territorial community development;
- planning of evolutionary rather than radical changes of a territorial community on the way to the community's achieving the sustainable development goals as well as the regional, state, and global goals;
- ensuring the proper administration for implementing the

planned measures along with monitoring the possible deviations and introduction of timely and appropriate updates.

The information on the assessment of the situation and level of administration of a territorial community necessary for designing, making, and implementing management decisions (plans, programs, projects, strategies, etc.) regarding the selection and promotion of such areas of activity, projects, and programs which will provide for achieving results desired for a territorial community and planned by the governing body can become a tool for mutual and beneficial use by both the functionaries of the governing body, and managers and owners of market economy entities, households and individuals, which will be a comprehensively substantiated first step of the parties to the participatory harmonization of goals and interests.

As a preliminary confirmation of the feasibility of using such an approach to creating a 3D model, we present the results of the approbation of the methodology of differentiation and comparative analysis of the territorial communities in the Pre-Carpathian according to the coefficient of economic efficiency of management (CEMTC), which fully confirm the possibility and expediency of continuing similar research and evaluations for other components of their sustainable development. After all, only 18 territorial communities (29.0%) out of the 62 territorial communities of the Ivano-Frankivsk region were described as economically efficient as of September 2021, another 18 (29.0%) were on the verge of self-sufficiency, and 24 territorial communities (38.7%) were largely subsidized, that is, economically inefficient. Setting the starting point as a weighted average value for the region ($CEMTC_{aver} = 1.078$) and positioning the results of the territorial community in relation to it allows us to clarify that positive results of economic efficiency were demonstrated in only 22 territorial communities (35.49%) out of 62 and negative results in as many as 40 territorial communities (64.51%).

However, it is impossible to unequivocally assert only on the basis of the assessment of economic inefficiency (E_{con}) about the poor management of the majority of the communities in the region in the absence of assessments of the welfare level of the population (S_{ocl}) and the state of ecology (E_{col}), since the lack of data on these 2 assessments does not provide the objective understanding of the state of sustainable development and cannot help to determine the trajectory for future changes. After all, there still is a possibility for even an economically efficient community to be very environmentally dirty at the same time, which, from the management perspective and under the criteria of sustainable development, completely nullifies economic achievements.

Therefore, obtaining and assessing the real picture along with the determination of the octant of the 3D model in which the community is located, and making the right decisions about establishing, monitoring, and adjusting the future goals of its development and the desired trajectory of movement towards them requires a comprehensive assessment under three criteria.

Then, it becomes quite expedient to supplement the estimates set (E_{con}) given in the list of territorial communities with estimates (S_{ocl}) and (E_{nvir}), obtained using the methods of assessing the well-being of the population at the local level and environmental ratings, and to assess the state of sustainable development of these communities not by individual components, according to which until recently most territorial community authorities have developed economic, social and

environmental “component” plans and programs, but based on a set of 3D-model estimates.

Only in this case, it will be possible to ensure the implementation at the level of territorial communities, as basic units of the national economy, of the conditions regarding the necessity and expediency to identify the key dominants of sustainable development and the optimal trajectory of economic growth. The implementation of these conditions, formulated by the State Institution “Institute of Environmental Economics and Sustainable Development of the National Academy of Sciences of Ukraine” will directly impact the sustainable development of each of the many domestic territorial communities and bring positive changes to the national economy.

5. DISCUSSIONS

Discussing the results of the study, it should be noted that our analysis has a number of differences from similar ones. As an example, a group of scientists [13, 14] improved the existing model of organizational support for the functioning and development of territorial communities, which, unlike others, is based on an integrated approach and provides for the choice of strategic guidelines based on building a pyramid of community development goals, which allows you to adjust funding and planning of work not only in the current financial year but also in the strategic time interval and forms an adaptive apparatus for financial support of the territorial community. However, we did not try to improve existing processes. We tried our research results to present the original 3D model.

For example, the study by Arumäe [15] and Cilona [16] examined aspects of government regulation of sustainable development. The process of state regulation of sustainable development involves the consistent implementation of a set of managerial economic, organizational, and financial measures that are components of the policy to ensure sustainable social development. Due to modern realities, it is the state power and the political strategy developed by it that determine the conditions for doing business, the use of resource potential, socio-economic processes, the prospects for the development of the country, and ensuring the interests of all members of society. However, in contrast, our research results focus more on the trajectory of strategic management, which is part of the overall system of regulation of sustainable development, however, here we narrow down certain aspects since then we should consider tactics and operational management.

Cialdea [17] and Retnani and Bukhori [18] considered the key aspects and specifics of the sustainable development of territories and their communities. This is how socio-economic systems interact in these territories and how such a connection it will increase the effectiveness of sustainable development. Other similar studies [19, 20] involved modeling the sustainable development of a single socioeconomic system in a single area. Such concretization has the right and place in science and practice, however, our 3D model of strategic management of the sustainable development trajectory is intended as a demonstration of its features and advantages for the territory of a particular country.

6. CONCLUSIONS

Thus, the potential of the proposed graph-analytical 3D model for the sustainable development management of territorial communities lies in the possibility of its use for planning, monitoring, evaluating, analyzing, and adjusting indicators of sustainable development of territorial communities of Ukraine according to a unified model and methodology; thoughtful establishment of priorities, goals, and objectives of sustainable development by the governing bodies and the population of communities as proposed and accepted by the integral (social) intelligence rather than by the intelligence of the compilers of separate “component plans”.

For successful implementation of sustainable development management of territorial communities into practice, it is necessary to theoretically substantiate the metric base of the sustainable development criteria reference scale of the 3D model, carry out an experimental approbation of its use in the processes of comparative research, and evaluation of practical management of selected territorial communities, develop and implement a program for the dissemination of information on its use among authorities of local self-government bodies.

It should be noted that to solve the problem posed in the article; a simulation should be carried out. Thus, an innovative model is proposed, which is based on a complex interpretation of the continuum of economic, social, and environmental conditions, these criteria in Cartesian coordinates, and allows management decisions to be made regarding community development plans, programs, and projects.

It has been demonstrated that under the condition of the complex use, the existing tools for evaluating the economic efficiency, welfare level, and environmental state of territories will provide the model with the information necessary for the governing body, and the proposed options for its graph-analytical and tabular interpretation.

The study has limitations and they consist in not taking into account all aspects of the specifics of the activities of territorial communities. Prospects for further research should be devoted to ensuring the safety and security of the activities of territorial communities since these aspects also have an impact on sustainable development.

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