

THE MODEL OF THE SUSTAINABLE DEVELOPMENT OF THE COMMUNITY

Mykola ROHOZA¹, Oleksandra KUZMENKO^{2*}, Volodymyr ROHOZA³

¹ Poltava University Economics and Trade, Koval Str. 3, Poltava 36014, Ukraine;
rogoza.ne@gmail.com, ORCID: 0000-0002-5654-7385

² Poltava University Economics and Trade, Koval Str. 3, Poltava 36014, Ukraine; oldrakk@gmail.com,
ORCID: 0000-0002-0660-1953

³ Poltava University Economics and Trade, Koval Str. 3, Poltava 36014, Ukraine; rgzvld@gmail.com,
ORCID: 0000-0003-3636-7894

* Correspondence author

Abstract: The article examines the evolution of the concept of sustainable development and the implementation of its principles at different levels of government in Ukraine. It is proved that decentralization is an instrument of realization of the state policy to ensure sustainable development of territorial communities. The territorial community is seen as a complex dynamic weakly structured self-regulating system. The task of management of sustainable development of the territorial community, based on the tasks and principles of decentralization, is proposed.

Keywords: development, sustainable development, community, decentralisation of power, dynamic model of the sustainable development of the community.

1. Introduction

The issue of sustainable development is one of the key directions of public administration at both national and regional levels. This issue is particularly relevant in the context of decentralization of power, when part of the powers and budgets are delegated to local governments. In order to realize such powers in the most successful way, economically valid measures are needed, the implementation of which will enable the optimal use of resources of the territorial communities.

Analysis of the latest researches and publications. The works of such scientists as O. Amosh, V. Vasilenko, V. Vitlinsky, V. Heitz, O. Granberg, T. Klebanova, V. Maksimov, S. Ramazanov and others are devoted to modelling and analysis of the sustainable development and improvement of mechanisms of management of socio-ecological-economic systems.

Scientists and practitioners have constructed various economic-mathematical models, on the basis of which it is possible to develop the sustainable regional development scenarios and to provide reasoned proposals for the management of the community. However, each territorial community has its own specific nature and is unique. Therefore, the use of even the already developed set of sustainable development models requires additional research and analysis to adapt them in the current realities.

The purpose of the article is to study the evolution of concepts of sustainable economic development of economic systems and the application of their principles in the formation, activity and development of territorial communities. Using such principles to develop a territorial community model as a poorly structured dynamic self-regulatory system with causal links between environmental, economic and social components in the context of decentralization of power. On the basis of the dynamic process from the point of view of the apparatus of differential and differential equations, to propose a model of study of certain behavior of economic systems in time under the influence of internal and external factors to analyze the equilibrium and stability of territorial community management as an economic system.

2. The concept of reforming local self-government and territorial authority in Ukraine

Decentralization of power as a component of state policy on regional development is one of the defining in the reforms agenda in modern Ukraine. It is the basis for the adoption of the fundamental institutional changes, the improvement of the living standards and is of great importance for the continuation of sectorial reforms. Due to the creation of a new system of distribution of powers between central and local authorities in Ukraine, a new system of relations between different branches of power and a new balance of checks and balances are being formed. That is, ordering the administrative and territorial structure and improving the system of organization of government are important partial tasks of a comprehensive reform of decentralization. The process of delegation of one's authority to the community level cannot be limited to the management of medicine, education and the provision of administrative services, when the communities represented by local governments are delegated state authorities, even with financial support. The success of the reform must be enshrined in the expansion of community action through the deepening of sectorial decentralization: in the areas of social protection, energy, transport, participation in security, law enforcement (Decentralizaciya..., p. 5-8).

The concept of reforming local governance and territorial organization of power in Ukraine defines two stages of implementation of the reform and the timeframe for their implementation: preparatory stage (2014) and the second stage (2015-2017). However, these deadlines were not met due to various circumstances and reasons. Therefore, the Government has introduced a new timetable for reform implementation. The formation of capable territorial communities should be formed by mid-2020, which would correspond already adopted law on the administrative and territorial structure in Ukraine. The principle of voluntariness, however, remains basic. However, by January 1, 2019, only seven oblasts in Ukraine have perspective plans for the formation of community territories covering the entire territory of the oblast: Dnipropetrovsk, Donetsk, Zaporizhzhia, Luhansk, Rivne, Kharkiv and Khmelnytskyi oblasts. First of all, his situation is the result of voluntary union of communities, which has led to constant changes of perspective plans. On the other hand, there are contradictions and different opinions regarding the formation of united territorial communities (UTCs) in the regions, so the total number of UTCs to be created in Ukraine is still unknown (1285 UTCs are currently foreseen by the plans (however 18.0% of the country's territory is not covered by prospective plans)).

The lack of clearly defined perspective plans entails the risks of not adhering to the timeframes of forming a UTC and the ability to form potentially disabled communities. As of January 1, 2019, 876 UTCs were created in Ukraine as a result of the unification of 4010 territorial communities (36.6% of all territorial communities), whose territory covers 37.6% of the country's area. The largest number of UTCs was created in Dnipropetrovsk (60), Zhytomyr (51) and Volyn (50) oblasts. However, in the Transcarpathian (6), Luhansk (9), Donetsk (10), Kyiv (13) and Kharkiv (16) oblasts, territorial community consolidation is at a much slower pace (Rohoza, 2013). At the same time, only 782 out of 876 officially created UTCs were operating as of January 1, 2019, 159 of which were created in 2015 and 207 in 2016, 299 in 2017 and 117 in 2018. Turning to the question of the formation of a UTC, one can find that the majority of communities were formed by uniting two or three local councils (55.2%). Among rural UTCs, this figure is 61.8%.

Analyzing the peculiarities of the formation of UTCs in Ukraine, it should be emphasized that a large number of communities, the vast majority of whom are rural, with a population of less than 5,000 people were created. At the same time, if in 2015 their share was 31.4% of the formed UTCs, in 2016 – 35.8%, in 2017 – 35.0%. A significant increase in the number of created UTCs in 2018 was due to the increased involvement of regional cities in the integration process.

The main tasks of decentralization in Ukraine by 2020 will be (3): approval of a new territorial basis for the activity of authorities at the level of communities and districts; transfer (decentralization) of powers of executive power to local government bodies and their differentiation between levels and bodies on the principle of subsidiarity.

3. Concept and principles for building sustainable development of the territorial community

To define the basic concepts and principles of creating the sustainable development of a territorial community, let's find out the main categories that are included in the concept of "sustainable development of a community".

Territorial community is a community of citizens who are aware of their rights and interests demonstrate the ability to constructively resolve issues of their own development, resolve conflicts, manage the economic, social and cultural spheres of community life and implement their own development strategy. The formation of territorial communities leads to the formation of a new type of local identity of the community and its inhabitants. According to the experts, local identity, together with a sense of trust, unity, solidarity, respect, mutual understanding among community members, influenced by collective and individual experience and interaction, provides the formation of community social capital, which is the basis for united constructive activity of local communities. The formation of a new subjectivity of communities on the basis of this social capital fundamentally restructures the field of realization of the state policy of regional and local development, promotes the introduction of modern effective European instruments of this policy, which brings the development of the national community to a qualitatively higher level.

Development is a process of movement; change of integral systems; the appearance of a brand new object (or its status); orientation, irreversibility, regularity, unity of quantitative and qualitative changes; the relationship between progress and regression; contradiction, fairness of form or cyclicity; change in time (Kuzmenko, 2011; Shkarlet, 2007).

Development is a set of progressive and regressive, controlled and unmanaged processes that occur in the economy at the micro and macro levels, resulting in qualitative changes occurring in economic systems and among participants of such systems (Marushevskyj, 2013).

Sustainable development is a general concept that means the need to find a balance between meeting the modern needs of mankind and protecting the interests of future generations, including their need for a safe and healthy environment (Gryniv, 2001, p. 126).

The development of the sustainable development concept took place in seven stages. UN Conference Declaration was drafted (26 principles and an action plan which consisted of 109 points) at the first stage. The United Nations Environment Program (UNEP), which is today the world's leading environmental agency, was developed in December 1972.

The United Nations General Assembly established the International Commission on Environment and Development (WCED) in 1983, whose task was to develop the basic principles, indicators of sustainable development, and a global environmental and economic program of action. A report entitled "Our common future" was published in 1987 as the result of the work of this Commission, presenting a new concept of the sustainable development as

an alternative to development based on unlimited economic growth. The report "Our common future" for the first time clearly defined the concept of sustainable development, which is interpreted as the development, for which the present generations meet their needs and do not compromise the ability to meet the needs of future generations.

The Concept of Sustainable Development gained the leading status after the UN Conference on Environment and Development in 1992. According to the results of the conference, five documents were adopted (Marushevskyj, 2013, pp. 5-7):

1. Rio de Janeiro Declaration on Environment and Development (the document contains 27 principles of sustainable development aimed at defining a new, equitable, global partnership by creating other levels of cooperation between states, key sectors of society and citizens).
2. Agenda 21 (each country was advised to develop a national sustainable development strategy, taking into account the necessary environmental measures. It was stated that sustainable development should have been a priority on the international cooperation agenda, based on a comprehensive approach to environmental issues. The measures to reduce to optimal volumes of production and consumption of natural resources; optimization of the ratio between production and consumer goods, which has, along with environmental, also an important socio-economic value; formation of the effective investment policies for development, utilization and usage of nature- and resource-saving, low-waste and zero waste technologies, production of ecologically safe products were approved,
3. UN Framework Convention on Climate Change (approved by the Millennium Declaration (2000), on the basis of which 8 Global Millennium Development Goals (MDGs) have been formulated); a framework of values, principles and key factors for development by 2015 were identified. Since the MDGs have been developed in many countries around the world, the MDGs have been adapted and development targets set, taking into account the specific situation of the country. Ukraine has joined the UN Millennium Declaration and made commitments itself to meet MDGs by 2015.
4. Convention on the Conservation of Biological Diversity.
5. Declaration on the direction of development, protection and use of forests.

In 2002, the United Nations World Conference on Sustainable Development in Johannesburg ("Rio + 10") discussed the issues related to the state and prospects of sustainable development in the context of analysing global change over the past 10 years, looking for concrete steps addressed on improving people's standard of living and protecting natural resources. Goals, timeframes and commitments on a wide range of issues that are designed to change lives in all regions of the world were set. Sustainable development has been proven to be one of the central issues on the international agenda and the practical steps needed to address many of the world's pressing issues have been taken. As a result, two major documents were

adopted (Matveyeva, 2017, p. 6) the Johannesburg Declaration on Sustainable Development and the Plan of Implementation of Decisions with the Determination of Activity Priorities.

The Rio + 20 UN Conference on Sustainable Development in Rio de Janeiro in 2012 discussed the institutional framework for sustainable development, the green economy in the context of sustainable development and poverty reduction. The document "The future we seek" was adopted at the conference. They also discussed: building "a green" economy to help achieving sustainable development and help people to get rid of poverty, and also help developing countries embark on the path of green development; institutional framework for sustainable development to coordinate international efforts to achieve it (Marushevskiy, 2013, p. 7).

The need to strengthen the Institutional Framework for Sustainable Development (IFSD) was considered in Chapter XI of the Agenda 21 (2002). Sustainable development has been recognized as a major goal for institutions at national, regional and international levels. The Implementation Plan emphasized the need to enhance the integration of sustainable development and the activities of all relevant UN agencies, programs and funds, as well as international financial institutions, within their mandates. Thus, the strategic approach to sustainable development has been successfully applied in European countries which have not only adopted national sustainable development strategies but also periodically are reviewing them. The principle of sustainable development is enshrined in the founding treaty of the EU (1997). This principle has been identified as key to all EU Member States' policies. This means that any sector or regional strategies, plans and programs should be oriented towards achieving a balance between economic, social and environmental goals (Marushevskiy, 2013, p. 7)

Significant scientific potential has been accumulated in Ukraine and a number of fundamental works on sustainable development have been prepared, Ukraine have prepared and approved 2020 Sustainable Development Strategy in 2015. In 2016-2017, supported by UNDP Ukraine carried out some activities to develop the draft of Sustainable Development Strategy of Ukraine until 2030 and the National Action Plan for the implementation of the Sustainable Development Strategy of Ukraine until 2020.

Thus, a number of countries declare achieving the optimum variant of the development, in each country their own path of development. In some countries, this path begins, in others it has already begun, others have already embarked on the path of sustainable economic development (for example, the USA, Japan, EU countries).

The concept of sustainable development is aimed at parallel solution of three main tasks: 1) economic: optimal, non-destructive use of scarce resources. The maximum income can be obtained in the conditions of preservation of the aggregate capital (social, natural-ecological, economic), by means of which this income is generated; 2) social: a fair equivalent distribution of public goods. Preservation of the stability of socio-cultural systems. The diversity of cultural capital forms the basis for the deepening and development of social systems. A human being is the main value of the state, acting not as an object, but a subject of its development;

3) ecological: guaranteeing the integrity of natural systems and preserving their ability to recover. The sustainability of ecosystems depends on the global stability of the entire biosphere, the possibility of human survival in the long run. The degradation of natural resources, their pollution and the loss of biological diversity reduce the ability of ecological systems to recover them.

Analysing the foundations of the proposed concept, sustainable development as a concept of quality social transformation can be presented in the form of a classic triad of components – environmental, economic and social, which are equally important for ensuring the safety, sustainability and balance of the processes of evolutionary development of the territorial communities. In turn, managing the sustainable development of territorial communities, the following principles must be taken into account: 1) humanity is capable of giving the systemic character to the development; 2) restrictions on the exploitation of natural resources are relative; 3) strive to meet the basic needs of all people, preventing mass poverty; 4) to find the balance between the life status of those who enjoy excessive benefits (monetary), with the ecological capabilities of the planet, the socio-economic capabilities of the community; 5) the size and growth rate of the population must be consistent with the production potential of the territories of the global Earth ecosystem.

In addition to the classical approach, there are other concepts and theories for understanding sustainable development. Therefore, 7 main approaches, such as: anthropocentric (classical), neoclassical, evolutionary-cyclical (civilizational), systemic, infrastructural, institutional approaches and dynamic equilibrium theory are distinguished. With regard to the sustainable development of territorial communities, scientists distinguish synergistic, globalization, humanitarian, environmental, consensus, integration, information-innovation, corporate and social sustainable development. Their application in management processes is always enhanced by means of systemic and situational approaches, as well as quality management (Myxnenko, 2006, p. 342-343). Thus, to ensure the development of the territorial community there is more complex compared to traditional approaches model that is based on the application of all existing approaches and models of the development while identifying the most relevant for the corresponding community. Thus, ensuring the sustainable development of the communities implies non-destructive use of nature for the benefit of the social well-being of present and future generations, focused on strengthening the economic capacity of economic complexes, has recently gained rapid development.

Sustainable development of a territorial community is characterized by a set of economic, environmental and social indicators. The development of a territorial community is sustainable if the values of all indicators are sufficiently close to the relevant substantiated normative values. If, however, the values of individual indicators or even all of them do not lead to a conclusion about the sustainable development of the community as a whole, then a program of sustainable development of the territorial community is needed. To develop this program,

let us consider the problem of optimum management of the sustainable development of the territorial community.

4. Formulation of the problem of optimal management of sustainable development of the territorial community

Let us consider the territorial community or region as a complex, weakly structured, dynamic self-regulatory system characterized by the presence of a large number of complex interrelated causal relationships between environmental, economic and social components. A dynamic system is called an object or process for which the concept of a state is defined as a set of some quantities at this point in time, and a law describing the change of state in time is given.

To set the law of this system we will use the models of economic dynamics. The economic dynamics model is a descriptive dynamic deterministic economic and mathematical model of the economic process in terms of the apparatus of differential and difference equations, which is used to study the deterministic behavior of economic systems in time under the influence of internal and external factors in order to analyse equilibrium and stability control (Pidubna, 2017).

The following problems must be taken into account when constructing the model: reproduction of the population and the natural environment; distribution of finished products for current needs and future development; definition of modes of reproduction of production resources; interconnection and coordination of cycles of reproduction of the population, labour resources, productive funds, social product, consumer amenities, etc. The time factor must also be taken into account, reflecting not only the dependence of the variables on time but also their relationship in time. Considering the concept of complex systems modelling, the following aspects should be taken into account in modelling: general approaches of systems theory and system analysis; the presence of active elements that lead to self-organization of the system; in poorly organized systems use statistical methods, methods of theory of random processes; to present the dynamics of indicators of sustainable development of the territorial community in the form of time series of components. Thus, the state of the system under consideration at each point of the time t is characterized by three groups of the indicators of environmental, economic and social components: $EnI = EnI(t)$ – environmental indicators, $Ecl = Ecl(t)$ – economic indicators, $SI = SI(t)$ – social ones.

5. Dynamic model of socio-ecological-economic system

Therefore, the state of the studied socio-economic system (SES) at each moment of time is characterized by a vector of phase coordinates:

$$SES(t) = (EnI(t), Ecl(t), SI(t)).$$

Then the equation of motion is represented by a system of differential equations in which the speed of change of each phase coordinate is given as a function of phase coordinates and time. Thus, the phase trajectory $SES(t)$ is determined by the following formula (1):

$$\begin{cases} \frac{dEnI}{dt} = f_{En}(EnI(t), Ecl(t), SI(t), t) \\ \frac{dEcl}{dt} = f_{Ec}(EnI(t), Ecl(t), SI(t), t) \\ \frac{dSI}{dt} = f_S(EnI(t), Ecl(t), SI(t), t) \end{cases} \quad (1)$$

In this case, the initial state of the analyzed system SES_0 is determined by the phase coordinates values - components of sustainable development - at some fixed point in time t_0 :

$$SES_0 = SES(t_0) = (EnI(t_0), Ecl(t_0), SI(t_0)) = (EnI_0, Ecl_0, SI_0). \quad (2)$$

The final state SES_N is determined by the normative values of the components of sustainable development:

$$SES_N = (EnI_N, Ecl_N, SI_N). \quad (3)$$

Therefore, the dynamic model of the socio-ecological-economic system can be interpreted as a system of ordinary differential equations in unknowns $EnI(t)$, $Ecl(t)$ and $SI(t)$.

If, under all the initial conditions (2), the socio-ecological and economic system eventually enters the regime described by the boundary cycle, that is, if, $t \rightarrow \infty$, and any EnI_0 , Ecl_0 and SI_0 :

$$\begin{aligned} \lim_{t \rightarrow \infty} EnI(t, EnI_0) &= EnI^*(t), \\ \lim_{t \rightarrow \infty} Ecl(t, Ecl_0) &= Ecl^*(t), \\ \lim_{t \rightarrow \infty} SI(t, SI_0) &= SI^*(t). \end{aligned} \quad (4)$$

where, $EnI^*(t)$, $Ecl^*(t)$, $SI^*(t)$ – are functions that describe the boundary cycle.

If there is such a value $t < \infty$, for which the functions $EnI^*(t)$, $Ecl^*(t)$ and $SI^*(t)$, which describe the boundary cycle, take values equal to the corresponding normative values of the components of the sustainable development, then it can be concluded that for the system under consideration it is possible to achieve sustainable development in a finite time. Thus, the problem of the sustainable development management of a territorial community can be formulated as the problem of minimizing the time of transition, that is, the problem of minimizing the time to achieve a state of sustainable development.

6. Conclusions

Thus, the territorial community is a complex semi structured dynamic self-regulatory system. This system is characterized by the presence of complex interrelated cause and effect relationships between environmental, economic and social components. Nowadays, it is necessary to use a modern mathematical apparatus for managing a community, i.e. models of economic dynamics and methods of their analysis and research. Because these models and methods let: analyses the dynamics of environmental, economic and social components of sustainable development; model the development of the system; evaluate the possible consequences of management decisions. The proposed mathematical model of sustainable development of a community or socio-economic system is presented as a system of differential equations. This system will allow solving the set time minimization of the transition period of sustainable development of the territorial community.

References

1. *Decentralizaciya v Ukrayini ta yiyi vplyv na social'no-ekonomichnyj rozvytok terytorij: metody chni pidxody ta rezul'taty ocinyuvannya: naukova dopovid*, <http://ird.gov.ua/irdp/p20180705.pdf>, 2018.
2. *Decentralizaciya: novy j etap. Osnovni zavdannya na period do 2020 roku*, <https://decentralization.gov.ua/news/10246#gallery-1>.
3. Gryniv, L. (2001). *Ekologichno zbalansovana ekonomika: problemy teorii: monografiya*. L'viv: LNU im. I. Franka, 240.
4. Kuzmenko, O. (2010). Analiz sutnosti potencialu rozvytku pidpryemstva yak ekonomichnoyi kategoriyi v umovax strategichnogo upravlinnya pidpryemstvamy, *Ekonomika: problemy teorii ta praktyky*, 9, VII, 1731-1742.
5. Kuzmenko, O. (2011). *Mexanizm upravlinnya potencialom rozvytku torgovel'nyx pidpryemstv sy'stemy spozhyvchoyi kooperaciyi: dy's. ... kand. ekon. nauk: 08.00.04 / Oleksandra Kostyanty'nivna Kuz'menko, Poltava, 289.*
6. Marushevskij, G. (2013). *Metody chni rekomendaciyi dlya vraxuvannya Cilej stalogo rozvytku v strategiyax rozvytku terytorial'nyx gromad*, https://www.undp.org/content/dam/ukraine/docs/DG/UNDP_MetRecommendation_v03.pdf.
7. Matveyeva, O. (2017). Imperiya stalogo rozvytku terytorial'nyx gromad ta jogo zagal'noteorety chni zasady, *Efekty vnist' derzhavnogo upravlinnya*, 1 (50), Ch. 2. S.224–232.

8. Myxnenko, A. (2006). *Suchasni innovacijni pidxody` do upravlinnya suspil`ny`m rozvy`tkom*. K.: NADU, T. 1, pp. 342-344.
9. Piddubna, O. (2017). *Dy`namichna model` stalogo rozvy`tku tery`torial`noyi gromady*, http://bses.in.ua/journals/2017/13-1_2017/43.pdf.
10. Rohoza, M. (2013). *Modelyuvannya rozvy`tku pidpry`yemstva*. *Naukovj visny`k Poltavskogo universy`tetu ekonomiky` i torgivli*, 3(59), pp. 141-146.
11. Shkarlet, S. (2007). *Evolyuciya kategoriyi «bezpeka» v naukovomu ta ekonomichnomu seredovy`shhi*, *Formuvannya ry`nkovy`x vidnosy`n*, 6, 7-12.