

Design Management of an Innovative Model of Sustainable Development and Regional Features in Conditions of Global Turbulence

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Abstract: - The article's purpose is to apply design management in forming an innovative model of sustainable development with adaptation to regional features in conditions of global turbulence. Indicators and indicators for evaluating the quality of functioning of the model of sustainable development laid down in the goals of sustainable development for the regions of Ukraine with their systematization and certain additions are proposed. Based on the results of the calculations, we will receive the results of achievements in the field of implementation of the model of sustainable development of the Black Sea region of Ukraine both in terms of the general economic, social, and ecological components and in terms of indicators, which will create prerequisites for making management decisions regarding the revision of goals, improvement of influence tools, optimization of transformational processes. The results of the evaluation of the implementation of the Sustainable Development Goals of the Black Sea Region of Ukraine made it possible to propose the design of an innovative model of sustainable development of the region in conditions of global turbulence. The design management of the innovative model of sustainable development covers the main principles, criteria, mechanisms, and tools for implementing sustainable development goals in the regions, which can be integrated into the management systems of state and regional projects at different levels. The model of sustainable development of the region is focused on ensuring the continued functioning of the regional system based on self-organization processes based on the gradual improvement of potential technologies and management mechanisms, taking into account existing achievements and shortcomings through the establishment of horizontal and vertical communications and the development of adaptive qualities of its components.

Key-Words: - innovative model, sustainable development, global turbulence, design management, Goals of sustainable development, war, methodical approaches.

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1 Introduction

Ukraine's socioeconomic, regulatory, legal, and organizational-management transformations have been mainly innovative in recent years. Several administrative, economic, legal, defense, and energy reforms have been initiated. The implementation of reforms in the complex is intended to facilitate the gradual integration of the economy of Ukraine into the European economic and political space, to unify the strategic goals and vision of the country's development according to the best world standards, to create conditions for the implementation of the Sustainable Development Strategy based on the balance of economic tasks, social justice, and environmental security. In this context, many practical steps and achievements have been made: the Sustainable Development Goals have been approved, monitoring of their implementation at the national and regional levels has been organized, the processes of digitalization of public administration are actively underway, the decentralization reform has been implemented, which opens up new opportunities for the sustainable development of communities and territories, taking into account the specifics of their natural, economic, human potential and cultural heritage, the concept of inclusive growth and competitiveness is implemented. However, despite the positive trends and achievements, an effectively functioning model of innovative provision of sustainable development of regions has yet to be created. Among the main problems of the formation and implementation of such a model are the low level of integration of the scientific research sphere and the real sector of the economy, the low innovation activity of enterprises and organizations caused by the lack of investment in innovation activity, the weakness of the state system of stimulation, support, and support of innovation-oriented projects in the field of sustainable development, the conflict of the process of balancing the goals of sustainable development at different management levels.

2 Literature Review

We agree with the opinion of [1], that the factors determining the sustainability of the region's development are:

"- social development (demography, household services, etc.); - optimization of the economic structure of the region in terms of the type of extended reproduction (labor-, fund-, resource-saving), which ensures the maximum economy of public labor in the region; formation of intensive foreign economic and interregional ties; - weakening of the negative economic consequences of economic development and exploitation of the territory of the region; - the creation of a regional innovation complex, necessary for maintaining the sustainable pace of development of the region and ensuring its competitiveness".

In [2], the topics covered include the development of sustainable housing models, energy and environmental issues in building design and technical systems, recycling for a sustainable future, models for humanitarian emergencies, and low-cost and web-based digital tools with applications in architecture and archaeology.

This paper will describe a model for the development of sustainable innovations. The model focuses on idea generation in the early phase of the innovation process, addressing the fuzzy front end of innovation. In this context, specific goals and principles of sustainable development are integrated into a problem-solving approach, [3]. The proposed model contributes to the expansion of innovation capability theory by shaping the innovations within the scope of social needs, which could be applied in other settings, [4].

The current economic and social crisis invites us to discuss "sustainable innovation" or "environmental innovation" as a basis for a new techno-economic (and social) paradigm founded on savings of energy and resources and the development of renewable energies. The economic analysis of the relationship between innovation and performance should include the environmental constraint as the ultimate limit of the development of capitalism, [5].

The impact of decentralization processes on forming a model of sustainable development of

regions was studied by scientists by the goals of Sustainable Development, [6]. Likewise, the study of world experience in the formation of an innovative model of sustainable development has been studied by many scientists, [7].

Therefore, the formation of an innovative model of sustainable development should be preceded by a detailed analysis and assessment of the region's current state in the context of compliance with the main parameters of its functioning with the goals of sustainable development. Such an assessment will allow us to identify the primary "gaps" as well as the strengths of the region and to develop appropriate strategies and programs.

3 Materials and Methods

To evaluate the quality of functioning of the model of sustainable development of the region, indicators and indicators are proposed in the work, which are laid down in the goals of sustainable development for the regions of Ukraine with their systematization and certain additions. It is proposed to measure the compliance of these indicators at the regional level on a 100% scale, which will contribute to the unification of indicators and the simplification of analytical support for decision-making. The process of assessing the quality of functioning of the sustainable development model of the region is proposed to be carried out in four stages:

- 1) Formation of a database of indicators of sustainable development of the region in terms of indicators of economic (X), social (Y) and environmental direction (E);
- 2) Determination of normative (Nx_i, Ny_i, Nz_i) indicator values, which can serve as data of the comparative period, planned indicators or reference values achieved in other regions;
- 3) Assessment of achievements at the level of indicators is carried out according to the following formulas:

$$\text{- for indicators of stimulants: } P_{xi} = \frac{Fx_i}{Nx_i} \times 100 \quad (1)$$

$$\text{- for indicators de stimulants: } P_{xi} = \frac{Nx_i}{Fx_i} \times 100 \quad (2)$$

Where, P_{xi} - the level of achievements of the region according to the i-th indicator of sustainable development;

Fx_i - the actual value of the indicator;
 Nx_i - normative value of the indicator.

The assessment of achievements (integrated indicator) at the level of indicators of sustainable development is carried out according to the simple average formula:

$$X = \frac{\sum_{i=1}^n Px_i}{n} \quad (3)$$

According to this methodical approach, the indicators for evaluating the goals of sustainable development presented in [8], which are highlighted in the 17 Goals of sustainable development, are grouped according to the directions of sustainable development of the regions into three blocks, namely: economic block (X), social block (Y) and ecological block (E). Within each block, the most relevant indicators from the author's point of view are selected. As a result of the calculations, we will receive the results of achievements in the field of implementation of the model of sustainable development of the region both in terms of the general economic, social, and ecological components and in terms of indicators, which will create prerequisites for making management decisions regarding the revision of goals, improvement of influence tools, optimization of transformational processes. Furthermore, the creation of an information base using the proposed approaches and the organization of periodic monitoring of the implementation processes of the sustainable development model will contribute to the self-organization and self-improvement of the model.

4 Results and Discussion

The assessment of the quality and effectiveness of the model of sustainable development according to the proposed approaches was carried out on the example of the Black Sea region. Using the data presented in the report, [8] and statistical data for the regions of the Black Sea region, [9], the deviations of the indicators of the regions from the average data for the regions of Ukraine by economic, ecological, and social block were calculated.

They were using formulas 1-3. standardized values relative to the average level and complex indicators of economic achievements of sustainable development of the Black Sea region in the section of the central regions were calculated. The results of the calculations are presented in Table 1.

The results of the calculations show the regions' strengths and "gaps" in terms of the leading indicators of economic development compared to the average values achieved in the regions of Ukraine. Thus, the lowest level of economic development is observed in the Kherson region. The obtained integrated indicator is only 60% of the regional achievements achieved on average. Weaknesses of the region include, first of all, the low level of investment and innovation activity. The level of creation of high-tech products in the regions is only 0.11%, and the level of involved investments per capita is 31,000 dollars USA. Odesa region is leading in terms of such indicators as the share of investments in machinery, equipment, and inventory in the structure of investments in tangible assets, the share of exports of goods with the use of high and medium-high-level technologies in the production of goods in the total volume of goods exports, and the employment rate of the population aged 15–70. These indicators are higher than the average for other regions. At the same time, the level of innovation costs (0.7%) in GRP, the share of realized high-tech products, and direct investments per person of the population are shallow.

The highest level of achievements regarding the economic component of sustainable development at the beginning of 2020 is observed in the Mykolaiv region. The region leads in 4 indicators out of 10. Positive for the region's development in 2019 is the start of a pilot project on SMART specialization, which would attract

additional volumes of foreign investment in the development of the food industry and organic agriculture. Despite some movement in this direction, SMART specialization projects are still in progress. Quarantine measures related to the COVID-19 pandemic, which negatively affected the advancement of all projects in the regions, were the main inhibiting factors. As in other regions of the Black Sea region, the level of innovative activity and technological efficiency of manufactured products and services is low, which creates barriers to forming an innovative model of competitive economic development.

This indicates that the existing innovation potential needs to be increased. The region needs to strengthen the innovative component of development, intensify efforts to develop and implement innovative technologies, build innovative infrastructure, and develop cooperation with international partners in scientific and technical support and development. The following assessment component analyzes the region's achievements in the social sphere. The actual indicators of social development in Ukraine and the regions of the Black Sea region, which are used for evaluation according to the social block of sustainable development, are grouped.

Using the data in the table, the comparative indicators of the state of the social block of the goals of sustainable development of the region were calculated. The results of the calculations are given in Table 2.

Table 1. Comparative indicators of sustainable economic development of the Black Sea region, %

Indicators	Indicators of economic development	Mykolaiv region	Odesa region	Kherson region
x ₁	Index of the physical volume of the gross regional product, %	106	106	109
x ₂	Ratio of capital investment and GRP, %	88	73	70
x ₃	Direct investments of non-residents in the region (equity capital and debt instruments) received during the year, USD. USA per 1 person of the population	14	51	31
x ₄	The share of the export of goods with the use of high and medium-high level technologies in the production of the total volume of export of goods, %	193	172	60
x ₅	The ratio of innovation costs and GRP, %	88	7	32
x ₆	The share of investments in machines, equipment, and inventory in the structure of investments in tangible assets, %	98	105	106
x ₇	GRP per 1 employed worker, thousand UAH	78	81	60
x ₈	Employment rate of the population aged 15–70, %	103	101	99

Table 2. Comparative indicators of sustainable social development of the Black Sea region, %

Indicators	Indicators of social development	Mykolaiv region	Odesa region	Kherson region
y ₁	The share of the population with average per capita equivalent cash incomes per month below the actual subsistence minimum in the total population, %	89	113	88
y ₂	The share of food expenses in total household expenses, %	101	92	90
y ₃	Consumer price index for food and non-alcoholic beverages (until December of the previous year), %	99	101	101
y ₄	The average life expectancy of men at the age of 15	98	99	97
y ₅	The average life expectancy of women at the age of 15	98	98	98
y ₆	Number of students of higher educational institutions of III-IV accreditation levels, per 10,000 population	73	127	60
y ₇	The share of the population that reported using Internet services in the last 12 months	100	95	95
y ₈	Salary ratio of women and men, %	93	102	116
y ₉	The share of rural full-time educational institutions with computer software training tools, %	32	50	120
y ₁₀	Enrollment of children in preschool educational institutions, in % of the number of children of the appropriate age	124	98	122
Y	Integrated indicator	91	81	82

Source: Calculated by the authors

The indicators from the calculations indicate that social security in the region corresponds to the level achieved in other regions on average. The highest indicators of social security were achieved in the Mykolaiv region due to the achieved level of economic growth in previous periods. In particular, the region has a developed communication infrastructure, a relatively high level of social infrastructure development, which is determined by the level of enrollment of children in preschool educational institutions (on average, 24% higher than in Ukraine), a sufficiently high level of food supply, medical care is organized at an appropriate level. The most problematic issues still need to be addressed regarding the computerization of schools and the development of higher education institutions.

Compared to the economic bloc, the situation regarding social security by the goals of sustainable development in the Kherson region is better. Thus, in the region, relatively lower growth rates of consumer prices are observed, a high level of children's enrollment in preschool educational institutions (20% higher than the average for Ukraine), and the principle of gender equality is observed.

The Odesa region leads in terms of educational provision due to the high concentration of higher mass institutions (more than 27% compared to other regions), a comparatively lower index of growth in consumer prices, and comparatively lower poverty rates of the population. At the same

time, more development of social infrastructure facilities and information and communication networks is needed. The assessment of the social and economic vector of sustainable development in the Black Sea region showed that the region does not use its unique potential of the sea economic complex effectively enough.

In [10], the Black Sea region has a strong maritime potential, which unites port enterprises, shipping business, various service enterprises, etc. Each subject of maritime economic activity has its own economic interests. In the process of realizing such interests, under the condition of increasing the level of intensity of competition, economic entities quite often ignore the need, even the obligation, to take into account the general societal goal of development and even the general goal of increasing the level of competitiveness of the region's transport complex. During the formation of the development goal of the coastal region, attention should be focused on the need to ensure the balanced development of its transport complex.

Existing problems in innovation and technological development require additional attention from local authorities and self-government. Issues related to forming intersectional transport, food, and innovation clusters are the subject of discussion. They are under the close attention of regional management bodies and the scientific and business community.

Table 3. Comparative indicators of sustainable ecological development of the Black Sea region, %

Indicators	Indicators of Ecological Development	Mykolaiv region	Odesa region	Kherson region
e ₁	Indicator of compliance with sanitary standards of communal sources of drinking water supply, %	83	152	61
e ₂	Use of fresh water for drinking and sanitary-hygienic needs, m ³ /person	90	118	123
e ₃	The share of discharges of polluted (polluted without treatment and insufficiently treated) wastewater into water bodies in the total volume of discharges, %	546	66	819
e ₄	The share of energy produced from renewable sources in the total final energy consumption, %	79	283	299
e ₅	Emissions of pollutants into the atmosphere from stationary and mobile sources of pollution, per km ² , tons	300	200	390
e ₆	The share of incinerated and utilized waste in the total amount of generated waste, %	15	16	71
e ₇	The share of the area of territories and objects of the nature reserve fund of the region, from the total territory of the region, %	45	70	239
e ₈	Volumes of legal extraction of aquatic bioresources in the exclusive marine zone of the region, per thousand ha	19	163	39
e ₉	Indicator of compliance with sanitary standards of communal sources of drinking water supply, %	147	133	255
e ₁₀	Use of fresh water for drinking and sanitary-hygienic needs, m ³ /person	83	152	61
E	Integrated indicator	90	118	123

Source: Calculated by the authors

Specific initiatives are already being implemented, but the mechanisms for implementing these structures still need to be more effective due to weak institutional capacity, conflicts of interest that are not regulated by domestic legislation, and the lack of a clear strategy and action plan. Analyzing the block of environmental indicators of sustainable development it should be noted that by 2022, environmental safety indicators in all regions of the region were significantly better than the average for Ukraine.

As can be seen from the table, in all regions of the region, the indicators of atmospheric air pollution through emissions from stationary and mobile sources of pollution, a high level of water supply to the population, a low share of polluted water discharges, and the generation of high-hazard waste are several times lower. All this is due primarily to the need for more concentration of chemical, heavy, and extractive industrial facilities. A significant advantage in the region is also a relatively high level of energy production from renewable sources (wind and solar), which is facilitated by appropriate climatic conditions—using formulas 1-3. standardized values relative to the average level and complex indicators of ecological safety of the Black Sea region were calculated in terms of the central regions. The results of the calculations are presented in Table 3.

Despite the high comparative indicators of the ecological situation of the Black Sea region, several problematic issues must be resolved in forming and implementing a sustainable, ecologically oriented "green" development.

Such problems are pollution of the water area of the Black and Azov seas due to artificial accidents, reduction of fertility, soil erosion and desertification of agricultural territories, climate changes, which lead to a reduction in rainfall in productive periods, and showers that lead to flooding, high levels of current agricultural waste, inefficient waste management technologies, etc.

To the main measures that need to be implemented to improve the ecological situation in the regions of the Black Sea region, scientist belongs to: "

- increasing the efficiency of the use and protection of natural resources based on the reduction of plowed land, stopping the degradation of grants, and increasing their fertility;
- selection of optimal parameters for the use of the region's natural resources;
- establishment and implementation of fines for violation of conditions of use of natural resources;
- achieving a balanced ratio of lands in zonal land use systems;
- formation of a highly efficient and productive land use system as a reliable basis for solving the food security of the region and the state;

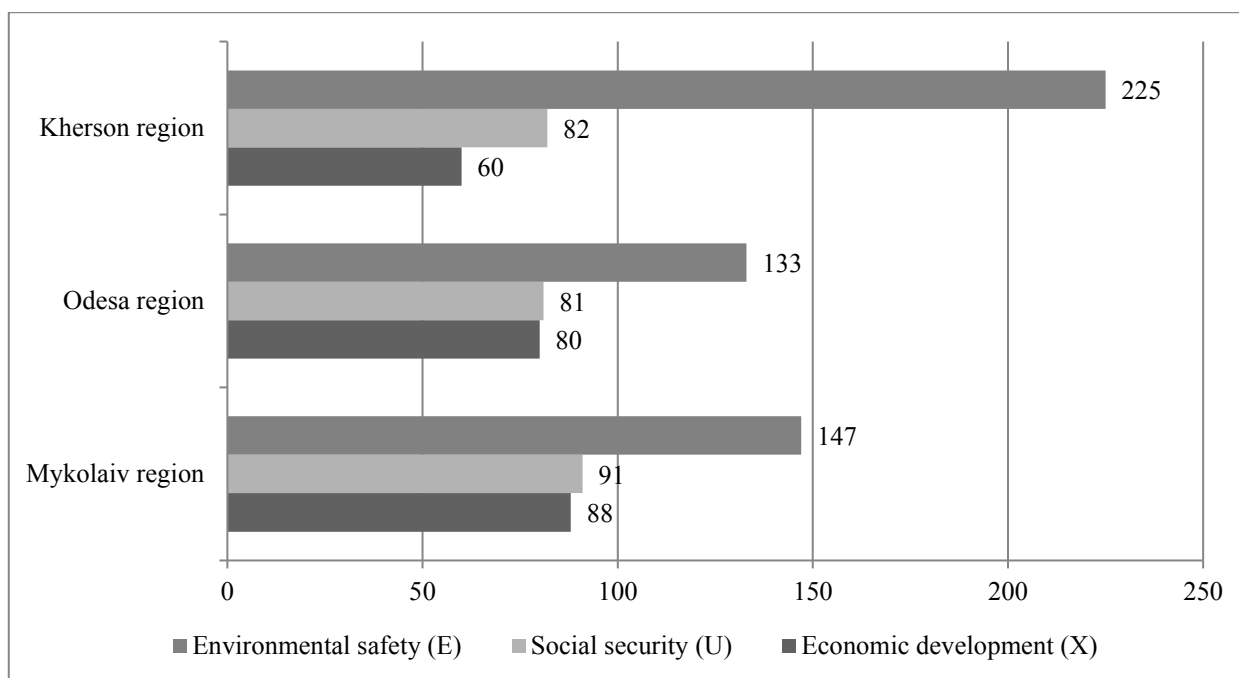


Fig. 1: Comparative level of achievement of the Sustainable Development Goals of the regions of the Black Sea region at the beginning of 2020

Source: Calculated by the author

- formation of adequate legal, economic, and organizational prerequisites for rational water use;
- the creation of closed cycles of water use with minimal water pollution;
- implementation of water-saving forms of management;
- restoring the functions of water sources;
- attraction of investments in the renewal of the tourist infrastructure of the region;
- restructuring and expansion of existing branches of production;
- the creation of clusters between scientific institutions, administrative bodies, financial institutions, and enterprises of the region,
- development of agricultural production with a focus on meat and dairy specialization", [11].

The results of calculations of integrated indicators characterizing the achieved level of sustainable development of the regions of the Black Sea region at the beginning of 2020 are illustrated in Figure 1.

The conducted calculations showed that compared to the average values for the regions of Ukraine in the Black Sea region, in particular in the Kherson region, a high level of environmental safety had been achieved due primarily to the low level of hazardous production waste generation and atmospheric emissions, and the widespread use of renewable energy sources. This is due primarily to the peculiarities of the production potential of the regions in which agricultural production and processing prevail. As for the economic and social

component, the level of achievement of the average value is, on average, 80%. The Black Sea region has significant potential for implementing the model of sustainable development. It is worth highlighting the significant resource potential for developing alternative energy. In the coastal regions of Ukraine, the average annual wind speed exceeds five m/s, which creates conditions for the effective use of wind energy. The potential of solar energy in the Black Sea region is 1400 kW/km.m - on the same level as countries that actively use solar energy (USA, Germany), [12].

The sustainable use of the resources of the Maritime Complex, which is one of the leading industries, is also an urgent problem of the sustainable development of the regions of the Black Sea region. Today, some of its sectors (sea transport, port activities, tourism, and recreation) are important for developing the global economy. A paradigm shift in the use of such key and specific resources is an important condition for the formation of an innovative model of sustainable development of the regions of the Black Sea region, which will ensure not only economic growth and competitiveness but will also have an impact on the development of the national economy. Currently, Ukraine is experiencing tragic and unprecedented events of military aggression by the Russian Federation in terms of the level of destruction of economic and human potential, which by their nature are not only turbulent for the economy and

society but also completely unpredictable in terms of consequences for both regions and of Ukraine as a whole.

The territories of the regions, in particular the Black Sea region, have suffered significant destruction and irreparable losses of economic, human, and natural potential and ecological damage. As a result of the full-scale war, the ecological problems that existed in Ukraine before its beginning became much more complicated. The lack of access to the territories and objects of environmental management, the loss and destruction of infrastructure, the loss of personnel and the limited ability to work, the suspension of control measures, and the cancellation of the obligation to pay environmental tax during the period of martial law negatively affected the opportunity to implement state management in the field of environmental protection fully. This poses a threat to the strategic goals of preserving biodiversity, decreases the potential for absorbing greenhouse gases, and increases the process of desertification. Endemic species of plants and animals are under critical threat; their disappearance will have catastrophic consequences for biodiversity on a planetary scale.

Military operations covered almost 3 million hectares of forest in Ukraine. Because of the war, more than 4.6 million people in Ukraine have problems with access to drinking water. Environmental and safety risks are growing, hazardous waste from destruction and military waste is generated, and 160,000 sq. km of territories of Ukraine are contaminated with explosive objects. As a result of the destruction of buildings, a large amount of waste containing ozone-depleting substances is generated, particularly insulation materials, insulating foam, etc. Pollution occurs due to the destruction of transport and industrial infrastructure, which leads to large-scale spills of oil products and other hazardous substances, [13].

Thus, after the war, Ukraine and its regions will face new problematic issues that require solving and attracting significant financial resources. Currently, the war is not over, and it is impossible to calculate the casualties. However, the necessity of forming a legislative framework and other basic conditions for rebuilding the economy, overcoming the consequences of environmental disasters, and restoring human potential is already evident today. Taking into account the significant destructive consequences, we can say that the task is not just to restore the potential of regions but to create

conditions for reengineering, that is, to build a new ecologically oriented model of regional development from scratch, based on available resources and innovative technologies for their processing into material goods.

Given this, the issue of implementing a model of sustainable development based on innovation is brought up to date after the victory, taking into account the scale of the damage, available resources, and the priority tasks of economic recovery and development. At the same time, the innovative model of sustainable development is the most promising in the context of reengineering the management of processes of revival and further growth of regional systems. The concept of reengineering also affects the enterprise level. This is a method of radical business restructuring, a revolutionary transformation of enterprise activity, which was first described and introduced into scientific and practical activity by American researchers in their book defined reengineering as "a fundamental rethinking and radical redesign of business processes to achieve significant improvements in such key performance indicators for modern business as costs, quality, service level, and responsiveness", [14].

In the conditions of radical market transformations caused by the rapid dynamics of scientific and technological progress, reengineering is considered a way of restructuring the business for maximum adaptation to new conditions. According to the definition of "reengineering of business processes - targeted and systematic modeling and reorganization of the material, financial and information flows aimed at simplifying the organizational structure, redistribution and minimizing the use of various resources, shortening the terms of the implementation of customer needs, improving the quality of their service and increasing the viability of the company, which takes place in the company's revolutionary use of crisis phenomena and comprehensive improvement of business processes", [15].

In current conditions, the principles and approaches of reengineering are also relevant for forming regional development models, especially considering the study of military actions. Therefore, in the research process, the model could be considered a tool necessary for describing the basic principles of formation, development, and effective functioning of the created object. According to its conceptual content, the region's sustainable development model is innovative.

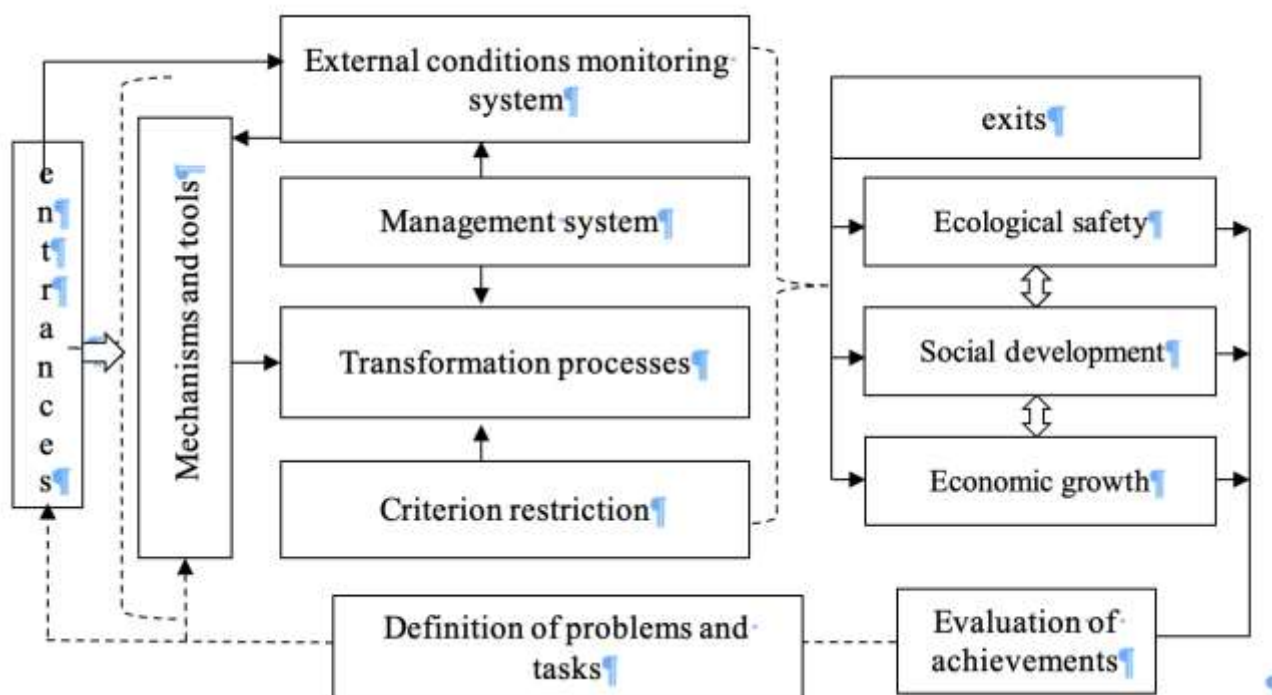


Fig. 2: Design of an innovative model of sustainable development of the region

Source: generated by the author

However, due to the transition of socio-economic systems to the processes of ensuring the balance of the primary goals of sustainable development, it is only possible with a significant transformation of organizational design and management, production, distribution, and consumption technologies. Taking into account the experience of the EU countries in the field of formation of models of sustainable, competitive development of regions, as well as theoretical and methodological approaches to the formation of socio-economic systems, we propose the design of an innovative model of sustainable development of the region, the implementation of which is possible at various organizational and administrative levels (Figure 2).

The design of this model reflects the main principles, criteria, mechanisms, and tools for implementing the goals of sustainable development in the regions, which can be integrated into the management systems of state and regional projects at different levels. The model is formed based on considering the region as an open system interacting with the external environment, purposefully carrying out transformational processes, the results of which must satisfy the criteria of sustainable development.

The model envisages the continuous functioning of the regional system based on self-organization, which is based on the gradual improvement of potential, technologies, and

management mechanisms, taking into account the existing achievements and shortcomings by establishing horizontal and vertical communications. In conditions of turbulence, the model's effectiveness depends on its components' adaptive qualities, primarily management systems, tools of influence on transformational processes, and technologies used. The main components of the model are:

- 1) Inputs, which include all resources and information that come from the conditional external environment, namely: financial, material resources, technology, and information from stakeholders.
- 2) Transformational processes include all processes of ensuring the livelihood and development of the region. At the same time, process implementation technologies are focused on the wide implementation of innovations aimed at the economical use of resources, minimization of energy consumption, reduction of harmful emissions into the atmosphere and environmental pollution, and human development. According to modern approaches, an important factor in the region's competitiveness is identifying and developing key competitive advantages, which allows concentrating efforts and limited financial resources on the innovative development of economic sectors, depending on the available resource potential.
- 3) Criterion restrictions are a set of factors that affect the sustainable development of the region,

which must be taken into account when developing regional plans and programs (legislative acts regulating the public management of territories, the budget code, and other legislative acts; available resource, financial, human resources potential of the territory; level of infrastructure development; no specific requirements)

4) Outputs as a result of transformational processes that determine the quality of the functioning of the model, taking into account the level of achievement of the established sustainable development criteria and their balance. We believe that in conditions of turbulence and uncertainty, a model of sustainable development of the region should be formed based on reengineering.

That is the formation of fundamentally new approaches to the organization and management of the region based on the definition of the main, service, and auxiliary business processes and managing business processes for each of which it is possible to establish clear criteria for the effectiveness of implementation, taking into account the goals of sustainable development. An important role in the implementation of the innovative concept of sustainable development belongs to local communities, which, by the decentralization reform, received broad powers and additional financial resources that can be directed to projects of socio-economic development of territories, in particular, taking into account the criteria of innovation and sustainable development. To date, innovative territorial development models based on well-founded smart strategies have been developed and partially implemented. Standards and criteria have been defined, which are used to initiate and monitor the sustainable development processes of communities at the stage of active implementation of "smart city" projects in several cities of Ukraine. Further implementation of these initiatives, provided adaptive management mechanisms are provided, will contribute to the sustainable development of the regions.

5 Conclusions

The design of an innovative model of sustainable development of the region in conditions of global turbulence is proposed, which covers the main principles, criteria, mechanisms, and tools for implementing the goals of sustainable development in the regions, which can be integrated into the management systems of state and regional projects at various levels. The model of sustainable development of the region is focused on ensuring the continued functioning of the regional system

based on self-organization processes based on the gradual improvement of potential technologies and management mechanisms, taking into account existing achievements and shortcomings through the establishment of horizontal and vertical communications and the development of adaptive qualities of its components.

To increase the adaptability of the model of sustainable development in conditions of global turbulence, the following measures are proposed: digitization and integration of public administration using Big DATA technologies; development of criteria for anticipatory assessment of hazards and preventive measures for their elimination; modeling of situations and development of alternative plans for the implementation of sustainable development goals; stimulating the development of small businesses as one of the most adaptable and mobile market participants; human development.

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- Olena Pavlenko, and Herman Karpenko, carried out the simulation and the optimization, formal analysis
- Inna Irtysheva, Marianna Stehnei, Iryna Kramarenko, and Yevheniia Boiko, was responsible for the Statistics, and conceptualization.
- Iryna Nadtochiy, Ihor Sirenko, and Natalia Hryshyna, have organized writing - original draft.
- Olena Ishchenko, Natalia Tubaltseva, Uliana Rosola performed visualization.

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