UDC 330.837 : 502.57

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Institutional principles of balanced nature management in the context of environmental and natural-technogenic safety

Abstract. The article reveals the main ecological and natural-technogenic prerequisites for the formation of modern adverse environmental conditions in Ukraine. In particular, the paper deals with specific features of renewal of fixed assets in the territory of the state as a whole. It also shows the disastrous state of their renewal rates by types of economic activity. The imbalances of infrastructure upgrades in Ukraine are detected by different techno-economic paradigms. The role of potentially dangerous objects in the formation of ecological risks and threats to the environment is defined and considered. It has been found out that the main reason for the imbalances of nature management in the context of environmental and natural-technogenic safety is imperfection of institutions for the environmental protection.

Based on the above, the authors consider the functional dimension of modern threats to sustainable development and propose their classification depending on the origin: classic and synergistic threats, transformations of human consciousness and social, ecological and economic imbalances. As a result of the studies, the authors have found out that the main problems of institutional ensuring the environmental protection in Ukraine are primarily caused by processes of property transformation, economic relations, restructuring of the mechanism of functioning of industrial enterprises, which is aggravated by the difficult socio-economic situation in the regions. The role of formal and informal institutions in the formation of balanced nature management in the context of environmental and natural-technogenic safety has been singled out and analyzed. Thus, formal institutions, being formally enshrined norms and rules, represent only a small (but very important) part of the whole number of nature management limits. The informal ones are important for proper regulation of relations in the society where the leading role is taken nowadays by public environmental organizations.

Despite the fact that today's system of institutions guaranteeing ecological and natural-technogenic safety of Ukraine includes a number of subjects of different hierarchical levels with a specific set of functions and powers. Thus, the process of institutionalization of environmental management itself in the context of environmental safety is considered to be extremely unbalanced and inefficient. The authors believe that the formation of an adequate institutional environment is one of the key components in the effective management of sustainable development, which will provide the balance of the processes to maintain the interaction of all subsystems (environmental, economic and social). Therefore, the authors aim their further research at searching for new structural elements of management to complement traditional formal and informal institutions and finding ways to balance their activities.

Keywords: Institutionalization; Environmental Safety; Technogenic Safety; Balanced Nature Management; Sustainable Development Threats; Institutional and Organizational Mechanism
JEL Classification: E11; Q21; Q28; Q31

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Інституціональні засади збалансованого природокористування в контексті екологічної та природно-техногенної безпеки

Анотація. У статті виділено та проаналізовано передумови формування сучасного несприятливого екологічного стану території України. Розкрито функціональний вимір сучасних загроз сталому розвитку, запропоновано їх класифікацію залежно від генезису. Окреслено основні проблеми інституційного забезпечення захисту навколишнього природного середовища України та її регіонів. Виділено та обґрунтовано основні складові інституціоналізації збалансованого природокористування в контексті екологічної та природно-техногенної безпеки.

Ключові слова: інституціоналізація екологічної та природно-техногенної безпеки; збалансоване природокористування; загрози та виклики сталому розвитку; інституціонально-організаційний механізм.

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Институциональные основы сбалансированного природопользования в контексте экологической и природно-техногенной безопасности

Аннотация. В статье выделены и проанализированы причины и предпосылки формирования современного неблагоприятного экологического состояния территории Украины. Раскрыто понятие функционального измерения угроз устойчивому развитию, а также предложена их классификация в зависимости от генезиса. Определены основные проблемы институционального обеспечения защиты окружающей природной среды Украины и ее регионов. Выделены и обоснованы составляющие институционализации сбалансированного природопользования в контексте экологической и природно-техногенной безопасности.

Ключевые слова: институционализация экологической и природно-техногенной безопасности, сбалансированное природопользование; угрозы и вызовы устойчивому развитию; институционально-организационный механизм.

1. Introduction

Environmental and natural-technogenic safety determines the state of protection of an individual, society and state from the adverse impact of the environment that is caused by natural, technogenic and anthropogenic factors. The current ecological situation on the territory of Ukraine can generally be characterized as extremely tense. Manifestations of environmental and natural-technogenic threats, risks and dangers to health and lives of people in different regions of the state due to the negative impact of technogenic and dangerous natural processes have recently started to grow. So, today the depreciation of fixed assets of most sectors of the economy of Ukraine is on average 70%, and the rates of their renewal do not cover the rates of their depreciation. The ratio between the renewal and depreciation is 1x40 on the entire territory of Ukraine, 1x5 on the territory of Kyiv region and 1x336 in Vinnytsia region [1]. The depreciation indicators are catastrophic in industrialized regions: 78% in Dnipropetrovsk region, 88% in Kharkiv region, 72% in Zaporizhzhia region [1], which are also characterized by serious ecological problems (in these regions, there are city-champions on air pollution by emissions, there are constant problems with contamination of drinking water, soil, etc.). The economy of those regions is characterized by a high proportion of resource-demanding and energy-intensive technologies that were implemented and increased in the cheapest way without building appropriate treatment facilities, which was possible due to the absence of effective legal, administrative and economic mechanisms of nature management and lack of adherence to environmental safety requirements. Besides, in Ukraine there are still no systematic economic incentives for adoption of environmentally friendly technologies. The level of use of innovative, resource-saving and environmental technologies, including technologies for processing, recycling and disposal of waste remains low.

It is to be noted that during the given period the total value of fixed assets increased by all types of industries, reaching UAH 9.148 trillion in 2013 [2; 3]. At the same time, the share of low-tech types remained consistently high (in the range 26-30% of the total), while the high-tech types accounted for only from 1.9 to 3.5% [2]. Mid- and low-tech types of production include about a quarter of all fixed assets. The dynamics of their use slightly varied and lost about 3% during the crisis. High-tech industries were gradually losing their positions and dropped almost by half from 2002 to 2010 (from 3.5 to 1.9%) [2]. Against this background, the rates of archaic modes of production remained stably high, the share of which during the given period reached 30% of the total use of fixed assets, and their leading positions were not lost even during the economic crisis, which indicates a relatively low technological level of mining and manufacturing sectors of the national economy [2].

It should be noted that an increasingly wide coverage of various sectors with some innovation leads to the increase of the capacity of fixed assets and redistribution of national income in favor of accumulation. There are two opposite but complementary trends: on the one hand, the more effective a new technique is, the more beneficial it is to increase the scale of its usage, and, accordingly, to increase the rate of accumulation. On the other hand, the greater the saving of labor cost due to innovative development is, the more opportunities there are to gain from this source to implement long-term, but less effective projects. So, the more effectively some types of equipment are developed, the more opportunities there are for the development of other, less efficient types. However, the very technique and technologies create a major impact on the environment in the industrial sector, where any enterprise of chemical, metallurgic, mining branches and power energy can be attributed to a potentially ecologically dangerous object (PDO). For 2015, the State PDO Register includes detailed information on more than 24 thousand units [4; 5], where sudden emergencies may cause substantial environmental damage. These enterprises produce almost a third of industrial output.

Safety is the basic and primary requirement for the person who cares that nothing would threaten his/her life, property, and welfare. The need for safety is objective and is realized at both the individual and collective (group) levels. It should be emphasized that, unlike many others, the need for safety cannot be fully met for threats are continuously generated. That is why, in the context of the research topic, *institutionalization of environmental safety* is considered as a dynamic and purposeful process of identifying and fixing the norms, rules, statuses and roles with their further systematization. This system is based on the principles of balanced nature management and is able to work towards satisfaction of a certain social need, in particular, a sufficient level of environmental safety.

2. Brief Literature Review. Theoretical studies and practical developments of the institutional principles of balanced nature management in the context of environmental and natural-technogenic safety were conducted within the scientific-applied subject matter of the Institute for Environmental Management and Sustainable Development of NAS of Ukraine in the research works «Theoretical-methodological and practical basis for technological and ecological safety in the dimensions of sustainable development» (SR № 0111U000330, 2011-2012), where the authors developed institutional and organizational mechanisms of policy of safety ensuring; «Institutionalization of relations of subjects of using natural resources of Ukraine» (SR № 0111U000328, 2011-2012), where the authors identified the priority directions of institutionalization of natural resource relations; «Environmental and natural-tech-

nogenic safety of Ukraine in the regional dimension» (SR № 0112U004967, 2013-2014), where the authors developed strategic directions of the regional environmental and natural-technogenic safety of Ukraine in the context of sustainable development. Scientific results, conclusions and recommendations based on the authors' developments were sent to regional economic agents, state bodies of executive power and local government bodies of Ukraine in the form of scientific and analytical reports. J. Campbell [6], M. Heller [7], G. Hodgson [8], D. North [9], M. Khvesyk [10], O. Ivashyna [11], D. Burkaltseva [12] studied the problems of forming institutional principles of balanced nature management in the context of the genesis of environmental and natural-technogenic safety.

Analyzing the functioning of the established institutions of environmental protection, it should be noted that their activities to ensure environmental safety, unfortunately, are not fully successful, which can be explained by the following:

1) the desire of some subjects relevant to the process of nature management to protect their income, to gain maximum benefit despite all the environmental regulations, laws and standards;

2) the tendency of growing environmental selfishness when the desire of some subjects to protect the environment only as part of their activities within the specified areas and time is dominating;

3) the weak system of institutional ensuring of safety, which does not meet the current challenges;

4) the vacuum of the content when under the guise of declarations and conventions, programs and arrangements the absolute inaction is hidden;

5) the declarative nature and complete inaction in the sphere of reforms and modernization of environmental institutions because of the absence of coordination and responsibility for the decisions between the bodies of nature management at the macro, meso and micro levels.

3. The purpose of the study is to substantiate the genesis of natural-technogenic and environmental safety and to determine their potential, as well as to assess the functioning of the established institutions of environmental protection under conditions of the balanced use of natural resources.

4. Results

Institutional principles are considered as a set of scientifically based (and fixed) regulations, under which the process of institutionalization of social phenomena, i.e. turning them into certain organized structures, operation systems is taking place. The achievement of the intended parameters of environmental safety crucially depends on the current institutional system that ensures the creation and operation of interdependent forms and methods of economic and administrative management, fulfillment of the programs of interconnected ecological and socio-economic development, and does not allow subjective decisions about their changes (reduce of financing, restructuring and unjustified reallocation of other resources) in the process of its implementation.

The transition to balanced development of nature management is a new political goal for most countries of the world, including Ukraine. The prerequisites for the implementation of this policy are good management and effective state governing bodies. However, in order to be able to implement a new policy of balanced development in compliance with the requirements of safety observance, it is necessary to establish institutions focused on this policy.

The ambivalence in social, ecological and economic system is a direct threat to the stability of any system at the national, regional and local levels. The manifestations of this threat can take various forms (from explicit to implicit, latent), but threats intensify and acquire the character of direct actions during the financial, economic-financial and economic crises different by the scale and intensity. The functional dimension of the danger contains a range of dangers that differ with regard to the system (object) in which they operate, its environment, stimulus, scope and nature of the hazard (latent condition, accident, crisis, catastrophe), prevention opportunities and so on. In addition, transformation processes started by human give rise, firstly, to unpredictable by nature dangers and, secondly, «synergicity» of dangers, that is a combination of different types of components of «output» dangers, including the impact of the environment, or, in general, superimposing on the neutral phenomena and processes, thus turning them into dangers.

Hence, a clear initial classification of dangers is impossible and, moreover, the very identification of the type and content of danger becomes an element of safety management and blocking of corresponding threats. However, theoretically, the following groups of threats may be singled out: (Figure 1) [13]. *«Classic»* threats are related to the unregulated work of technical systems of the economy and its infrastructure that are characterized by spontaneous action and are not combined with their negative purpose. *«Synergistic»* threats are defined by synergistic laws of interaction of social and natural universes, the violation of which is accompanied by implicit but real pathologies of organic (natural, social) systems. *Threats of transformation of human consciousness* arise when the human psyche acquires more and more instrumental and pragmatic properties and loses organic, creative and critical properties at a growing human's «diving» into functionally «inorganic» information-communicative networks. *Threats of the so-called techno-humanitarian imbalance* arise as a result of prevalence of new technical possibilities of human that are rapidly growing over the moral responsibility for their use.

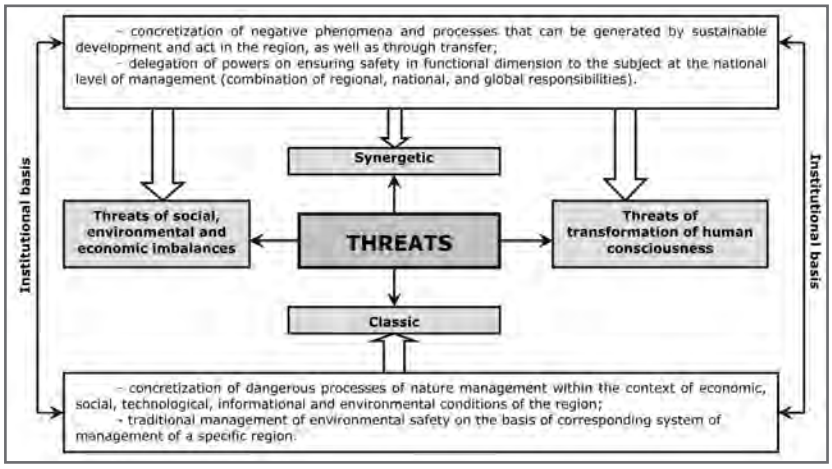

Fig. 1: **Functional dimension of modern threats to sustainable development**
Source: Developed by the authors

Therefore, modern institutional insurance of safety guarantee, which is to accompany balanced nature management, responding to functional dimension of threats, should include two main segments of safety management. *The first segment* should be connected preferably with the set of classic threats and use a set of the safety management methods which are now formed on the basis of management of natural-technogenic safety. In this case, the regional aspect of safety should be combined with specification of processes in the context of economic, social, technological, informational and environmental conditions of the region and act on the basis of the appropriate management system in the region. *The second segment* of safety institutionalization should correspond to mostly the second, third and fourth blocks of

threats (as they are fundamentally new) and be connected with «regional responsibility» for the negative phenomena and processes that can be generated by sustainable development and act both in the region and through the transfer, such as new technologies developed in the region, go far beyond its boundaries. So, the region should delegate its powers to enforce safety in functional dimension to the subject at the national level of control.

According to the «Agenda for the 21st century», the institutional environment is considered as the basis, the foundation, ensuring sustainable development on the whole and regulating the interaction of three subsystems of sustainable development, among which there are economic (involves sustainable economic growth), environmental (includes equilibrium nature management) and social (provides social progress) components. It is the institutes with their ability to act at the micro, macro and meso levels of economic system that become one of the direct factors of economic evolution and safety guarantee. Meanwhile, in the programs of reforming the national economy, the problems of formation of safe development, primarily as an economic institute and instrument of regulation of the country's vital activity are still given insufficient attention to. Therefore, it is necessary to form new institutional principles of safe development. The effective process of institutionalization is complicated by specific features of the Ukrainian industrial environment, transformation of ownership, economic relations and economic mechanism of functioning of industrial enterprises which is intensified by various socio-economic situations in the regions, such as:

1) high dependency of areas on industrial production, which leads to lack of interest of industrial enterprises in the efficient environmental policy of the state;

2) deficit of financial resources;

3) insufficient motivation of local communities;

4) inadequate system of state governing that is poorly adapted to market relations.

Specific institutional principles of implementation of state environmental policy have not been identified yet. The absence of a comprehensive approach indicates significant shortcomings in planning and implementing state programs of economically sustainable development of industrial production. So far, no conditions have been created in which the state environmental policy could effectively fulfill its role in raising the population's living standards and quality of life and ensuring social security of the state, promoting the growth of its economic competitiveness

The institutionalization of balanced nature management in the context of environmental safety should include several key components that represent a system of legal, institutional, organizational and financial tools that should be used in aggregate, which will ensure fulfillment of objectives of environmental policy and increase its effectiveness (Figure 2).

The legal component (legal mechanism) is formed, on the assumption that the creation and development of the regulatory framework, undoubtedly, are influenced by various factors, among which the following are crucial: features of the original legal framework; development of statehood of sovereign Ukraine; specifics of socio-economic and environmental situation of the whole country and its regions; expansion of international cooperation and Ukraine's aspirations for European integration, etc.

The institutional component of ensuring environmental safety covers the activities of institutional elements that represent subjects of state policy of different status with a special purpose and role in the process of its formation and implementation. The organizational component of the complex mechanism of formation and implementation of the policy of environmental and natural-technogenic safety is aimed at ensuring the functioning of institutions (subjects) of the policy, i.e., it is a set of rules and procedures for designing the functional structure of management and regulation of the interaction of its members, organizing their powers and so on.

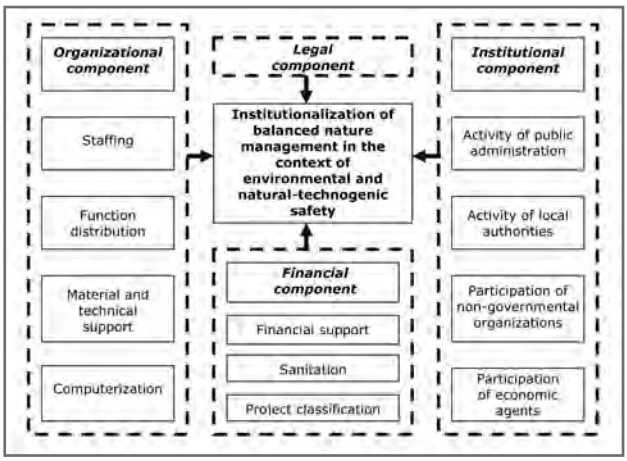

Fig. 2: **Components of institutional-organizational mechanism of environmental and natural-technogenic safety ensuring**
Source: Developed by the authors

The financial component of the complex mechanism of formation and implementation of the policy of environmental and natural-technogenic safety aims to create conditions for attracting financial resources for the development and promotion of projects through the formation of a multi-channel funding system.

So, safe environmental development institutions are to coordinate behavior of all of the subjects according to the tasks and principles of sustainable ecological and socio-economic development. This is a set of informal rules and norms of social behavior and mechanisms formally enshrined in the law to ensure their compliance and to structure the interaction in society according to the principles of sustainable development. In today's world it is believed that life and economy are managed by the official (formal) institutions [9].

Formal institutions are formally vested norms, i.e. rules legitimized by specific competent authorities and fixed as acts or written orders based on regulations (the Constitution, statutory and common law, judicial precedents, regulations, etc.) and cover political (and judicial) rules, economic rules and contracts. However, official institutions are only a small (but still very important) part of the restrictions.

Informal institutions are important for regulating relations in society. They originate from public information as part of the heritage that we call culture. Informal institutions are informal constraints (norms, customs, traditions, codes of behavior, various conventions, etc.).

As it is known, solving environmental problems is a long-term process and its results cannot often be appreciable immediately. The state, by including the environmental component in the socio-economic policy, determines the behavior of individuals, companies and public organizations. The bodies of state power are engaged in the process of formal consolidation of rules and regulations, thereby speeding up the process of changes in society to meet the objectives of sustainable development and at the same time to ensure their implementation. The bodies of state power also ensure the mechanisms of public compliance with established formal institutions of sustainable development. However, it is necessary that the government itself, with its socially sanctioned enforcement powers, should follow the rules laid down by it. For this purpose, there is a need for broad participation of the public as the institution controlling the fulfillment by the state of its commitments.

In this aspect, increasing is the role of public organizations that can generate signals about the ineffectiveness of institutions of ensuring environmental and natural-technogenic safety on the way to sustainable development and the need for institutional changes in order to adjust and adapt the legislation to the environmental needs of society, and monitor the government's fulfillment of the specified official limits. Currently, the system of institutions of ensuring ecological

and natural-technogenic safety includes a number of subjects of different hierarchical levels with the defined set of roles and responsibilities, but the actual process of institutionalization of nature management in the context of environmental safety is unbalanced and inefficient. For instance, in 2013 territorial regional subdivisions of the Ministry of Environmental Protection of Ukraine were abolished and some of their functions were transferred to regional administrations. The following issues remain unsettled:

- registering objects that have or could have harmful effects on human health and air quality;
- reviewing and registering reports on inventory of pollutant emissions at enterprises;
- providing enterprises with specified background concentrations of pollutants;
- rendering information about the quality of work performed to organizations that develop documents substantiating emission volumes of economic players;
- developing and reporting on the implementation of regional plans for mitigating consequences and adapting to climate change;
- reporting by the joint program on observations and evaluation of air pollutants spread over long distances in Europe (the Convention on Long-range Transboundary Air Pollution of 1979).

According to economic consequences, there are clear problems of institutional changes, such as:

1) centralization of licensing procedures is enhanced;

2) the National Commission of the Red Book, the State Commission of Ukraine on mineral resources, the Coordination Council on the establishment of ecological network, etc are transformed;

3) the right of the Ministry of Ecology and Natural Resources of Ukraine to approve prescribed cut and limits on getting game animals is abolished;

4) the ban on burning remnants of natural dry vegetation is lifted, which may lead to a rise in the number of forest and steppe fires;

5) because of the absence of territorial bodies, the Ministry of Ecology and Natural Resources of Ukraine is detached from solving issues of using natural resources: forests, subsoil, water resources;

6) the matter of the person responsible for environmental policy remains open since according to the Law of Ukraine «On the Fundamental Principles (Strategy) of Ukraine's State Environmental Policy for the Period until 2020», these functions have been assigned to the territorial bodies of the Ministry of Ecology and Natural Resources of Ukraine that were recognized as the major institutional body of the implementation of the National Environmental Policy at the regional and local levels.

5. Conclusions

Adequate institutional environment is one of the key components of effective management of sustainable development, which ensures a balance of the processes on the whole by means of interaction between all subsystems (environmental, economic, and social).

The development of the institutional prerequisites for sustainable environmental management in the context of environmental and natural-technogenic safety is a long-term process and its results are not often appreciable immediately. Substantiation of the content, ways of establishing and directions of evolution of institutions as elements of institutional environment of market economy should be supplemented by studies aimed at seeking and including new structural elements complementing traditional formal and informal institutions in creating the framework of the economic system. Special attention, therefore, is paid to institutions and forms of cooperation between economic agents that fill the institutional structures with necessary elements to guarantee environmental and natural-technogenic safety in the context of balanced nature management.

Further, the problems of institutionalization of safety are studied by the authors as part of a scientific-applied research works «Ecological modernization in the system of natural-technogenic and environmental safety of Ukraine» and «State environmental policy of Ukraine under decentralization of power», where the essence of the processes of modernization is revealed not only in terms of companies that are economically interested in environmental protection, but also from the standpoint of forming a flexible system of safety management institutions. In our opinion, the controlling center of this system is the state, but the system itself is considerably decentralized, including self-regulation of companies and activities of non-governmental environmental organizations.

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Received 28.09.2015

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Стаття надійшла до редакції 28.09.2015