

Algorithm for Organizing the Process of Ecological and Economic System Regulation of the Territorial Unit

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Abstract

The optimization of using the natural-resource potential of the region is the most important function to manage the social and economic regional interactions, causing the needs to make changes in the management system for the balanced eco-economic development of the territory by taking into account the intensification of reproduction processes. The challenge of improving the theoretical and methodological framework and toolkit to form the scientifically-based system of balanced use of regional resources is characterized by a high theoretical and practical importance. The purpose of this study is to elaborate the perspective directions of regulation development for the environmental and economic sustainability of the territory system. Unlike the undertook studies, the given empirical study focuses on simplifying the regulatory process of ecological and economic development in the region due to the integrated management systems (IMS) implementation.

Keywords: ecological and economic system, development, management, ISO 9000, ISO 14001, integrated management system, Balanced Scorecard

1. Introduction

Currently the development of ecological and economic systems occurs under the influence of globalization and dynamism, contributing to both an increase in the growth rate and the higher uncertainty and instability of economic development (Younga et al., 2006, Sardar et al., 2003), causing the necessity of appealing to the theory of sustainable development (Mulder & Van Den Bergh, 2001), which is currently under the development (Robinson, 2004). From a perspective of the system approach, the sustainable development can be determined as a type of internal deterministic system changes leading to its development and progress. The development becomes unstable, when a crisis state occurs, which leads to the system breakdown. Consequently, the transition to the sustainable development paths requires the formation of environmentally and economically balanced strategy (Akgün et al., 2012), which combines the economic and resource regional needs. At that, the economic and environmental systems should be considered as parts of the subsystem, combination, and co-evolution of which is accompanied by the entire system conversion, and the occurrence of emergent properties.

Among the factors that determine the sustainable ecological and economic development of the region, we shall allocate the following:

- increasing the resource base;
- raising the population's living standards;
- ensuring the environmental safety of the region;
- improving the economical indicators of the region.

Taking into account that the region is a part of techno-biosphere limited by a certain territory, wherein the natural, social and industrial structures and processes are linked with the inter-supporting flows of substance, energy, and information, the sustainability of ecological and economic system represents the dynamic sustainability and is implemented under the certain relations between the parameters, which characterize the state in the economy and ecology of the territorial unit (Moffatt & Hanley, 2001). Changes in one of given areas without corresponding changes in the other may be the cause of dynamic equilibrium violation.

The recent institutional changes make it necessary to apply the standards of ISO 9000, simplifying the development and implementation of environmental management in accordance with standard ISO 14001, which leads to the optimization of using the natural-resource potential of the region (Zhu et al., 2013).

2. Methods

The theoretical basis of the work made the foreign and native concepts of sustainable development, hypothesis and the main provisions of ecological and economic interaction, regional development management, analysis and management decision-making, theories and concepts of a State and Regional Development, Strategic Management theory, and the process-oriented approach to managing economic system.

The methodology is based on the systematic approach principle, under which "Economy - region - nature" are considered as a single system, and the region – as a key part of their interaction, wherein its rationality criteria should be established in view of the essence and nature of the relations, inherent in the system as a whole, and not only for its economic or ecological subsystems. In addition to the system analysis methods in the work the important role played the structurally functional, regulatory, comparative and statistical analysis and forecasting, methods of induction and deduction, economic and mathematical modeling, comparisons and analogies, expert judgments, Econometrics, economic and statistical groupings and dynamic series, and other.

In the course of work the works results of Russian and foreign economists specializing in the field of sustainable development, working out of theoretical and methodical bases of Environmental Policy, Regional Development, as well the determination of place and role of the environmental factor in the region development have been used. Statistical data, materials of international and Russian conferences on problems of natural processes monitoring, control system integration, and the ISO data, provided in the annual report, have been used.

3. Theory development and hypotheses

In the discussion below, we are developing the arguments to simplify the regulatory process for the ecological and economic region development through the IMS implementation.

3.1 Concept of the Eco-Economic System Management in the Region

The system management process represents the activity of management subjects united in a certain system, which is aimed at achieving certain objectives through the management functions implementation. Since the management process for the eco-economic system is multidimensional and has a complex structure (Munda et al., 1994), which includes functions and management cycles, the implementation of organizational transformations is the most critical stage of the process, since, in many respects, the success of management depends on the competent optimal organizational structure implementation. Nowadays, the necessity to state management for the eco-economic processes does not require any proofs and is generally recognized in the world.

As it is known, scientifically, the management is a directed impact of management subject on the management object based on the objective laws and in favor of the creation of conditions for the optimum functioning of this object. The harmonization of environmental and economic development implies the existence of hard centralized management mechanism. Since the management reflects the relations between the two subsystems: a managed one (the object) and the managing one (the subject), we proceed from the management concept of eco-economic system, in which the management subject is presented as a two-level subsystem, consisting of the subsystem of state and municipal authorities and management bodies of the enterprises and organizations (Figure 1).

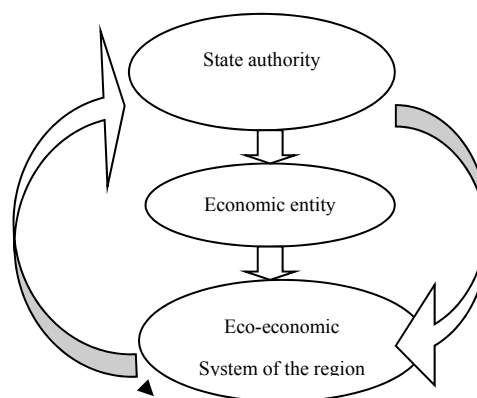


Figure 1. Concept of the eco-economic system management in the region

In the given concept the regional authorities and local government play a great role, since they are responsible for the economic development of natural and territorial complexes in accordance with its characteristic features, and the prevention of environmental problems occurrence. The strategic objectives are brought by the state authorities to the concrete executors of operational objectives.

We should take into account that "functioning of the market mechanism in all fields, including environmental protection, implies not only the relative freedom of exchanging goods, services, resources, and so on, but also the inclusion of a hard enough centralized management mechanism in the field of relations between a person, society, biosphere" (Usov, 2007). However, whatever decisions in the field of environmental safety have been taken at the federal, regional and municipal levels of management, the problem is solved positively, if the enterprises engaged in the economic activities will not be environmentally oriented. In this regard, the bodies of regional and municipal authorities in their work often use the Environmental Management Systems, which allow taking into account the priorities of environmental protection in the planning and implementation of economic activities of separate territory, and are an integral part of the management system.

3.2 Using International Standards in the Eco-Economic System Management of the Region

The Environmental Management is a part of the general organization management system, which is used for the development, implementation and management of its environmental aspects – elements of activities, products or services that can interact with the environment and provide a significant impact on it.

In the environmental sector the following aspects of international standardization are allocated (Vishnyakov, 2005):- technologies in the field of ecology; - products/service; - Environmental Management Systems.

Many researchers agree that ISO 14001 and ISO 9000 are the best practical recommendations in the context of Organizational and Environmental Management (Christmann, 2000). The international standards of series 14000 set the requirements for the Environmental Management Systems in order to give the organizations a tool for the policy development and to determine the objectives of reducing the environmental impact (Pashkov et al., 1997). The Environmental Management System is the basis for the formation of a competitive, sustainable, responsible business, which is able to meet the growing needs and expectations of the public, and increases the investment attractiveness of the region. The application of standards in order to create an effective management system or its using as a tool, which sequentially allow achieving an improvement of all the environmental aspects, predetermines the increase in economic efficiency of the territorial entity.

Nowadays, an intense competition and technological complexity of production in the industrialized countries make it necessary to develop, implement and support the international standards of various management systems (Wiengarten & Pagell, 2012).

The analysis of scientific literature shows that the number of Russian organizations, which are interested in a system building that meets the requirements of two or more different standards, is growing steadily. Among the most widespread management systems it's necessary to allocate the following:

- ISO 9001:2000 Quality Management Systems;
- ISO 14001 Environmental Management Systems;
- Occupational Health and Safety management under the OHSAS 18001.

According to the International Organization for Standardization the certification of management systems based on the ISO 9001 and ISO 14001 is increasing worldwide (more than a million of the Quality Management Systems and more than 285,000 of Environmental Management Systems) (ISO, 2013). Delmas and Montes-Sancho (2011) believe that the more enterprises in the country are certified under the ISO 9001, the greater the likelihood that those enterprises will shortly be certified and under the ISO 14001.

The conducted studies confirm that a well-functioning quality management system is a prerequisite for the environmental management implementation (Wiengarten & Pagell, 2012). The standards have a similar structure and philosophy (Viadiu et al., 2006).

At the heart of the management systems functioning a spiral, repeating cycle aimed at the continuous improvement lies, which ultimately brings the very tangible environmental, social and economic benefits.

The organizations often develop and implement the management systems that meet the requirements of different standards, which are developed in parallel or sequentially. In this regard an optimal solution is the development of IMS. The argument to develop and implement the IMS is the reduction of terms of documents elaboration, because it is possible to allocate the general business processes. The integrated management systems allow us to reduce the marginal cost of certification of ecological systems (Casadesus et al., 2011).

ISO standards advise to consider all types of activities from the standpoint of added value, which leads us to understand them as the business processes, and allows the organization to consider them a factor of strategies for improving the business, enabling to build a organization management system, which will be promptly and adequately react to the internal and external changes.

The identification and description of key business processes is usually one of the important stages in the process approach for the eco-economic system management of the region. In the allocation of main business processes it should be provided that the economic conditions shall be already included in the biosphere development at the stage of business planning. When constructing the integrated management system of the region you should allocate the following general business processes:

- organization management (planning, organizing the implementation of set goals and objectives);
- document management;
- records management;
- personnel management;
- control and measuring equipment monitoring;
- internal communication;
- monitoring and measuring;
- internal audit;
- continuous improvement;
- corrective and preventive actions.

The optimization of management system is performed on the basis of reengineering and allocation of most productive business processes, and using modern information technologies and systems.

The general policy of the organization, the general process model, and the general guidance on the organization management system are developed, the general indicators of processes monitoring are determined.

The organizations are increasingly realizing the importance of integrated management systems, because the integration has numerous advantages (Olaru et al., 2014). In world practice the trend towards the management system integration is noted (Hunt & Auster, 1990; Marcus, 2007).

3.3 Management Algorithm for the Eco-Economic Development of the Region

The implementation of world management models in the field of environmental management, environmental protection, and quality management will determine the balanced eco-economic and social development of local territories.

The purpose of regional eco-economic system management is aimed primarily at increasing the competitiveness indicators, hence the need for the development of regional policy in the field of economy and ecology. The eco-economic goals and corresponding to them objectives can be achieved and solved only when you have developed the regional management policy for the eco-economic system. In our opinion, the management policy for the eco-economic system at the regional level implies its integration with the strategy of social and economic region development.

The existing now need to develop the eco-economic policy in the region implies the identification of a strategy and a measures system, aimed at creating conditions for the effective ecologization of production activities of economic entities and improving the economic indicators.

As evidenced by the national and international experience the most recognized tool of the state management for the sustainable eco-economic systems of the region is its strategic indicative planning (Wruse, 1990). Namely the strategic planning under the unstable market environment becomes one of the essential elements, because it allows taking into account the ever-increasing speed of changes occurring in the economy and the increasing competition in all fields. In the process approach to the strategic planning it should be considered as a process, because planning acts as one of the management functions.

The sustainability of regional eco-economic system depends on the correctness and structuring of strategic objectives, and the sequence of planned activities. The regional strategic planning is intended to identify the prospective and current development objectives of the region, to develop the necessary planning documents, which determine measures to achieve the set goals. In the process approach to the strategic planning, it should be considered as a process, because planning acts as one of the management functions.

Among the key elements of strategic planning we shall allocate as follows:

- analysis of the presuppositions for the region development;
- definition of objectives of the strategic development;
- development of the concept of the strategic region development;
- preparation of management decisions to achieve the set objectives;
- implementation of selected objectives;
- control over the implementation.

The analysis of initial conditions and presuppositions is a key procedure, since the region development is predetermined by the efficient use of its potential and externalities. At the initial stage of the strategy development, first of all, the problems identified as a result of a comprehensive analysis of the initial situation level in the region shall be estimated.

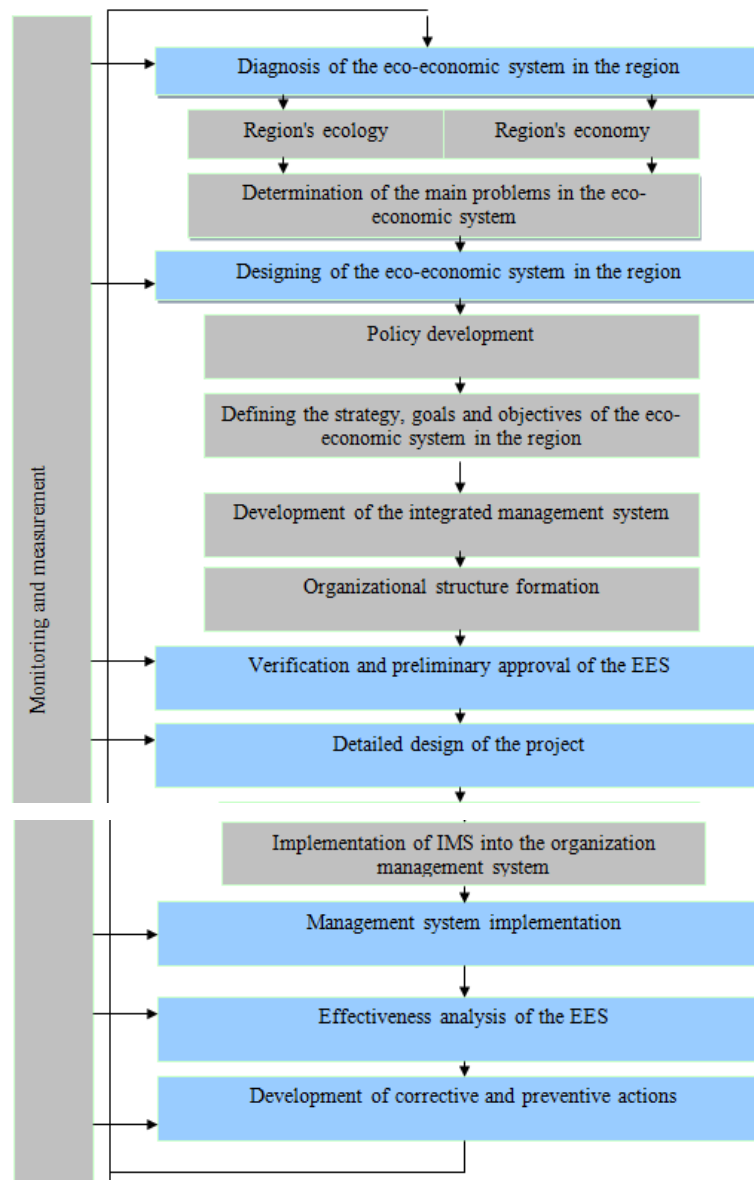


Figure 2. Algorithm for the eco-economic system management of the region development

Thus, since the transition to the sustainable development requires the mandatory environmental orientation, when making the managerial decisions, which makes it necessary to adapt the eco-economic management system in the region to the requirements of international standards in the field of ecology (Martin-Pea et al.,

2014), we attempt to achieve the set objective based on the implementation of IMS into the overall region management structure. As well as J. Tari and J. Molina-Azorin, (2010) we think the most optimal way is to integrate the management systems through the EFQM model.

By the definition of the International Organization for Standardization the process approach is a systematic identification and management of interrelated and interacting with each other business processes, ensuring the achievement of objectives by the organization. This approach shall be as the basis of the eco-economic system management of the region. The process approach, along with a description of activities through the interrelated processes, includes the constant monitoring, management and perfection of processes.

Proceeding from the above, the algorithm for the sustainable development management of the eco-economic system in the region is shown in Figure 2.

The eco-economic system monitoring in the region is the major tool of mechanism for implementing the development process and shall include the evaluation regularly performed according to the program of eco-economic condition of the region.

The implementation of eco-economic system of region management is performed according to the predetermined plan of implementation, which includes:

- scope of work and their interaction;
- terms of the project as a whole and terms of progress works;
- List of those responsible for the execution of works in the project;
- resources required to perform all the work.

3.4 Main Actions of the Algorithm's Successive Stages

The list of main actions in the proposed algorithm for the ecological and economic system management of the region is shown in Table 1.

Table 1. Main actions of the successive stages for the eco-economic system management in the region

Item #	Stage	List of main actions	Documentary proof
1.	Diagnostics of the existing management system	Carrying out of diagnostics of the organizational structure and business processes for the EES. Identification of ecological and economic problems faced by the region. Making recommendations to solve the problems	Diagnostic report for the management system
2.	Designing of the eco-economic management system in the region	Policy development Defining the strategy, goals, and objectives of the EES in the region. Organizational structure formation Developing documentation for the integrated management system	Organizational and functional company model
3.	Verification and preliminary approval of the project	Examination of the organizational and functional model to conform to the stated requirements. Justification of alternative management system. Development of a detailed project implementation plan	Approved EES project for the region management system
4.	Detailed design of the project	Preparing of the organizational and regulatory documents package: provisions on the management system; provisions on subdivisions; regulations; job description Organizational structure determination	Project implementation plan. Package of organizational and regulatory documents (provisions, regulations, instructions)
5.	Management system implementation	Implementation of the integrated management system into the overall region management system. Implementation of activities according to the new management system implementation plan	Organizational and administrative documents
6.	Effectiveness analysis of the eco-economic system	Audit of the eco-economic management system	Report

Under the diagnosis it should be understood the recognition and identification of problems of the investigated object, identification of options to resolve them. In this case, the object of diagnostics is the multi-component, contradictory territorial and economic and social and economic substance, formed from the components of eco-economic system, which is in a state of dynamic non-linear development from one attractor to another.

Based on the viewpoint of V. N. Lexin (Lexin, 2003) we believe that the diagnostics of the eco-economic system in the region shall include as follows:

1. Diagnostics of the situation in general.
2. Diagnostics of the key problems posing the main points of monitoring.
3. Diagnostics of the development process, determining the direction of the general situation transformation.

According to the classification of stages of the strategic planning, proposed by Shvetsov (Shvetsov, 2007), we should allocate the following stages of diagnostics:

- primary, which defines the current state of the eco-economic system in the region;
- secondary, which determines the results achieved and defines the necessary corrective actions.

As it is known, the sustainable development process, and the conditions of its occurrence are estimated using both the qualitative and quantitative indicators. The international experience on using the sustainable development indicators, mainly, highlights the construction of indicators system, which reflects the certain aspects of sustainable development (ecological, economic) or the construction of integral indicator, which includes the main groups of indicators. It should be noted that the ecological indices (indicators) of the sustainable development represent the value derived from the other parameters; consequently, the usage of integrated eco-economic indicator is preferable, from the point of view of the ecological factor in the economic development of the region and the possibility of estimating the stability degree of the trajectory for its development.

Since the eco-economic system management is based on the principle of dynamic equilibrium guarantee for the ecological and economic subsystems, we believe that the model of balanced scorecard may act as the fundamental core of the management concept.

4. Results and Discussions

The use of ecological factor in the development of territories is associated with need to take account a number of its specific properties, and management features, demanding the application of adequate organization schemes, interaction of the management subsystem elements, and management technologies.

The territorial social and economic system is a fairly heterogeneous complex, which basis of allocation constitutes the system elements characteristics – separate economic entities and their groups. The distinctive features of this subsystem are the property of activity, reflexivity, and subjectivity.

The development process of local eco-economic systems can be represented as a manifestation unity of two determinants: conservative, which provides the keeping of existing ways of reproduction for a long time, and innovative, which provides the appearance of new qualities in the system. Since this state occurs not because of targeted actions, and as a consequence of domestic private processes and interactions, it's necessary to note the presence of another the most important property of local eco-economic systems – the ability to self-organization.

In the work the attention is also stressed on the following principles of eco-economic system management: expediency, evolutionary, balance between the interests of economic entities, population and the municipal formation's authorities; operability of the management for the production and economic processes; complexity; social orientation and orientation to the market situation.

The principle of expediency implies the increasing of integration ties, ensuring the more efficient use of potentials (administrative, production, resource) of the municipal formation.

The system elements of municipal formation are constantly converging, since it's provided by the principle of Evolutionary. From the simplest forms, such as: the voluntary public organizations without legal entity, to more complex, such as: environmental funds, associations, etc.

Due to the principle of balance between the interests, which restores the destroyed industrial communications based on the parity mechanism, the disproportions in mutual relations of elements united in a single formation are eliminated. The principle of management expediting ensures the effective use of resource potential of the municipal formation through a combination of economic interests of both processors and commodity producers. The accounting of quantitative and qualitative parameters of development and placing of suppliers of raw

materials and processing enterprises, in the vertically integrated formations, is complied due to the action of the complexity principle.

The algorithm formed on the proposed conceptual basis for the sustainable development management in the region provides the vector of development for its eco-economic system, which promotes, on the one hand, the preservation of the system itself and its best qualities and achievements, and on the other hand – the further capacity of changes, corresponding to the imperatives of the sustainable development.

Summarizing the above material, it can be concluded that the algorithm allows to solve issues on the evaluation of state, monitoring, and the improvement of eco-economic system territory, and gives the system the vector of development, which promotes, on the one hand, the preservation of the system itself and its best qualities and achievements, and on the other hand – the further capacity of changes, corresponding to the imperatives of the sustainable development.

5. Conclusions

- Implementation of world management models in the field of environmental management, environmental protection, and quality management results in a balanced eco-economic and social development of local territories. At the same time, the subject of management is represented as a two-level subsystem, consisting of a subsystem of state and municipal authorities and management bodies of enterprises and organizations.
- Management of a balanced eco-economic development is greatly simplified by the implementation of integrated management system into the general region management system.
- The proposed algorithm for the eco-economic system management of the region can be used as a tool for a sustainable region development.
- Sustainability of regional eco-economic system depends on the correctness and structuring of strategic objectives, and the sequence of planned activities.
- The transition to the sustainable development requires the mandatory environmental orientation, when making the managerial decisions, which makes it necessary to adapt the eco-economic management system in the region to the requirements of international standards in the field of ecology, what can be achieved through the implementation of integrated management system (IMS) into the general structure for the region management.
- The model of balanced scorecard shall be considered as the fundamental core of the management concept for the eco-economic development of the region.

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