Information-Analytical Support for the Processes of Formation of "Smart Sociopolis" of Truskavets

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Abstract. The projects of the creation of "Smart sociopolis" contribute to the transformation of territorial structures into the open market for investments and provides for the use of modern technologies for the reorganization of the existing fundamentals of ownership into a more flexible, capable of adapting to any changes in the external sector. The urgent issues of informational and analytical support of the processes of formation of recreational innovative structures on the example of the Truskavets sociopolis are analyzed. The socio-economic background and methodological aspects of construction of recreational innovative structures, approaches to their management with the purpose of transformation into "smart sociopolis" are highlighted. The methodological principles of organization and integration of sociopolises to modern economic conditions are suggested. The mathematical models of estimation and forecasting of states, stability and efficiency of sociopolis development are proposed. The effectiveness of innovative and technological processes for the formation of the Truskavets sociopolis mainly depends on the states of their organizational management structures. Innovative approaches to intellectualization and optimization of the management of sanatorial technologies of the Truskavets sociopolis are proposed in order to transform it into a "smart sociopolis" as an integrated system capable of efficient functioning, to provide for a sustainable development and to win the competition among analogous structures of Ukraine and abroad. The model of the structure of sociopolis with taking into account its potential possibilities is suggested. The modern tools of organizational management of the Truskavets sociopolis based on modern information technologies and providing effective processes for the development of the Truskavets sociopolis, providing it with adaptive ability, resistance to environmental conditions are suggested.

Keywords: information-analytical support, smart sociopolis, recreational innovative structures, economic conditions.

1 Introduction

Local self-governing is of especial importance in the system of the territorial structure of the state. In many countries the structure of local self-governing is one of the forms of formation of local authorities. The structures of local self-governing are basic elements of the territorial structure of the country. The bearer of local self-governing and, consequently, the subject of administrative activity is the territorial community, which is interpreted as a set of citizens of Ukraine who live together in an urban or rural settlements, have collective interests defined by law and legal status. Unlike the usual territorial unit, the settlement, which has the status of a territorial community, is endowed with extended rights.

2 The Presentation of the Main Material

In modern society, technology to create modern sociopolises has been spread. One of such sociopolis is Truskavets, around which are located resort towns. Sociopolis is reorganized from the special (free) economic zone of the tourist-recreational type "Polis for resort of Truskavets", which is active since January 1, 2000, and has been established for a period of 20 years in administrative-territorial boundaries of the city of Truskavets in Lviv region [1]

For further development of Truskavets and other resort complexes, it was expedient to use modern scientific technologies for the development, treatment and rehabilitation, service and necessary for the effective development of the resort of production, transforming the sociopolis into a high-tech settlement. Structures of this type are called "Smart Sociopolis". The projects of the creation of "Smart Societies" contribute to the transformation of territorial structures into open areas for investment and provide the introduction of modern technologies. Transformation of Truskavets to "Smart Sociopolis" has high chances to enter the World network of health care institutions and correspond to the status of health resorts of international level. This led to the need to reorganize the existing fundamentals of ownership into a more flexible, capable of adapting to any changes in the external sector. It was precisely this form that was supposed to respond to the innovative structure of the system of social policy, so that it could become the only organism that can efficiently function, provide a sustainable development and to compete among similar institutions of the country and abroad. It is this model of the structure of sociopolis was proposed after the analysis of its potential. The general structure of sociopolis is presented in Fig. 1.

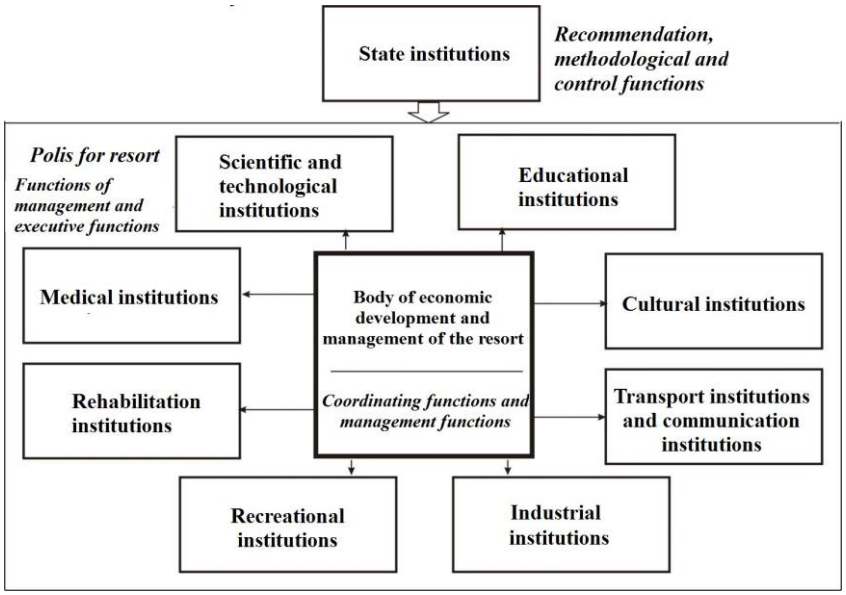

Fig. 1. The general structure of the sociopolis

The main elements of the Truskavets sociopolis are business entities, branches, and other units located on its territory. That is, sociopolis is a resort - a set of cities that function as the only "smart" economic complex, the development of which is based on the development, realization and implementation in the health-improving process of the latest information technologies, innovative approaches to the development of recreational, health and rehabilitation processes, ecological research, services, support industries and management. The main elements of the sociopolis Truskavets are business entities, branches, and other units located on its territory. That is, sociopolis is a resort - a set of cities that function as the only "smart" economic complex, the development of which is based on the development, realization and implementation in the health-improving process of the latest information technologies, innovative approaches to the development of recreational, health and rehabilitation processes, ecological research, services, support industries and management. An important aspect of creating the smart Truskavets sociopolis is the introduction of new computer technologies that provide highly qualified treatment based on the use of modern medical equipment.

Analysis of the experience of the organization of analogous structures in the foreign countries, we came to the conclusion that the organization of a reasonable sociopolis Truskavets will have such prospects [2, 3]:

For Ukraine:

- formation of a model for the development of sociopolys and recreational areas, the possibility of the development of new methods and principles of their organizational management;
- the possibility of implementation of a new form of rehabilitation of the population of Ukraine in the context of reorganization of the health care system;
- development and distribution of new technologies in Ukraine: diagnostics, recreation, rehabilitation and treatment, services, landscaping and formation of resort architecture, biotechnology, preventive and restorative phytotherapy, waste management;
- development of methods of formation of the modern market of sanatorium-resort services, organization of effective and systematic rehabilitation of the population of Ukraine.

For Truskavets sociopolis and the region it is:

- -improvement on the basis of introduction of information technologies of the system of management of the sociopolis;
- increase of revenues to the budget of the sociopolis and creation of additional work places;
- increasing the level of environmental protection and rational use of natural resources;
- establishment of environmental monitoring and the possibility of correction of environmental conditions of the Truskavets sociopolis;
- increase in the level of medical, cultural and consumer services for the population and tourists;
- preservation and reproduction of natural flora, medicinal plants based on the achievements of medical botany;
- intensive development of landscape gardening, construction and architecture;
- development of technologies for utilization of waste;
- development of sewage treatment industry;
- improvement of the organizational structure of the trading network and service;
- development of communication and transport industry;
- setting up of the special conditions for the study of foreign languages and the maintenance of the population by means of the connection of the sociopolis of Tpuskavets to the international information media;
- keeping the objects of non-precision in a proper condition.

Taking into account the recreational resources available in Ukraine, the creation of a smart "Sociopolis Truskavets" contributes to the construction of regional and national recreational innovation systems. Such a structure may play the role of a basic organization in the Carpathian recreational innovation system [[4], [5]].
There is a need to create similar structures in other recreational zones of Ukraine. They may be city resorts operating in these areas after their reorganization.In regions of Ukraine that do not belong to recreational zones, it is desirable to create recreational parks and recreational polises, the profile of which may be determined by

the natural resource potential and the probability of diseases of the inhabitants of these regions (Fig 2, 3).

Consequently, the recreational parks, recreational polises, recreational resorts, other recreational innovative enterprises and the interconnections among them can become a prospect of a national recreational innovation system as a new form of public health protection in Ukraine.

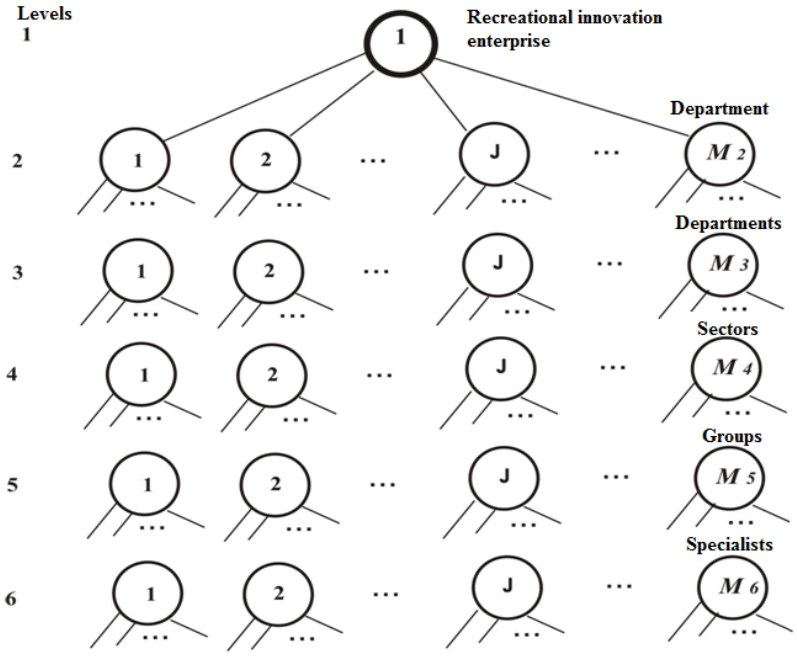

Fig. 2. Hierarchical structure of recreational innovation enterprise

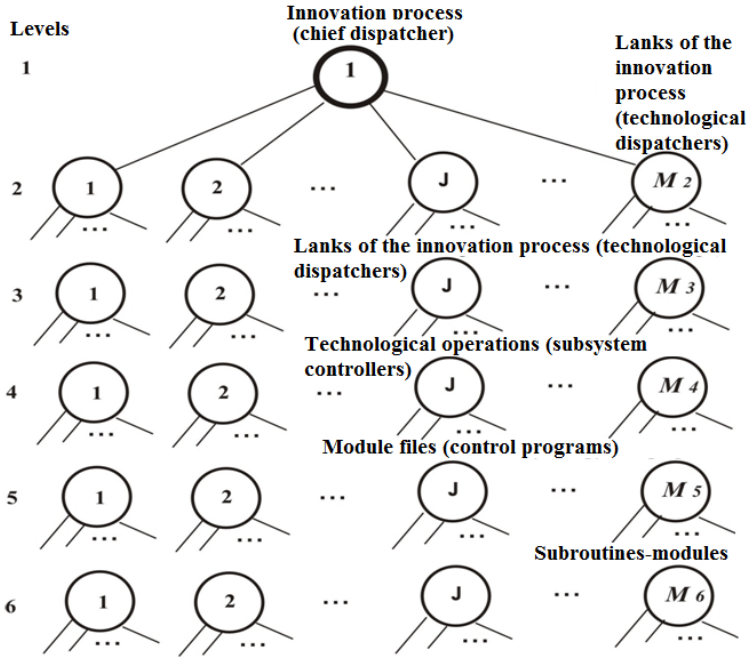

Fig. 3. Hierarchical structure of the intellectual system management of recreational innovation process

To form an effective model of the smart Truskavets sociopolis, economic and mathematical methods are widely used in the study of the development processes of socio-economic systems and their structural units, which is one of the prerequisites for the use of these methods in our study of development. The study of prospects for the development of the Truskavets sociopolis, with the help of economic and mathematical methods, will facilitate the study of the plurality of factors that affect certain aspects of business entities of the Truskavets sociopolis, and hence the determination of possible additional reserves for improving the efficiency of its functioning. It is primarily about the production and solving new problems multivariate analysis, evaluation and forecasting of conditions of stability and effectiveness of the development of economic systems of the Truskavets sociopolis, the solution of which is impossible with the help of traditional methods.

The basis of the construction of mathematical models for estimating and forecasting the state of development of the Truskavets sociopolis, in order to make optimal managerial decisions on effective marketing-oriented development management, proposes to put the principle of hierarchy of complex systems, since socio-economic systems (which include the Truskavets sociopolis), complex technical systems (technological processes) and living systems of different levels of organization (cell, organs or living organisms, populations in general) belong to systems with a bug level hierarchical structure [6], [7]. This is conditioned by the fact that the functioning of the control systems of intellectuals , the Truskavets sociopolis

in general, as well as the human body are subordinated to a certain goal, the achievement of which can be regarded as the realization of the structural-functional state, which covers the elements of many levels of the hierarchy [8]. That is the general scheme of managerialtion as well will provide is to achieve the goal, can be displayed in a hierarchically organized management system, which includes the following three levels.

The first, microlevel of control systems, manages local management responses, which are actually specific responses, for example, the body cells for changes in the environment, the operating elements of the Truskavets sociopolis, or the modules of the subprograms of intellectual technologies.

The second level, the meso-level, created by a set of elements (specialized control systems) of the micro level, which in a certain way interact, manages the internal environment of the human body, units of the Truskavets sociopolis or intellectual systems.

The third level, macrolevel, adjusts the control systems of the lower levels, introducing the corresponding changes to the specific reactions of the first, and the complex of their interactions in the second level.

That is, the control systems of the level of the organism, the Truskavets sociopolis and intellectual technologies, the specified structural hierarchy of living, social and technical objects, include several special control systems that ensure the flow of metabolic processes in the cells of the body, the fulfillment of its vital functions, the implementation of technological and managerial processes in the Truskavets sociopolis, ensuring their organizational and economic functions. Therefore, in order tostudy the dynamic and static characteristics of the states and stability of the Truskavets sociopolis development, the effectiveness of their technologies will dwell in more detail on obtaining formalized descriptions of hierarchical structures by constructing a hierarchical pattern of models. This pattern of models should become an instrument for studying the states and sustainability of the Truskavets sociopolis development.

Efficiency and innovation processes in the formation Truskavets sociopolis largely depend on the state of nih organizational management structures. Therefore, the development of specific procedures for mathematical modeling of hierarchical structures is relevant and can be widely used for evaluation, analysis and forecasting of stability and development of the Truskavets sociopolis, effectiveness of their innovation and technological processes.

Thus, the study of the state of development of the Truskavets sociopolis is suggested to be based on the presentation of the Truskavets sociopolis in the form of such a hierarchy: from the Truskavets sociopolis (macrolevel) – subdivisions (meso level) – specialists (microlevel).

Effective work of intellectual systems of organizational management of the Truskavets sociopolis, management of innovative and technological processes, the Truskavets sociopolis will be provided with the flexibility and adaptability of their functional structure organized on a hierarchical principle as follows: technological level (level of innovation process and its parts, macro level), level of intellectual

systems and subsystems (meso level), the level of module files and modules (micro-level).

If you know the structure of the process of life and its recovery for the investigated object and whether its elements, in principle, you can define the set of all possible states and intensities of transitions from state to state. This makes it possible to build graphs transitions peaks which are possible states of an object and, as edges - transitions from stateto state with particular intensity value transitions. For example, if the system is known to be in some state Si, and in order to move it to the state Sj, it is necessary for me to leave a certain event, then from the state Si to the state Sj there is an arrow indicating the intensity of the implementation of this event (Fig. 4).

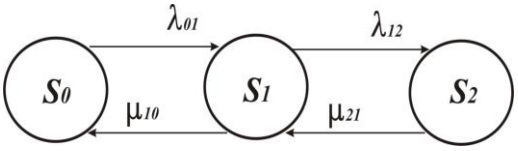

Fig. 4. Graph of Markov process

Note that when constructing such graphs, not all events (transitions) can be resolved. Restrictions on the count of transitions are explicitly contained in the verbal descRIEtion of the principle of functioning and restoration of the investigated system. On the basis of the constructed conversion graph, it is easy to write a system of differential equations, whose solution will allow us to obtain probabilistic dynamics of states of the system.

It is also possible to present a probabilistic process by a matrix of transitions. The matrix of transitions for the graph depicted in Fig. 3, has the form:

$$P_{ij} = \begin{pmatrix} 0 & P_{01} & 0 \\ P_{10} & 0 & P_{12} \\ 0 & 0 & P_{21} \end{pmatrix}; \quad (1)$$

where p_{ij} is probability of transition from the *i-th* in *j-* th state; P_{ii} is probability of storage of the *i-* th state.

Let's dwell briefly on the method of determining the probabilities of states of the Markov process. Let an object whose state of dynamics is subject to investigation may be in states whose numbers are finite and equal to n . The states of the states S_0 , S_1, ..., S_i, ..., S_n correspond to the indices *0, 1* , ..., *and* , ..., *n* . With *both* th state to *j* th state of the object moves with constant intensity $\lambda_{ij,}$ and on the *j*-th state to *and* - state - with constant intensity μ_{ji} .

To determine the probabilities of each of the states of the Markov process with any finite number of states of Kolmogorov proposed a system of differential equations [9, p. 336]. The application of the Kolmogorov differential equations for determining the probabilities of the states of the investigated object will be considered on an example of an object whose graph of states can be presented in the form depicted in Fig. 3.3, where the number of states of the object is equal to three.

The probability that the object on the time interval Δt with respect to time t, is in the state S_0, is the product of the probability that an object at time t is in the zero state, the probability that it will pass on the interval Δt from the state S_0 to the state S_1, plus the product of the probability that the object at the time t is in in the state S_1 , the probability that it will pass to the state S_0 from the state S_1 in time Δt [10]. This formula is written as follows:

$$P_0(t+\Delta t) = P_0(t)\cdot\{1-[P_{01}(\Delta t)]\} + P_1(t)\cdot P_{10}(t). \quad (2)$$

Similarly written equations for the probability that the object on the time interval Δ t, that is the time t, in a state S1 and S2. The result is a system of equations:

$$\begin{aligned} P_0(t+\Delta t) &= P_0(t)\cdot(1-P_{01}(\Delta t)) + P_1(t)\cdot P_{10}(t), \\ P_1(t+\Delta t) &= P_1(t)\cdot(1-(P_{12}(\Delta t)+P_{10}(\Delta t))) + P_0(t)\cdot P_{01}(\Delta t) + P_2(t)\cdot P_{21}(t), \\ P_2(t+\Delta t) &= P_2(t)\cdot(1-P_{21}(\Delta t)) + P_1(t)\cdot P_{12}(t). \end{aligned} \quad (3)$$

Probability of transition of object from state S_i to state S_j with intensity λ_{ij} is equal to:

$$P_{ij}(\Delta t) = 1-e^{-\lambda_{ij}\cdot\Delta t} = 1-(1-\lambda_{ij}\cdot\Delta t) = \lambda_{ij}\cdot\Delta t \quad (4)$$

Probability of transition from state S_j to state S_i with intensity μ_{ji} is equal to $\mu_{ji} \cdot \Delta t$. The probability of no transitions from the state of S_1 in the state S_2 and S_0 is:

$$1-(P_{12}(\Delta t)+P_{10}(\Delta t)) = 1-(\lambda_{12}\cdot\Delta t+\mu_{10}\cdot\Delta t) \quad (5)$$

Substituting the expressions in (3) , we obtain the following system of equations:

$$\begin{aligned} P_0(t+\Delta t) &= P_0(t) - P_0(t)\cdot\lambda_{01}\cdot\Delta t + P_1(t)\cdot\mu_{10}\cdot\Delta t, \\ P_1(t+\Delta t) &= P_1(t) - P_1(t)\cdot(\lambda_{12}+\mu_{10})\cdot\Delta t + P_0(t)\cdot\lambda_{01}\cdot\Delta t - P_2(t)\cdot\mu_{21}\cdot\Delta t, \\ P_2(t+\Delta t) &= P_2(t) - P_2(t)\cdot\mu_{21}\cdot\Delta t + P_1(t)\cdot\lambda_{12}\cdot\Delta t. \end{aligned} \quad (6)$$

On the right-hand side of the equations of the system of equations (6) emotions were transferred to the left part of P_i *(t)*. Dividing the right and left sides of equations for Δt and considering that:

$$\begin{aligned} P_i(t+\Delta t) - P_i(t) &= \Delta Pi, \\ \Delta P_i / \Delta t &= dP_i / dt, \end{aligned} \quad (7)$$

the system of equations (6) can be reduced to a system of differential equations:

$$\begin{aligned} dP_0/dt &= -\lambda_{01}\cdot P_0(t) + \mu_{10}\cdot P_1(t), \\ dP_1/dt &= \lambda_{01}\cdot P_0(t) - (\lambda_{12}+\mu_{10})\cdot P_1(t) + \mu_{21}\cdot P_2(t), \\ dP_2/dt &= -\mu_{21}\cdot P_2(t) + \lambda_{12}\cdot P_1(t). \end{aligned} \quad (8)$$

We can also get the system of differential equations (8) directly in the form of a state graph if you use it so they rule [11, p. 123]: "For each of the possible states of the object a, an equation is written, the left part of which is dP_i / dt , and to the right are as many constituents as the arcs of the graph touches this state. If the arc of the graph is directed to this state, then a plus sign is placed before the equation of equation if the arrow is directed from this graph a -minus. Each of the components of

the equation and is equal to the product of the intensity of this transition state (or in this state) the probability state from which comes an arrow. "

If the study is Markov and stationary process, for which derivatives dP_i / dt can be taken to be zero (probability states do not change over time), the system of differential equations (8) goes with the system of algebraic equations:

$$\begin{aligned} &-\lambda_{01} \cdot P_0(t) + \mu_{10} \cdot P_1(t) = 0, \\ &\lambda_{01} \cdot P_0(t) - (\lambda_{12} + \mu_{10}) \cdot P_1(t) + \mu_{21} \cdot P_2(t) = 0, \\ &-\mu_{21} \cdot P_2(t) + \lambda_{12} \cdot P_1(t) = 0, \\ &P_0 + P_1 + P_2 = 1. \end{aligned} \tag{9}$$

The fourth equation for this system (for three unknowns) becomes necessary because the first three are reduced to two, and the number of unknown probabilities of statesin this system of equations is equal to three. The solution of the system of algebraic equations (9) will look like:

$$\begin{aligned} &P_0 = 1/[1 + \lambda_{01} / \mu_{10} + \lambda_{01} \cdot \lambda_{12} /(\mu_{21} + \lambda_{10})], \\ &P_1 = P_0 \cdot \lambda_{01} / \mu_{10}, \\ &P_2 = P_0 \cdot \lambda_{01} \cdot \lambda_{12} / \mu_{21} \cdot \mu_{10}. \end{aligned} \tag{10}$$

If the set of states studied objects and large, the system of equations (10) should be solved with the help of cybernetic technology.

The suggested methodology for modeling the state of development of Truskavets sociopolis has a scientific and practical interest, since it enables:

- to optimize innovative and technological processes;
- analyze, evaluate, predict states, stability and effectiveness of RIE development;
- to support the adoption of optimal managerial decisions.

Since the studied systems are considered complex, each of which acts in at least two functions - as an element of a more complex system and as a system consisting of elements, that is, simpler subsystems, which, in turn, are also systems consisting of elements, etc.

In order to approbate the proposed mathematical models for estimating and forecasting the state of development of the Truskavets sociopolis, we conducted a study of the state of development of the sanatorium and resort complex of Truskavets, which includes 23 sanatoriums and 8 boarding houses. Interest in these studies is due to the fact that the Truskavets sociopolis and its basic structures form a unified innovation structure in the region.

In this case, the states:

S1 (UN) − "unsatisfactory" state of development of the sanatorium and resort complex, that is, the state in which the main economic indicators of the complex (for example, the volume of services rendered) are lower than planned but not lower than the indicators of the previous year;

S2 (S) − "satisfactory" state of development of sanatorium and resort complex, that is, the state in which the basic economic indicators of the complex correspond to the level planned;

S3 (G) – "good" the state of development of the sanatorium and resort complex, that is, the state in which the main economic indicators of the complex are higher than the planned;

S4 (VG) – "very good" the state of development of sanatorium and resort complex, that is, the state at which the main economic indicators of the complex are significantly higher than planned.

Having conducted research on the development of the sanatorium and resort complex Truskavets in 2006 – 2008, we received the following indicators:

in the state of *S1 (NZ)* there were 6 sanatoriums;

in *S2 (S)* - 11 sanatoriums;

in *S3 (G)* - 10 sanatoriums;

in *S4 (VG)* - 4 sanatorium.

Thus, the probabilities of the states of the studied complex have the following initial values:

$P_0(S1) = 6/31 = 0.2;$

$P_0(S2) = 11/31 = 0.35;$ (3.23)

$P_0(S3) = 10/31 = 0.32;$

$P_0(S4) = 4/31 = 0.13.$

During the studied period, the developmental conditions of the studied health-improving complexes of Truskavets changed. The intensity of the transitions from state to state is depicted by the corresponding values above the arcs of the graph transitions (Fig. 5).

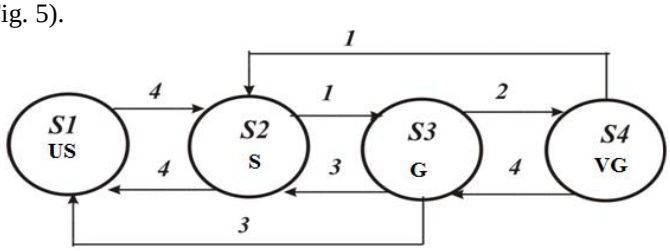

Fig. 5. Graph of states of development of the Truskavets sociopolis

To evaluate and predict the state of development of the Truskavets sociopolis with the help of the proposed mathematical apparatus in the previous section, we conducted a study of the dynamics of probabilities of the state of development of the sanatorium complex by calculating with the help of computer technology the system of Kolmogorov differential equations:

$$\begin{aligned}
\frac{dP_{S_1}}{dt} &= -\lambda_{S_1,S_2}\cdot P_{S_1} + \lambda_{S_2,S_1}\cdot P_{S_2}, \\
\frac{dP_{S_2}}{dt} &= \lambda_{S_1,S_2}\cdot P_{S_1} - (\lambda_{S_2,S_1} + \lambda_{S_2,S_3})\cdot P_{S_2} + \lambda_{S_3,S_2}\cdot P_{S_3}, \\
\frac{dP_{S_3}}{dt} &= \lambda_{S_2,S_3}\cdot P_{S_2} - (\lambda_{S_3,S_{2_1}} + \lambda_{S_3,S_4})\cdot P_{S_3} + \lambda_{S_4,S_3}\cdot P_{S_4}, \\
\frac{dP_{S_4}}{dt} &= \lambda_{S_3,S_4}\cdot P_{S_3} - \lambda_{S_4,S_3}\cdot P_{S_4}.
\end{aligned} \qquad (11)$$

The research of the statics of the probabilities of the conditions of the development of the sanatorium complex is carried out by calculating with the help of computer technology the corresponding system of differential equations (11) of the system of algebraic equations:

$$\begin{aligned}
&-\lambda_{S_1,S_2}\cdot P_{S_1}+\lambda_{S_2,S_1}\cdot P_{S_2}=0,\\
&\lambda_{S_1,S_2}\cdot P_{S_1}-(\lambda_{S_2,S_1}+\lambda_{S_2,S_3})\cdot P_{S_2}+\lambda_{S_3,S_2}\cdot P_{S_3}=0,\\
&\lambda_{S_2,S_3}\cdot P_{S_2}-(\lambda_{S_3,S_{2l}}+\lambda_{S_3,S_4})\cdot P_{S_3}+\lambda_{S_4,S_3}\cdot P_{S_4}=0,\\
&\lambda_{S_3,S_4}\cdot P_{S_3}-\lambda_{S_4,S_3}\cdot P_{S_4}=0.
\end{aligned}. \qquad (12)$$

The system of differential equations (11) and the system of algebraic equations (12) describe the graph presented in Fig. 5.

In the study of the dynamic and static characteristics of the probabilities of the states of the studied complex on the main economic indicators, we can conclude that the most probable for the Truskavets sociopolis is the state in which the basic economic indicators of the complex are lower than the planned but not lower than the indicators of the previous one year.

That is, the complex develops and development can be considered:

- unsatisfactory - with a probability of 0.48;
- satisfactory - with a probability of 0.42;
- good - with a probability of 0.08;
- very good - with a probability of 0.02.

A more detailed analysis of the situation related to fixation of the state of Truskavets sociopolis is presented in the work [12]

Truskavets sociopolis as a social system is open, it contains all the characteristics of cybernetic systems - controlled, consisting of a set of subsystems that act as mechanisms for the development and implementation of self-sustaining reactions.

That is, an effective control system should have a certain set of states that corresponds to a variety of states of the control object, and must have channels of information transmission that would allow timely reception of signals about the situation in the object of management and the external environment and the adoption of optimal solutions for the actual problems. From here it becomes clear the key role of the system of transmission and processing of information in modern management, the importance of intellectualization of managerial processes.

Opportunities of modern information technologies to store compactly, quickly to deduce, quickly and comprehensively to analyze, visually to display information, form and accumulate knowledge[13-15] and on this basis to form recommendations for adoption of optimum decisions, can be put in a basis of intellectualization of management of marketing-oriented technological changes and innovative processes in the recreational innovative enterprises as means of marketing-oriented management by the Truskavets sociopolis. The effectiveness of these approaches to intellectualization affect the quantitative and qualitative changes.

Quantitative changes related mainly to the use of information technology in routine operations in diagnostic experiments, which increase the level of standardization, accuracy and speed of obtaining diagnostic output and solutions, which is extremely necessary in psychosomatic examination and counseling of patients.

Qualitative changes are provided by the possibilities of modern information technologies to implement new types of diagnostic and other technological changes, based on the use of modern technologies of formation of databases and knowledge bases, pattern recognition algorithms, methods of artificial intelligence, which are based on the manipulation of knowledge in the areas caused by the technologies of formation of the Truskavets sociopolis (Fig. 6).

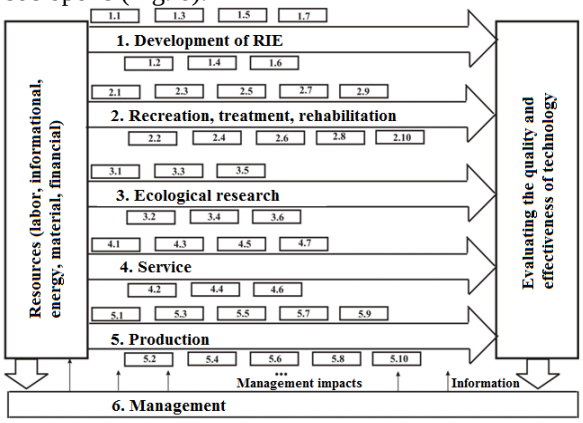

Fig. 6. Scheme of organization and management of technological changes and innovative processes

As the high efficiency of businesses most likely explained by the tendency of nih leaders to managerial innovations than the ability to improve processes, foreign theorists and practitioners of management came to the conclusion that the best form of organization of management companies should be considered flexible, adaptive control system, natural property which is continuous innovation, willingness to make any changes in the management, organization, technology, range, etc. System management of information and system requires rationalization of the structure of information flows, simplification of procedures for information exchange and document circulation, reduction of information overload, scientific approaches to the formation of effective analytical information, creation of firm databases and knowledge bases for the purpose of making optimal decisions. These problems with any intellectual system of management are constantly changing, since management companies, for their progressive development. It should be on innovative basis, that contain the means and measures for the implementation of modern innovation policy and operational management (a set of scientific, technical, production, management, marketing and other activities). The information that is necessary to ensure innovation policy should enable managers to navigate in technological issues, provide a basis for planning, identify priority problems, the formation of alternatives to overcome these problems, the choice of rules for decision-making. Information support of operational

management of enterprises should ensure implementation of planned plans, production of high-quality products, provision of efficient services, achievement of the planned level of economic indicators. That is, management as a system of control and regulation should provide the necessary information interaction between the enterprise and the external and internal environment. But for the effective operation of this service and the adoption of optimal solutions for managing the processes of development of the Truskavets sociopolis, it is recommended that they be implemented through the development and use of appropriate intellectual technology. This technology should be organized on such intellectual systems, based on information on the state of development of the Truskavets sociopolis, knowledge of experts aggregated in the knowledge base, automating the decision-making processes at the qualification levels of the Truskavets sociopolis employees, the states of the Truskavets sociopolis and the states development of Truskavets sociopolis in general, and worked out on this basis appropriate management decisions (Fig. 7).

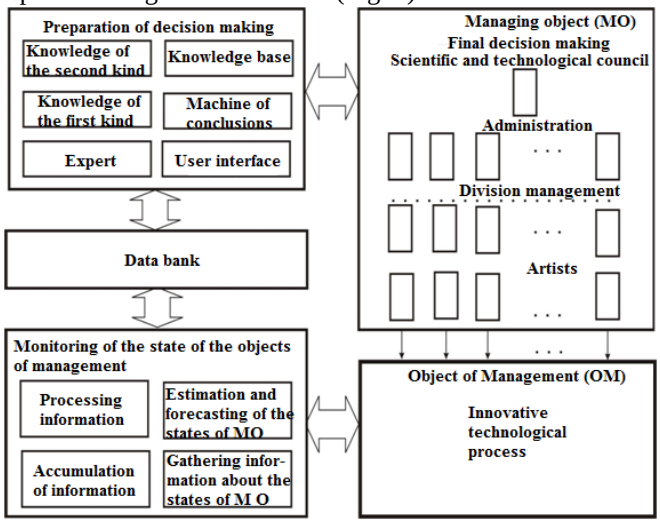

Fig. 7. Intellectual system of marketing-oriented management of states of development of the Truskavets sociopolis

Thus, intellectualization technology marketing-oriented development management of the Truskavets sociopolis allows us to build a flexible, adaptive and stable management system of the Truskavets sociopolis, the natural property of which is constant innovation, readiness to make any changes in the market of healing goods and services, in management, organization, resources, technologies, goods and services.

3 Conclusions

Solving problems of organizing marketing-oriented management of the Truskavets sociopolis with the aim to adapt their organizational structures and business processes

to the dynamics of the environment should be based on software tools that make it possible to model organizational structure of the Truskavets sociopolis in general and to model that of a specific employee of Truskavets sociopolis in particilar in his role, taking into account his knowledge, duties, intentions, and etc.

Creation of tools of organizational management of the Truskavets sociopolis using the echievements of informational technology, which primarily include intellectual systems and knowledge management system, helps to make diagnosis and prediction of conditions of stability and effectiveness of the Truskavets sociopolis, to provide the Truskavets sociopolis appropriate adaptive ability, resistance against environmental conditions, intensification of their development, development and introduction of new science-intensive technologies of recreation, treatment and rehabilitation, environmental research.

The basis of the tools necessary for creation and operation of control systems of the Truskavets sociopolis may contain integrated object-oriented and distributed databases and knowledge bases, hybrid expert systems, decision making support systems, integrated neural systems, etc. Decision making support systems allow us to model and automate decision making, simulate and automate organizational management of the Truskavets sociopolis. Distributed (decentralized) artificial intellect, integrated automated management systems and multiagent systems constitute the most suitable class of models for organizational marketing-oriented management for the Truskavets sociopolis.

Truskavets sociopolis is one of the most significant at the state level of Ukrainian tourist-balneological complexes. Its development and analytical processing of information concerning perspective directions of improvement is general-methodological and can be used as a platform for other resort, recreational and health sociopolises.

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