THE EVALUATION OF RISK OF THE DEVELOPMENT OF SOCIO-PRODUCTIVE STRUCTURE WITH USE OF THE PROGRAM COMPLEX OF ASM 2001

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ABSTRACT

How to manage socio-productive structure in modern economic conditions? On the basis of systematic analysis is formulated the concept "dangerous state of socio-productive structures". Described are three possible scenarios of failure of development of socio-productive structure. Proposed is LP-model of development of socio-productive structure. The calculations are made with using the software complex ASM 2001. The results obtained are help in making strategic solution on basing the assessment of the risks of unsuccessful development of socio-productive structure.

In conditions of unstable economy in the Russian Federation manifests the imperfection of the local law. Strategy for socio-economic development of the country was based on the formation of urban agglomerations. How to manage? In the thesis generally investigates the economic aspect of management or only businesses, or only territory.

Work (Gritskikh, 2009) this is the generalization of scientific works devoted to the social dimension of development in various Russian regions and single-industry towns. Two trends were highlighted: the formation of urban agglomerations and the growth of social tension in single-industry towns, but there is no model of effective management of social and industrial structure. An interesting work was written on the of flows management (Polenin, Gladkova, 2015), in which was investigated the transmission of electricity as a stream. In the National standard (GOST R 15704-2008) set out recommendations on the use of GERAM to improve the efficiency of the company.

And how to evaluate the success of the development of socio-productive structure as a system that combines production and industrial infrastructure, in which there are material, financial and information flows?

In general, the operation of the system can be represented as formal model of streams (see Fig. 1; formula 1).

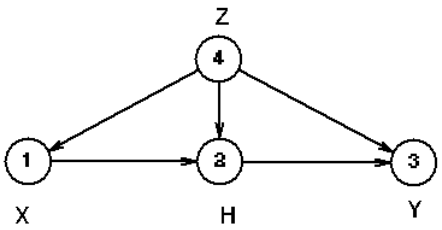

Figure 1. The formalized model of the flows

$$y(t) = F_S(x(t), h(t), z(t)) \quad (1)$$

Where: S – the flows of the socio-productive structure;

$x_i \in X$, $i = 1, 2, ..., n_x$ – the set of input streams;

$h_l \in H$, $l = 1, 2, ..., n_H$ – the set of internal influences;

$z_k \in Z$, $k = 1, 2, ..., n_Z$ – the set of impacts of the external environment;

$y_j \in Y$, $j = 1, 2, ..., n_Y$ – the set of output streams.

Optimization of movement flows of socio-productive structure cannot do without the methods of mathematical modeling with the use of a systematic approach.

First of all, we did the decomposition of socio-productive structure as system (S), allocating two subsystems: enterprise (S_1) and the infrastructure (S_2).For system development, is necessary successful development of all subsystems. The development of enterprises effects the development infrastructure. Development infrastructure supports the development of the enterprise.

For technical systems the dangerous condition this is a condition that can lead to the destruction of the object, damage and so on (Ryabinin, 2008, p.116).

What should be understood under the term "the dangerous condition of the socio-productive structure"? How to evaluate the probability of successful functioning of the socio-productive structure?

In the economic systems should be considered the not probability of success but probability of failure on the basis of logical-probabilistic modeling of risk and the effectiveness of the system (Solozhentsev, 2009, p.226).

The peculiarity of the socio-productive structure is the danger of full-scale experiments. The transition to a market economy in 1990-ies was accompanied by the destruction of the USSR and decline in living standards of the population. That is, the mathematical experiments for of study in this case more preferred.

As criteria for assessing the development of the socio-productive structure be choose: demography; damage; investments; tax revenues; subsidies, etc.

Let us formulate the hypothesis of the study. The dangerous condition for socio-productive structure is condition that may result:

A) Mass protests of the population for the purpose of destroying an existing management system (strikes, revolutions, etc.);

B) The Exodus of the population due to the impossibility of living in a particular area (technogenic accidents, natural disasters, etc.);

C) Termination of the production due to the loss of markets for manufactured products (the economic crisis; the decline in the quality of goods or services).

Logical and probabilistic theory this is of knowledge according to the calculations of the risk of accidents and catastrophes in the complex-structured systems (Ryabinin, 2008, p.125). The socio-productive structure represents the complex-structured systems. For assess the risk not successful development of socio-productive structure was an attempt of application of the software complex ASM 2001[1] (authors A. S. Mozhaev and I. A. Gladkova).

To build scenarios for the development of the socio-productive structure were selected three criteria for the evaluation of not successful development of socio-productive structure (see Fig. 2): environmental pollution, water and atmosphere (Y_1); a social explosion (Y_2); reduction of the amount of the taxes (Y_3).

[1] SC ASM 2001 – software for automated structural and logical simulation of complex systems

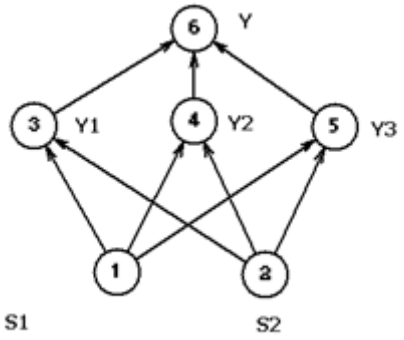

Figure 2. The three criteria for the evaluation of not successful development

In socio-productive structure always has a conflict of interests of different parties as a solution to social or environmental problems involves the reduction of the profit of the owner of fixed assets

Not all owners of the enterprises want observe laws that regulate the activities in the environmental field. Pollution of territories of subjects of RF the various substances occurs continuously.

For an assessment of risk of probability of unsuccessful development of socio-productive structure it is necessary to consider not less than three scenarios.

For an example we will make the scenario "Ecological Pollution" for social and production structure on one of material streams: resources → production → waste (see Fig. 3).

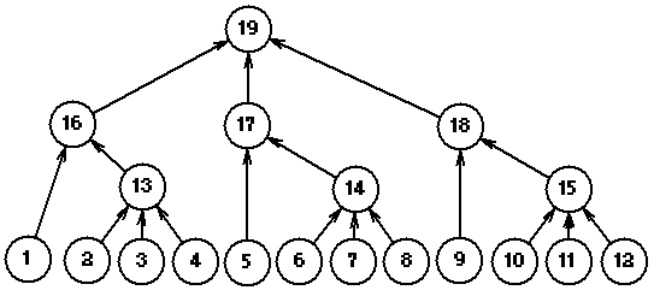

Figure 3. The scenario "The Ecological Pollution"

The designations:

x_1 – lack of filters of cleaning of gaseous waste;

x_2 – destruction of filters of cleaning of gaseous waste;

x_3 – filters of cleaning of gaseous waste aren't put into operation;

x_4 – the owner doesn't finance processes of cleaning of gaseous waste;

x_5 – lack of treatment facilities for liquid waste;

x_6 – destruction of treatment facilities for liquid waste;

x_7 – treatment facilities for liquid waste aren't put into operation;

x_8 – the owner doesn't finance processes of cleaning of liquid waste;

x_9 – absence of landfills;

x_{10} – destruction of landfills;

x_{11} – landfills aren't put into operation;

x_{12} – the owner doesn't finance waste disposal processes;

13 (x_{13}) – non-use of filters of cleaning of gaseous waste;

14 (x_{14}) – non-use of treatment facilities for liquid waste;

15 (x_{15}) – non-use of landfills;

16 (x_{16}) – emissions of gaseous waste in the atmosphere;

17 (x_{17}) – dumpings of liquid waste in reservoirs;

18 (x_{18}) – waste disposal out of landfills;

19 (Y_1) – risk of ecological pollution.

How to choose probabilities for the listed events?

If probability of an event is accept equal 0.05 (the event is improbable), then Ps = 0.1855 (the ecological pollution is improbable).

If probability of an event is accept equal 0.5 (an event equally possibly), then Ps = 0.9375 (the ecological pollution is possible).

If probability of an event is accept equal 0.95 (the event will practically be carried out), then Ps = 0.99999375 (the ecological pollution will take).

The increasing quantity of places (out of landfills) where solid waste is dumped on the earth, gives the grounds to accept value of probability of an event x_{12} not less than 0.3. One may to assume that the unwillingness of owners of enterprises to reduce the profit in the presence of financing of processes of utilization (burial) of waste is the reason of such actions.

The media occasionally publishes articles about discharges into water and emissions of various substances in the atmosphere, so we can assume that the probability of events x_4 and x_8 can be 0.3.

In the twenty-first century much public attention to the ecological state of the territories is initiating capital investments in the variety of the systems treatment of industrial and non-industrial waste, so the probability of events x_1, x_5, x_9 can be taken equal to 0.05 (unlikely).

The probability of events x_2, x_6, x_{10} depends on the regularity and quality of the preventive works; the natural disasters; the technological accidents of a large scale; terrorist acts, etc. Therefore, the probability of events x_2, x_6, x_{10} can be taken equal to 0.1.

The probability of events x_3, x_7, x_{11} depends on the timeliness of registration of project documentation; the quality of manufacturing of elements of systems for treatment of industrial and non-industrial waste, etc. Therefore, the probability of events x_3, x_7, x_{11} can be taken equal to 0.1. With this approach, we get Ps = 0.46135 (environmental contamination possible).

For the other two criteria assess the risk of probability of unsuccessful development of the socio-productive structure scenarios are created similarly.

Conclusions

It is necessary to create such economic conditions, to owner of the enterprises was not profitable evade the costs of improving waste treatment systems of various types.

Necessary to use unmanned aircraft for monitoring territories to identify:

A) vehicles, dumping of solid waste along roads (outside of landfills; outside waste recycling plants);

B) the objects that pollute the water bodies.

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