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Elaboration of the Management Model of Development of Conflict Regions

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Abstract

Implementation of the elaboration of the management model in conflict regions can be achieved by building stable development models. They will allow us to select the best scenarios taking into account the mentality of our country and implement forecast of region stable development. The problems of building research and analysis models for the effective planning conflict regions development based on situation self-development scenario and control impact on it is considered in the paper. In weakly structured organizational systems the need of making decision appears in the course of control process. Situation development laws and patterns are described in qualitative manner. Experts and analytics take part in situations where dynamics of their development is not subject of any patterns. They use their own experience and intuition when making decisions.

Keywords: Stable Development, Goals Tree, Local Goal, Global Goal, Region Development Model.

Introduction

The most important stage in creating and implementing of an organizational system is its analysis and modeling. Modern development of large-scale complex systems led to the raised interest to the methodology of their modeling. It involves constructing and analyzing the model of the system.

In the management process of poorly structured organizational systems the necessity of decision-making is set up. The laws and regularities of situation development are described qualitatively in them. In such systems the situations are set up where the dynamics of situations are not subject to the regularities of the decision-making process. In the decision-making process experts and analysts participate. They rely on their own experience and intuition for making appropriate conclusions.

During analysis of complex organizational systems we can establish the goals set and the factors that are challenging for the system. These goals are usually structured, i.e. they consist of sub-goals; each sub-goal by itself may consist of sub-goals, etc. As a result, the list of atomic goals is received. The number of sub-goals can be very large. We should also take into consideration that single elements do not affect the main goal in the similar ways.

Main Part

Information technology for selection of optimal set of system goals and operation modes consist of the several phases:

Structuring system goal. It means that main or global goal of system operation is selected. This is assigned a zero level and the latter is their decomposed by sub-goals [1].

Assigning weights to system goals. Ranking of goals occurs by evaluation of each of them through numerical values – their “weights”. Experts or expert group make this evaluation and assignment which has subjective character. The goal is described by text sentences and can contain numerical indices. The method is known as hierarchical analysis method.

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Minimization of system local goals. Since the amount of simple goals and factors can be very large, it is necessary to carry out numerical evaluation and ranking of the most important goals and factors in order to select the most effective goals and factors. To build the cognitive map of local goals of interdependency, the table's rows and columns correspond to local goals are required. As a result of the analysis and agreement with experts, the cognitive map, which has the form for given fragments, was obtained (fig.3). The numerical indices – reachability degrees of global (C_0) and local (C_j) goals – were introduced. They have the following form for the above-considered zero rank tree's fragments: $C_0 = 1,12$

The computations gave the result:

$$J(C_0) = 1, 12$$

The reachability degree for the subsets of foals (taken into account their interdependency) is expressed by the formula:

$$J(C^*)=J(c_{ji})+...+J(c_{jk})$$

J(C*) is the maximum acceptable reachability degree and is denoted as Δ. In the considered case its value is 0.2101.

Let us form the minimization problem: C* C must be found so that the following conditions would be fulfilled simultaneously:

$$J(C^*)\leq\Delta$$

$$|C^*|=max$$

The result of minimization for the local goals is $E=\{b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8\}$.

Classification of multi-objective alternative. The basic local goal that remains after the minimization must be characterized by the expression of reachability. This expression is determined by experts and express the verbal formulation (for example, "low", "medium").

Building of effective control model for region stable development

Operation of the system of region stable development is also based on scenarios. If the scenario is effective, then the system of region stable development is also effective. The model allows the effective scenario of system operation to be chosen. The model anticipates operation of the system in real environment and reduces significantly intuitive errors which sometimes lead human beings to wrong decisions. As a result, expected damage is reduced and effectiveness of business is significantly increased.

A scenario is characterized by four components: goals, influence factors, operations, and relations between operations.

Factors that affect the stable development can be considered by different experts in different manners. Their amount, of course is very large. In our case, as a result of analysis carried out, the important factors (they are not strictly fixed, they are rather selected by experts from the numerous lists and is based on the analysis) were determined.

After identification of factors, composition of the cognitive map is made. The process of building the cognitive model of the situation development consists of two components:

-scenario of self-development

-scenario when the situation is affected by certain control parameters can be fixed.

On the basis of the cognitive map, formed modeling of self-developing situation occurs. The aim is to determine tendencies that affect positively the region stable development.

When cognitive analyzing, strengths of cross effects of factors are measured by linguistic variable (like "significant", "normal", etc.).

Main phases of modeling of cognitive analysis and situation development

1. The conceptual study of the existing situation occurs, which implies building of the cognitive models using the modeling system.

2. The building and studying of the cognitive models of the situation self-development scenario are performed. In the process of cognitive modeling:

• The necessity of control of the situation development by modeling the situation self-development scenario is defined.

• The analysis of the situation development's objective vector to reveal contradictories, reachability and effectiveness of the control vector integral influence is carried out.

• The principal reachability of the assigned goal (without taking in account resource constraints) is studied (if the goal is principally unachievable then the study of reasons is carried out).

• If the assigned goal is principally achievable, then alternative opportunities of goal achievement is generated.

• Reasons that complicate goal achievement (taking into account structural features of the model) are analyzed.

• Using results of generating the principal opportunities of goal achievement and taking into account the structural features the way of situation control is defined and the control situation development is modeled.

The best variant between compromises ways of situation control selected in the above-said phases is chosen to select the control situation.

Building of research situation model

Modeling is a cyclic process. Knowledge of research problem is being enlarged and defined more precisely. Initial data are constantly being improved.

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The main objective of modeling is achievement of assigned goal. The latter implies determination of the objective vector and selection of required actions' variants.

Each variant of goal achievement can be modeled in one of three options:

• Forecast of situation development - when no other situation affects it (self-development scenario)

• Situation development when various selected actions affect it (with control)

• Synthesis which means such kind of actions selection of which leads to the desired situation development (inverse problem).

The modeling phases are as follows:

• Description or selection of a model

• Creation or selection of modeling scenario.

• Forecast of situation development.

• Study of behavior forecast for situation development.

• Creation of report based on the modeling results.

Modeling process of emergency situation consists of two parts (Fig. 1):

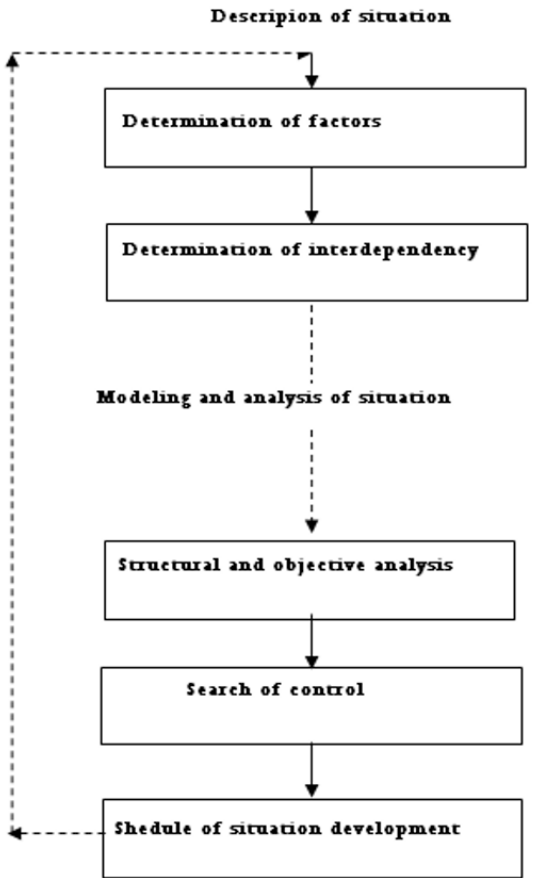

Figure 1. *Flowchart of emergency situation modeling process*

• Description of the situation that implies determination of basis factors and interrelation between them

• Modeling and analysis of the situation where

Determination of (basic) factors are processes which, depending on conditions, are considered within the scope of research situation and, in one way or another, determine its development.

After forming basic factors it is necessary to define the significance of each factor (the significance of factors is determined during computation of situation state; the higher is the absolute value of factors' significance the greater impact will have its value upon integral evaluation of the situation).

Basic factors consist actually of two components:

The first one – the significance of the factor (the absolute value of the significance). its value is represented by integers in the range 0-10 in the modeling system.

The second one – evaluation of dynamics of factors. It can have three values: -1, 0, and 1. Value -1 means that increase of this factor makes the situation worse, value 1 means that increase of this factor improves the situation, and value 0 means that this factor does not affect the situation.

When building the model, it is necessary to list the most significant factors.

At the initial stage (the stage of determination of factors) user can perform certain operations with the model:

• To add new factors;

• To change existing factors;

• To remove factors from the model;

• To determine characteristics of factors(for example, the significance);

To rank factors according to the given row.

The phase of defining interdependency (mutual influence).

To complete the model it is necessary to point out which factor affects another one. The number of such dependencies is $n \times n$, where n – number of factors.

The mutual influence of the factors may be immediate (direct) and indirect.

The influence of one factor on another is immediate if an expert believes that change of the factors immediately affects the corresponding factor.

The influence of one factor on another is indirect if the expert believes that change ofthe factors does not cause any change of another factor.

The structural-goal analysis of the situation

• The analysis is determined by the following parameters:

• The vector of the situation's goal

• The vector of the situation's control

• The vector of situation's changes.

According to the above description the structural-goal analysis was carried out. The table of desired changes' tendencies was built and with the aid of modeling system the graphs of goal vector's contradictories and control influences diagram were built (fig.2), where:

1. Region stable development
2. Social indices
3. Economic indices
4. Environmental indices
5. Organizational indices
6. Population density
7. Demographical dynamics
8. Population growth rate
9. Dwelling space per head (m2)
10. Population stable development stimulation
11. Business activity (%)
12. GDP per head (%)
13. GDP per head (%)
14. Imprt of services and products (%)
15. Economic progress

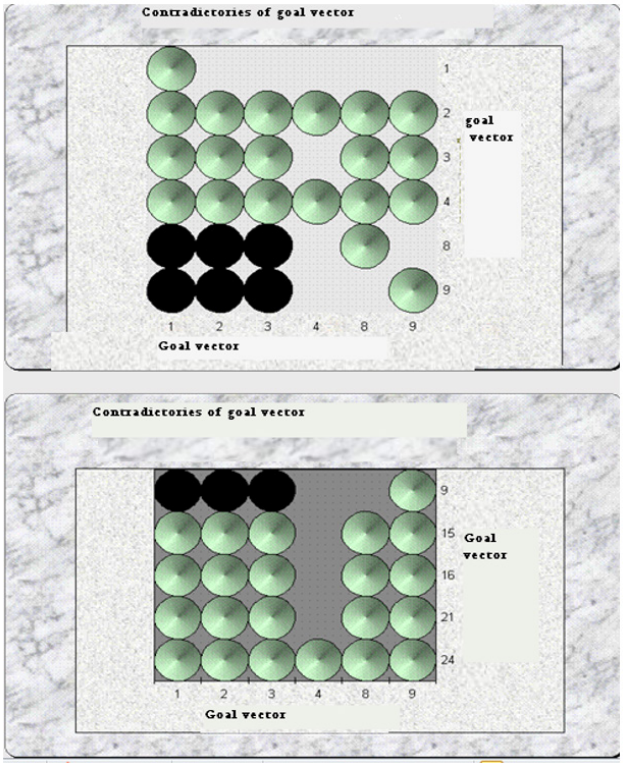

Figure 2. *Graphs of the contradictories of the goal vector and diagram of control influences effectiveness*

Conclusion

According to the received results from the diagram (fig.2) one can see that the goals (factors) 1 (region stable develop-ment), 2 (social indices) and 3 (economic indices) are mutually contradictory. Similarly, the goals 1, 2, 3, 8 (population growth rate), 9 (birth rate) are mutually contradictory. All the other goals are in mutual positive interrelations. The nature of mutual inconsistency of their changes tendencies consist of the following: if any goal grows (decreases) then another goal decreases (grows). For example, at the moment of the growth of the goal 1 the goal 9 decreases or vice-versa.

The scenario of self-development

According to the model, the results for the initial values of relevant factors of self-development scenario were obtained. On the diagram fig.3 the graphs of results are shown:

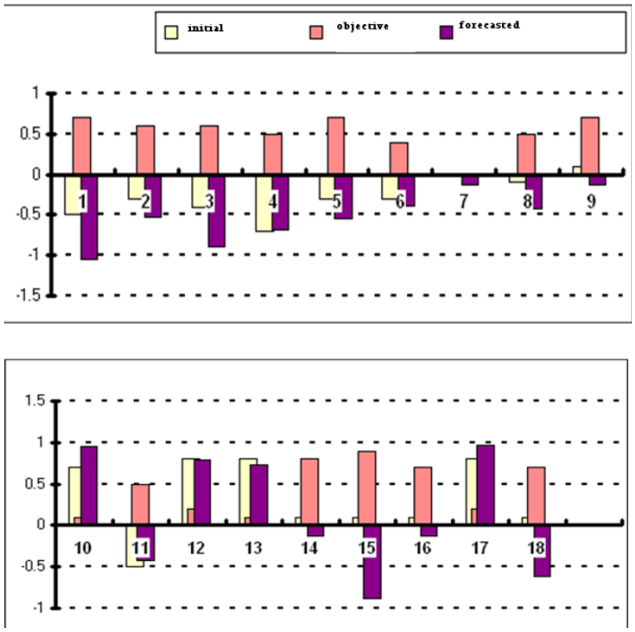

Figure 3. *Diagram of self-development scenario*

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