International Journal of New Technology and Research(IJNTR)
ISSN:2454-4116, Volume-3, Issue-11, November 2017 Pages 12-14

Approach to The Assessment System Stability Through Modelling of Organizational Structure of The Object

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***Abstract*-Relevance of the topic due to the use of structural modeling guidelines for describing and studying the behavior of economic entities with a view to deciding on the best choice of a state in which an object may be economic in terms of stability, functionality, profitability and system compatibility between economic entities.**

***Index Terms*- system modeling, object, structure, functioning, stability, reliability, profitability**

I. Introduction

The reliability of the system depends on its stability. The system will be stable, if it is protected from interference and its functioning constantly and not disturbed by external factors. Immunity system strictly defined organizational structure, hence the need to be able to implement structural modeling and be able to evaluate. Further sets out a possible approach to the implementation of structural modeling and evaluation structures.

Modeling is the study objects of cognition their models; building and study models real-world objects processes or phenomena with a view to obtaining explanations of these phenomena, as well as to predict phenomena of interest to researchers.

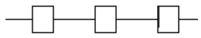
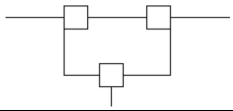
Structural modeling is closely related to mathematics, simulation and statistical modeling in certain circumstances, namely when creating economic object and calculation of structural characteristics; When a simulating system works with a fixed factor; When modeling system operation in the interim period.

On the basis of the above, on possible areas of modeling, they can be reduced to two main areas: structural and functional modeling.

Structural modeling is intended for building and modifying organizational structures, economic and other systems and optimize the structural links. Structural modeling (simulation of structural equations) can be briefly defined as the totality of methods of multivariate analysis, allowing to study the relationship between observed and non-observable phenomena (variables.) look at it in detail.

Structural modeling is modeling the composition and relationships between elements in the System. Optimal functioning of the system as a whole is determined by the correct organization structure of subsystems and reflected in the maximum yield of the system (object). Structure of subsystems can vary in dependence from the domestic Interior and external factors. In table 1 reflects the structure of systems in conjunction with the results of its work.

Table 1. Table conformity (T∑), from theresemblance of the structure of the system (C) (∑) with the result of the work of ∑

№	*Fi*	*Sij*fact	Scheme system Zij (∑)	Sfactor-vector	C
1	2	3	4	5	6
1	F_1	S_{1m}		(S_1*...)	
…		…	...		
k	F_k	S_{km}		(S_1* ...$S_к$*)	

where:
Fi - max (min) the profitability of the system;
S ij - impact j-th factor on i-st exodus (the value of the j-th factor when F_i income);
S - quotient vector or vector situations S=(S1,S2,...S(k));
C - rating or weight System (*C*(∑)) or V (∑);
Zij (∑) - circuit System ∑ (project or organizational structure).

For managers important columns 2 and 6 table 1. Thus, it is necessary to build the structure of the systemZij (∑)from which will be the corresponding rating V (∑), which will meet the reference weight system Vmax (∑), receiving maximum revenue F. In order to assess the structure, you must properly undertake structural modeling and integrated structural assessment (structural rating) below describes a structural essence modelling.

II. The point of structural modeling

Quality operation of the system is determined by the aggregate of all indicators of the system, i.e. the weight of the (ranking) System connected with the quality of functioningthe functioning of the System.

Structural and functional indicators of quality system can be divided into single($ПК^{Е}$), group ($ПК^{Г}$) and integrated ($ПК^{є}$).

A single indicator $ПК^{Е}$ associated with a structural or functional characteristic of X_i, X_i so-single characteristic of the system and the sum of all individual characteristics X = {X_i}. Individual characteristics of the system are the characteristics associated with the structure of the system (bandwidth, hierarchy, complexity, information) and the

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characteristics associated with the functioning of the system (System throughput, functional complexity, reliability). Thus, the essence of structural modeling is to develop models for calculating the structural characteristics and weight of the system ПК^{E} ($\sum$).

Group indicatorПК^{Г}- group of characteristics of the system, where a set of the form:

$$X = \{\{X_j^k\} \dots \{X_k^p\}\}$$

This is the set of possible types of k and p group characteristics.

Group rate ПК^{Г} group characteristics of the system, where many species:

$$X = \{\{X_j^k\} \dots \{X_k^p\}\}$$

Is the set of possible types of k and p group characteristics.

IntegratedПК^{є}isassociatedwithratingsystem. In theory, expert estimates this figure is called a weighing system. To calculate the weight must be from individual features to build integrated. Expert assessments are used to determine the significant individual characteristics, as a result, in determining the weight of the system will not be counted inconsequential individual characteristics.

Among the methods of expert evaluation methods selected characteristics leads and numerical estimates. The following is the algorithm to structural modeling specifications.

III. ALGORITHMOF STRUCTURAL MODELING OF COMPLEX SYSTEMS

1. Build a structure using any available means.
2. Calculate quantities of structural characteristics$X_i \overset{df}{\cong} k_i$.

Formalisation of the calculation of the structural indicators System $\sum$.

1) k_1 – complexity – (k_1^*, k_1^{**})

$$k_1^* : c = (1 + \xi\mu)\bar{e} \quad (1)$$

$$\mu = \left\{\mu_1 = \frac{M}{N(N-1)}\right\}; \mu_2 = \frac{M}{N(N-1)k(k-1)}; \mu_3 = \frac{M}{N(N-1)k(k-1)r(n+m)(r(m+n)-1)} \quad (2)$$

where:

k – number of elements;

N – number of levels (ways);

n+m – the number of outputs for the Office and for information; r – number of inputs

C – p-tioncoefficient;

$\mu 1$, $\mu 2$, $\mu 3$ – calculates the dependencies from the power of the elemental E many of the system;

ξ- complexity manufacturing item and complexity of manufacturing communications between them.

$\bar{e} = \sum_{i=1}^{N} e_i k_i$ (3)

where:

e– the complexity of manufacturing all elements i -s types;

ei– the complexity of manufacturing elements I -th type;

ki– number of elements I -th type;

M – number of really existing relations; N - number of sub-systems / elements in the System;

μ– the relative coefficient, used for countingthe complexity of the ($\mu 1$, $\mu 2$, $\mu 3$);

m – number of outputs on I

n – number of outputs on f.

If the system is set to draft, i.e. in statics, what c = □

k_1^* - structural value;

k_2^{**} - functional value;

$$k_1^{**} : (M \times L)k = V_F \ (4)$$

M – is the number of parallel operations;

L – the hardest job (the length of the longest process chain);

k – is a relative factor, associated with the introduction system in implementing environment;

V_F – the amount of required activities that you want to obtain the final result;

2) k_2 – reliability (R)

$$R_1 = \frac{K_V}{N} \ (5)$$

where:

K_V – number of elements with the maximum number of entries.

N – total number of elements in the□ (system).

Or

$$R_2 = \frac{\#S\#}{M} (6)$$

where:

#S# - number of subsystems in the system; M is the total number of links.

These formulas (4, 5, 6) are applicable, if the system is given as (draft).

While running the system R is calculated by the formula (7):

$$R = (T^H, \bar{T}, P, \Delta) \ (7)$$

where:

T^H- during normal operation of the system;

T is the average time, error-free operation of the system;

P = probability of error-free operation of the system in a given period of time;

Δ - number of errors in the system in a given interval of time;

3) k_3 -capacity determines the max/min system performance over time.

$$\Pi_1 = \frac{\#S_I^{=I}\#}{\#S\#} \ (8)$$

$$\Pi_2 = \frac{M}{(H \times L)K} \ (9)$$

where:

$\#S_I^{=I}\#$ - number of identical subsystems I-info;

L-length of computational chain;

H-the degree of parallelism of work (number of simultaneous jobs);

#S #-number of subsystems in the System.

1) k_4 -versatility. How many activities can be realized in the system.

$$U_1 = \frac{K_V}{N} \ (10)$$

$$U_2 = \frac{\#\tilde{S}^*\#}{\#S\#} \quad (11)$$

where:

K_V - number of elements with the maximum number of different types of inputs;

N - is the number of all items in the system;

$\#\tilde{S}^*\#$- number of different subsystems function;

#S #-number of subsystems in the system;

2) k_5 - informative:

$$I_\varepsilon = \frac{\overline{K_I}}{N} \quad (12)$$

where:

$\overline{K_I}$- number of elements with the maximum number of similar information youmoves;

N is the total number of elements:

3) k_6 - hierarchy:

$$Y^\varepsilon = \frac{\#Y^f\#}{\#Y\#} \quad (13)$$

where:

$\#Y^f\#$ - number of equations (ways) by types of hierarchy: management, information, functions, activities, time.

#Y# - total number of equations (ways) in the system;

The lowest hierarchy- Y^F-must be on management and overall functionality.

1. Build expert table (table 2).
2. Recorded metric values of k_i the Group of experts (if Ballroom-1 to 10, if the numerical method is from 0 to 1) (table 2.3).
3. Indicate in the table the expert assessment for each characteristic k_i the type of$V_i \overset{df}{\cong} k_i$, , i.e. i -I score j-th expert.
4. 14 formula to determine the average weight of each k_i-specifications:

$$V_{ij} = \frac{j \sum V_{ij}}{j \sum i \sum V_{ij}} \quad (14)$$

5. In table 2indicate on each characteristic calculated weight..
6. Sort by ascending values of veowls characteristicsk_i.
7. Apply the formula 15 calculate weight (ranking) system to a transformed matrix weights characteristics k_I.

$\Pi K^E = V^E = \sum_1^n X_i \overline{V_i}$ (15), where

X_i – metric value characteristicsk_i;

k_i – i- characteristic of the system;

V_i – average ratings (weight) characteristics k_i;

V_Σ– weight system;

$Э_j$ – expert j-st;

V_{ij} – score i characteristics j expert.

Table 2. The matrix of weights

№	characteristic	$Э_1$	$Э_2$	..	$Э_m$	V_{ij} - weight
1	2	3	4	5	6	7
1	K_1	V_{11}	V_{12}		V_{1m}	
2	K_2	V_{21}	V_{22}		V_{2m}	
i	...k_i=x_i					
n	K_n=x_n	V_{n1}	V_{n2}		V_{nm}	

The value of points depending on the number of characteristics of the system are determined in ∑ k interval from 1 to 10. For greater accuracy calculated rankings ∑ applies method of numerical evaluations, i.e. score expert j expressed in rolls from 0 to 1 (table 3).

Table 3. Application of the method of numerical evaluations

№	criterion	Experts			
		$Э_1$	$Э_2$	$Э_j$	$Э_M$
1	X_1=k_1				
2	X_2=k_2	0.01	0.05		1
...	...				
N	X_i=k_N				

5* to calculate average weight for formula 3, after filling in the table 3. (step 5 is replaced with the step 5 *)

$$\overline{V_i} = \frac{\sum_{i=1}^m V_{ij}}{M} \quad (16)$$

To associate a rating system with the system's ability to perform specified work well to connect the process of calculating the ranking with functional modeling system. If you want to simulate the work of the system in time, then use simulation and statistical modelling. The results of structural and functional modeling system made in table 1 compliance.

IV. Conclusion

To summarize, it can be argued that the results of the sampling structural modeling must be associated with a functional modeling results, due to the fact that the structure is one of the internal factors affecting the simulation aspect of its functioning. So to simulate the operation of the system as a whole need to intensify both directions simulation system as structural and functional.

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