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Methodological Aspects of Assessment of the Anti-Crisis Management Institutional System

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Abstract: Authors attempt to develop a methodology of assessment of the anti-crisis management institutional system based on definition of statistical probability of occurrence of a specific condition of institutional system effectiveness, meanwhile, an uncertainty of system of possible results of institutional systems functioning will be evaluated based on entropy value, the institutional system features which can be accepted to calculate its institutional value. As a result integrated index of efficiency of the anti- crisis management institutional system, calculated based on indexes which describe institutional features of the system will be offered.

Key words: Institutional system · Anti-crisis management · Assessment methodology · Entropy value · Institutional features · Institutional value · Efficiency of the institutional systems

INTRODUCTION

Analysis of theoretical approaches to access efficiency of anti-crisis management institutional systems is seamlessly fit into performances of general principles of efficiency evaluation of *X-economies* institutions [1]. Meanwhile, we consider an approach to evaluate efficiency of the anti-crisis management institutional systems, based on assessment of institution quality, involving as a component, evaluation of its economic efficiency as the most adequate one. Besides, the offered approach reflects the most of the purposes and functions of anti-crisis management institutional system because an element of dominance of one or another goal of anti-crisis institution at specific stage of the business cycle is always available within the framework of this system.

Studies in the area of the artificial intellect and information theory, expert systems, games theory, probabilities and statistical decisions, mathematical statistics, statistical recognition theory affect enormously the development of methodological bases of efficiency assessment of functioning of anti-crisis management institutional systems.

Therefore, intrinsic difficulties related to the algorithmization and programming of processes of recognition of the anti-crisis management system institutional features are revealed despite of detailed studies in the area of mathematical logic, statistical and information modeling of the studies performed in the economics [2-8]

The said difficulties are connected, first of all, with finiteness of "linear» formalization at models building as a model reflects convincingly logical link of an object features, its information importance, but the model cannot represent adequately its semantic connections.

Results of carried out studies prove, that methodological approaches to assess efficiency of anti-crisis management institutional system stipulate the following basic principles of the system building [9]:

- Defining of membership of an object to specific class or group of objects;
- Revealing of differences of a diagnosed object from objects of the class by comparison of its actual indexes with base ones;
- Definition of allowable variations from base indexes;
- Working out of a method to develop institutional norms to be applied as base indexes.

A.A. Auzan point of view [9] that all happening in an enterprise within the limits of institution processes is essential to understand how and according to what laws and rules resources are distributed beyond the enterprise limits can be accepted as a methodologically justified.

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This assumption expands system economics content of general institutional approach to understanding of anti-crisis management processes. In case of such approach the crisis itself determines the anti-crisis management as a system of activity of specific institutional forms described by institutional features and indexes, dynamically existing as a time basis and decision-making criteria vary in the environment of the anti-crisis program performance.

Consider application of some provisions of the information theory related to definition of institutionalization results value in the anti-crisis management. At first we will use a syntactic measure of information as a standard to measure quantity of information. Other standards to measure information, as shown below, will have an application at assessment of value of its institutional features [10].

Suppose existence of some system of predicted conditions of the anti-crisis management institutional system which includes *n* conditions. According to data of information processing results we will define the statistical probability of occurrence of this condition of institutional system efficiency *Ri* and aprioristic probability for this institution will be designated as *P (Ri)*. Uncertainty of possible results system of institutional system functioning shall be accessed by the entropy value:

$$U(R) = -\Sigma P(Ri)\, log2P(Ri) \quad (1)$$

Where:

- *U (R)* entropy of results of institutional system functioning;
- $P(R_i)$ aprioristic probability of result of functioning of specific institution system R_i;
- $log_2 P(R_i)$ logarithm, then the second value $P(R_i)$ is used.

It would appear reasonable that the institutional systems which are united according to equal probability of its activity have maximum entropy. Entropy of such institutional system, involving *n* equal probability conditions, can be calculated as:

$$U(R) = -\Sigma P(Ri)\, \Sigma log2P(Ri) = \Sigma\, 1/n \times log21/n = log2n \quad (2)$$

For example, in case of equal probability results of the institutional systems functioning in the conditions of crisis and according to typology of crises shown in earlier sections of the thesis, value $n = 20$. Entropy value of such institutional system is equal:

$$U(R) = log2n = log220 = 4,34 \quad (3)$$

Entropy value of anti-crisis management institutional system will be decreased in the course of entering of some volume of new or additional information having as internal and external nature into the system. Meanwhile, incoming information value is comparable to the institutional system entropy difference before and after the information reception and can be expressed as follows [11]:

$$IR_i(k_i) = U(R_i) - U(R_i/k_i) \quad (4)$$

Where: $R_i(k_i)$ is quantity of information entered into a system of results of institutional system activity *R* under institutional feature k_i;

- $U(R_i)$ uncertainty of results of institutional system functioning before information coming (initial entropy);
- $U(R_i/k_i)$ uncertainty of results of institutional system functioning after information coming under feature k_i.

Therefore, the uncertainty elimination will lead to rise in efficiency of control action of the anti-crisis management institutional systems.

Entered data value $IR_i(k_i)$ can be considered as an information value of specific institutional feature k_i in relation to results of functioning of institutional systems R_i of this institution which reduces as a whole the entropy of the anti-crisis management institutional system.

The functional weight of one or another institutional feature can be as a positive and negative value, that is or decrease or increase efficiency of an institution and whole institutional systems of anti-crisis management. Results of activity of one anti-crisis management institution having the most institutional value, can be of substantial importance and value for other institution of the system.

Total institutional value of the system may be assessed at institutional feature k_i, to be defined according to information coming as a result of monitoring of the economics [11]. Institutional weight of a simple feature for all groups of institutional systems features will be:

Table 1: Institutional features (indexes) of the system to be used then calculating its institutional value

Institutional feature name	$IR_i (k_i)$
Index - ratio of resolved arbitration cases for a given period (month, quarter, year) to the quantity of all cases in arbitration during the same period	I_a
Index - ratio of number of restructured enterprises to enterprises in default for a given period	I_b
Index - ratio of quantity of cut jobs as a result of bankruptcy to jobs being created (preserved) as a result of re-structuring of enterprises for a given period	I_c
Index - ratio of income (losses) volumes received as a result of re-structuring (bankruptcy) of enterprises to cumulative charges to maintain anti-crisis management institutions for a given period	I_d
Index - rates of change (increase, saving) of transaction costs to maintain anti-crisis management institutions	I_e
Index - rates of change of financial assets allocated to maintain one or another institution of anti-crisis management system for defined period	I_f
Index - ratio of value of change (gain, decrease) of tax revenues in the budgets of all levels as a result of restructuring and financial recovery of economic entities to the value of expenses of the same budgets to maintain the institutions of the anti-crisis management	I_g
Index - rates of change (increase, saving) transformation costs to maintain the institutions of the anti-crisis management for defined period	I_h
Index - ratio of newly created enterprises and those undergoing bankruptcy (liquidation) for defined period	I_t
Index - rates of growth of the account balance of primary income of newly created economic entities	I_z
Index - rates of growth of the account balance of primary income of restructured economic entities	I_r
Index - share of vertically subordinated structures in the total of structures (institutions) of anti-crisis management system	I_m
Index - relative density of horizontal structures in the total of structures (institutions) of anti-crisis management system	I_s
Index - ratio of value of change (gain, decrease) of tax revenues in the budgets of all levels as a result of restructuring and financial recovery of economic entities to the value of expenses of the same budgets to maintain the institutions of the anti-crisis management	I_v
Index - change in labor efficiency dynamics needed to perform programs of the anti-crisis management	I_w

$$IR(k_i) = \Sigma P(R_i)\, I \times R_i(k_i) \quad (5)$$

Using this relation, we can define an optimum choice of number of categories of feature. Institutional value of feature will rise with increasing of number of categories meanwhile a sample volume raises simultaneously. In other words, information volume is actually fixed and it only remains to build an optimum institutional (organizational) process of its accumulation.

The system's institutional features which can be accepted to calculate the features institutional values are listed below (Table 1). It also should be considered that institutional weight values of one or another feature are resulted in retrospective dynamics, in this case conditions of independence of these values are associated with prior values results and are entirely interconnected among themselves. Therefore quantity itself of institutional values of one or another feature depends on its prior value or process dynamics.

Considering before said dependence, formulas structure will be the same in calculation of institutional importance of features value.

In addition, the formulas will include conditions of features probability, that is condition of availability or absence of some defined feature is entering into each probability value. For example, information weight of availability *of Y* interval of *k2* institutional feature for result of specific institution functioning *Ri* under condition of availability of j interval of *k1* feature will be:

$$IR(\frac{K2y}{K1y})_i = \log 2 \frac{P(\frac{k2y}{Ri \times k1y})}{P(\frac{k2y}{k1y})} \quad (6)$$

Accordingly, information value of *k2* feature if *j* digit of *k1* feature is available, considering all possible results of institutional system functioning as a whole by *k2* feature, will be:

$$IR_i(\frac{K2}{K1j}) = \sum P(\frac{k2y}{Rj \times k1j}) \times log 2 \frac{P(\frac{k2y}{Ri \times k1y})}{P(\frac{k2y}{k1y})} \quad (7)$$

Where:

$IR_i(\frac{K2}{K1j})$ - Quantification of conditional information value of *k2* feature.

At evaluation of institutional system efficiency, its institutional value (productivity) and costs value under each *k1* institutional feature shall be compared. In this case *Cj* costs value means a set of costs of all types required to provide information to specific institution of the anti-crisis system [11,12].

Effectiveness ratio tending to l as a minimum, under *k1* feature will be used as a criteria to assess the institutional system efficiency:

$$\beta = \frac{IR(K1)}{\sum Cj} \quad (8)$$

Where:

IR (K_I) - Information value of an institutional feature;

ΣCj - Sum of costs factors to provide information to specific institution of the anti-crisis system.

It is evident, that effectiveness ratio will be greatest if information value *IR (K_I)* is received with the minimum value of costs required to receive information.

Evaluation integrated index of efficiency of institutional system of anti-crisis management (?$I_{ēī}$) to be calculated based on fifteen indexes describing institutional features of the system is offered to be used based on comparison and analysis of available methods to assess efficiency of institutional systems. Indexes shall be calculated as a ratio of according indexes within the accounting period to its basic indicator. Integrated index of institutional system efficiency can be represented as follows:

$$\sum I_{ucs} = \sqrt[15]{\begin{matrix}\mathrm{Ia}\times\mathrm{Ib}\times\mathrm{Ic}\times\mathrm{Id}\times\mathrm{Ie}\times\mathrm{If}\times\mathrm{Ig}\times\mathrm{Ih}\\ \times\mathrm{It}\times\mathrm{Iz}\times\mathrm{Ir}\times\mathrm{Im}\times\mathrm{Is}\times\mathrm{Iv}\times\mathrm{Iw}\end{matrix}} \quad (9)$$

Level of ratio of costs for collection, archiving, processing and transfer of information using the information and communication technologies in the system of institutions of anti-crisis management compared to its efficiency level is shown as a graph on Fig. 1.

Left vertical of offered dependence diagram shows dynamics of efficiency index of the institutional systems of anti-crisis management *(R)*.

Right vertical shows entropy value of the institutional systems of anti-crisis management *(U)*.

Dynamics of value of cumulative transaction costs of anti-crisis management institutions *(C)* is shown in the horizontal.

As it seen, the dependence is as follows; as awareness of institutional system of anti-crisis management raises and level of its entropy decreases, its acquisition costs will also raise and the system effectiveness as a whole will rise in connection with the above. However at some moment then certain limit of increase of the costs required to acquire information and the minimum value of entropy are achieved, any grow of effectiveness of anti-crisis management system stops and its value remains as a stable. All above evident existence of limit costs of decrease of a system entropy in case then raise in its acquisition costs is not justified by

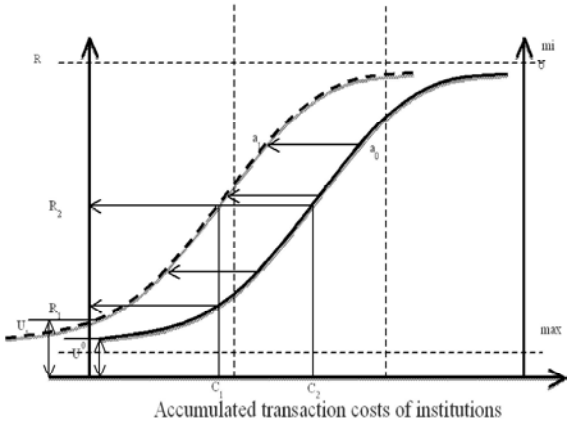

Fig. 1: Dependence of costs, entropy and efficiency of anti-crisis management institutional system

absence of dynamics of efficiency rise of separate institutions functioning or whole institutional system of anti-crisis management.

The anti-crisis management institutions require diverse information. It is a set of data about control object condition, past and present thereof, as well about it relations, trends and regularities. Information space of each economic system functions as a single unit and develops together with an organization.

In other words, institutional system stipulates varying by alternative projects on bailout of an enterprise or avoidance of crisis, requiring according data support which reflects reliably the actual processes in the system. That is why an institutional system shall be considered as an institution of steady relation between it functionality and verified result of its activity. Therefore, institutional system of anti-crisis management has a quite specific logic expressed as a sequence of actions as follows:

- If on time (A);
- Authentically and with sufficient completeness of information (B);
- Using proven method of its processing (C);
- Anti-crisis measures (D) are performed;
- High probability achievement of assigned goal as a result of effective functioning of institutional system of anti-crisis management can be ensured.

Revealing and studying of specific properties of information and its role in the process of institutionalization of anti-crisis management, allow defining a number of conclusions:

- Cycle development of anti-crisis management institutional system is accompanied by occurrence of its new, specific qualities;
- Continuous process of bankruptcy, liquidation, re-structuring and simultaneous appearance of new enterprises evident constant process of updating and rise of information flows, which increases substantially importance of information value of institutional features of structural institutions of the anti-crisis management institutional systems as a whole;
- High entropy of market macro-environment of enterprises reduces substantially the controllability, decreases level of the information monitoring of change in situation conditions and forecasting probability;
- COntinuous threat of crisis conditions stipulates allocation and strengthening of forecasting, anti-crisis, preventive functions of institutions of anti-crisis management system in relation to stabilization of the economic development of enterprises.

Besides, the expert evaluation of a financial condition of the enterprises and bankruptcy process, results of which constitute the information-analytical basis of adapting of the anti-crisis management system institutions is one of prospective directions of data support of the institutional system of anti-crisis management.

All above reasonably requires the scientific summarizing of institutional theory aimed to generate a variety of approaches to evaluate role of institutional component in dynamics of financial and economic performance of an enterprise, its organizational structure and management system. It is especially important in case of complex objects evaluation when resting on adaptive, learning and self- learning systems is required.

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