Analytical content of properties of uncertainty and certainty of organizational-economic systems: derivatives indicators

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ANALYTICAL CONTENT OF PROPERTIES OF UNCERTAINTY AND CERTAINTY OF ORGANIZATIONAL-ECONOMIC SYSTEMS: DERIVATIVES INDICATORS*

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The summary. Uncertainty and certainty of organizational-economic systems are their integral properties. Existence and development of any object in stochastic conditions is not obviously possible without presence of uncertain conditions and the certain factors determining the subsequent conditions of organizational-economic system. Representation and a substantiation of the methodological device of carrying out of an estimation of uncertainty and the certainty, the author stated earlier in the publication «Uncertainty and certainty property estimation of organizational-economic system», have formed a basis for deepening of research and formation of a complex of analytical indicators.

In the scientific article the original derivative indicators are resulted and described, allowing to carry out the analysis of properties of uncertainty and certainty in organizational-economic systems. All derivative indicators are typified on groups, allowing to make some panel of indicators. Reveals two approaches to an estimation of uncertainty and certainty on the basis of dependence of subsystems. Decomposition of public-private partnership, as example of difficult organizational-economic system is made.

Keywords: uncertainty, certainty, organizational-economic systems, public-private partnership, analytical indicators

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1. A substantiation of necessity of research and the literature review

Research of the nature of uncertainty, its typification, problems of acceptance of administrative decisions in the conditions of uncertainty, and also convergences with risks are engaged many foreign both Russian scientists and experts, including profile scientific institutes and the organisations. The most significant results of researches for the theory and the uncertainty methodology, the put in pawn bases of the subsequent development of theoretical and applied workings out, are presented in works Knight F.H.[1], Ross[2], T.E. Cliffe Leslie[3], Lavington F.[4], Pigou A.C.[5], Haynes J.[6], Long J.[7], Moore P.G.[8], Thomas H., McCall J.[9], Traub J.F.[10], Wasilkowski G.W., Wozniakowski H. And many other things. Modern representations of foreign scientists about uncertainty of economy are traced in works Borch K.H.[11], Smith N.J.[12], Jaeger C.C., Webler T., Rosa E.A., Renn O.[13], Oxelheim L.[14], Wihlborg C., Etc.

Domestic researches of uncertainty in the majority are based or refer to foreign works. It confirms the assumption of the author of catching up character of development of the given direction of scientific thought of the period of the beginning-middle of the XX-th century, during the period when basic ideas and representations about the uncertainty have been stated, making a modern paradigm.

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[1] Knight Frank H. Risk, Uncertainty, and Profit. - Boston, MA: Hart, Schaffner AND Marx; Houghton Mifflin Co., 1921

[2] Ross, Uncertainty as a Factor in Production, Annals, American Academy, vol. VIII, 1896, pp. 304

[3] T.E. Cliffe Leslie. The Known and the Unknown in the Economic World. – Essays in Political Economy, 1888, pp. 221-42

[4] Lavington F. Uncertainty in its Relation to the Rate of Interest//Economic Journal, vol. XXII, 1912, pp. 398-409; Lavington F. The Social Interest in Speculation//Economic Journal, vol. XXIII, 1918, pp. 36-52

[5] Pigou A.C. Wealth and Welfare, 1912, part V, p. 176

[6] Haynes J. Risk as an Economic Factor. – Geo. H. Ellis Printer, 1895. – 43 p.

[7] Long J. Wealth, Welfare, and the Price of Risk//Journal of Finance, American Finance Association, vol. 27 (2), 1972. – p. 419-433

[8] Moore P.G., Thomas H. Measuring uncertainty//Omega, Elsevier, vol. 3 (6), 1975. – p. 657-672

[9] McCall J. The Economics of Information and Uncertainty. – NBER Books, National Bureau of Economic Research, Inc, number mcca 82-1, 1982

[10] Traub J.F., Wasilkowski G.W., Wozniakowski H. The Information, uncertainty, complexity: the lane with English – M.Mir, 1988. – 184 p.

[11] Borch K.H. The economics of uncertainty. – Princeton University Press, 1968. – 227 p.

[12] Smith N. J. Appraisal, risk and uncertainty. - Thomas Telford, 2003 – 132 p.

[13] Jaeger C.C., Webler T., Rosa E.A., Renn O. Risk, uncertainty, and rational action. – Earthscan, 2001 – 320 p.

[14] Oxelheim L., Wihlborg C. Corporate Decision-Making with Macroeconomic Uncertainty: Performance and Risk Management. – New York; Oxford: Oxford University Press, 2008. – 244 p.

In the subsequent, in a domestic science such scientists as Petrakov N.J.[15], Rotar V. I, Ajvazjan S.A., Tepman L.N.[16], Vishnjakov J.D., Radaev N.N.[17], Shapkin A.S.[18], Chernov V.A.[19], Utkin E.A.[20], Frolov D.A., Kachalov R.M.[21], Ermasova N.B.[22], Kulikova E.E.[23] and others were engaged in studying of essence of uncertainty. The results of their researches added with theoretical and methodological workings out of foreign scientists, make modern traditional understanding of uncertainty and risks.

2. Object of research

According to subjects of research object of studying are the difficult organizational-economic systems concerning by definition of the author, to systems of the third order. As an ideal case of consideration of mechanisms of formation, an estimation and the analysis of uncertainty in the form of entropy and its return condition in a kind negentropy, the author uses public-private partnership. At the given kind of interaction of the state and private business all variety of forms of social and economic mutual relations in which process the key role is played by information streams is shown. Simultaneously with it, the public-private partnership can include realisation of some the non-adjacent projects acting as a microsystem within the limits of difficult organizational-economic system between relations of the state and private business. Thereby, in public-private partnership forms of independent elements incorporate both forms dependent.

3. Approaches to an uncertainty estimation

The estimation of uncertainty for difficult organizational-economic systems assumes the independent separate account of all types of the uncertainty making uniform subsystem. For the decision of a scientific problem according to entropy and

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[15] Petrakov N.J., Rotar V.I, Ayvazian S.A. The factor of uncertainty and management of economic systems. – Science, 1985. – 190 p.
[16] Tepman L.N. The risk in economy: Studies., 2002. – 380p.
[17] Vishnyakov YA.D., Radaev N.N. The general theory of risk. - 2nd ed., Rev. - M.: Publishing Center of the Academy, 2008. – 368 p.
[18] Shapkin A.S. Economic and financial risks. Assessment, management, investment portfolio. - 5th ed. - M.: Publishing and Trading Corporation «Dashkov Co.», 2006. – 544 p.
[19] Chernov V.A. Analysis of commercial risk. - Moscow: Finances and Statistics, 1998. – 291 p.
[20] Utkin E.A Frolov, D. Risk management of the enterprise. - Moscow: TEIS, 2003
[21] Katchalov R.M. Managing economic risk / PM Katchalov. - Moscow: Nauka, 2002. – 192 p.
[22] Ermasova N.B. Risk management organization. - M. CTI «Dashkov Co.», 2009. – 380 p.
[23] Kulikov E.E. Risk management: an innovative aspect. - M.: Berator-Publishing, 2008. – 112 p.

negentropy for difficult organizational-economic systems as it is represented to the author, it is necessary to use two various approaches to their definition (Figure 1).

The first approach is based on consideration of those subsystems which join in uniform system and are dependent among themselves. In the second approach subsystems which mismatch criteria of the first approach, that is the subsystems joining in uniform organizational-economic system are estimated, but being independent – their author designates as a microsystem. Taking into consideration, that realisation of projects of public-private partnership can be expressed in aggregate both dependent, and independent projects it is expedient to use concept of a portfolio of projects. Hence, there are such etymological forms as a portfolio of risks of projects and a portfolio uncertainty projects of public-private partnership.

In conditions when for an estimation of entropy and negentropy difficult organizational-economic system application of two different approaches to their calculation is necessary, the portfolio of risks of projects and a portfolio uncertainty projects of public-private partnership becomes necessary to differentiate concept. The author, being based on essence risk-administrative of the approach, suggests to use following understanding of a portfolio uncertainty projects PPP:

(1) the portfolio uncertainty projects of public-private partnership includes isolated uncertainty of projects which are independent in relation to other projects. In system of public-private partnership existence of several portfolios uncertainty projects is possible;

(2) the portfolio uncertainty projects of public-private partnership includes uncertainty of subsystems and the independent projects, being dependent under the relation to each other. In system of public-private partnership there can be only one portfolio dependent uncertainty.

Such understanding of portfolios uncertainty projects is a little bit wider than sights of other scientists which identify a portfolio of risks and uncertainty with interdependence of components. An example, displays of narrow representation of

portfolios of risks Tihomirova N.P. and Tihomirovoj T.M.'s[24] research which system of the interconnected risks of object name a brave portfolio (a portfolio of risks) can serve.

Author's division of projects allows to make a portfolio estimation uncertainty through an entropy indicator, and together with it and a portfolio estimation negentropy about use of the methodological device stated earlier. Association of several subsystems or microsystems is based on various approaches to an entropy estimation.

The first approach assumes, that cumulative entropy of difficult organizational-economic system is defined on the basis of convention of change of components entropy[25]. In these purposes the theorem of addition full conditional entropy then mathematical expression takes the following form is applied:

(1)

$$H(S_1, S_2, ..., S_m) = H(S_1) + H(S_2 \mid S_1) + ... + H(S_m \mid S_1, S_{2,}, ..., S_{m-1}),$$

where

$H(S_1, S_2, ..., S_m)$ – a portfolio of uncertainty (entropy) of difficult system for dependent m-subsystems;

$H(S_1)$ – entropy of the first subsystem;

$H(S_2 \mid S_1)$ – entropy of the second subsystem concerning the first;

$H(S_m \mid S_1, S_{2,}, ..., S_{m-1})$ – entropy of a m-subsystem concerning previous (m-1)-subsystems.

Feature of a portfolio of the uncertainty counted for dependent subsystems, that the general entropy of the given portfolio is less is, than the sum isolated entropy its subsystems. The convention of occurrence of uncertainty of one subsystem depending on occurrence of uncertainty of another dependent subsystems reduces

[24] Tikhomirova N.P., Tikhomirov T.M. Risk Analysis in Economics: Monograph. – M.: Publishing: Economics, 2010. – 318 p. – P. 222

[25] Wentzel H.H. Probability Theory: Textbook. for universities. – M.: Higher. wk., 1999. – 576 p. – P. 477

probability of display of the phenomena and events, the general uncertainty and system thereby decreases becomes stabler and accordingly more operated.

The second campaign to a portfolio estimation uncertainty considers independent microsystems and in this case an estimation assumes use of a principle of additivity. According to the given principle the general uncertainty of difficult organizational-economic system for independent microsystems can be found by summation entropy its components (microsystems):

(2)

$$H(S_1, S_2, ..., S_m) = H(S_1) + H(S_2) + ... + H(S_{m-1}) + H(S_m),$$

where

$H(S_m)$ – entropy of a m-microsystem (subsystem) as a part of difficult organizational-economic system.

Use of the deduced expressions of calculation negentropy allows to make replacement in formulas of calculation of a portfolio of uncertainty (entropy) of difficult organizational-economic system of values of entropy on negentropy and to receive scientifically proved estimations of a portfolio negentropy (stability and controllability) for difficult system.

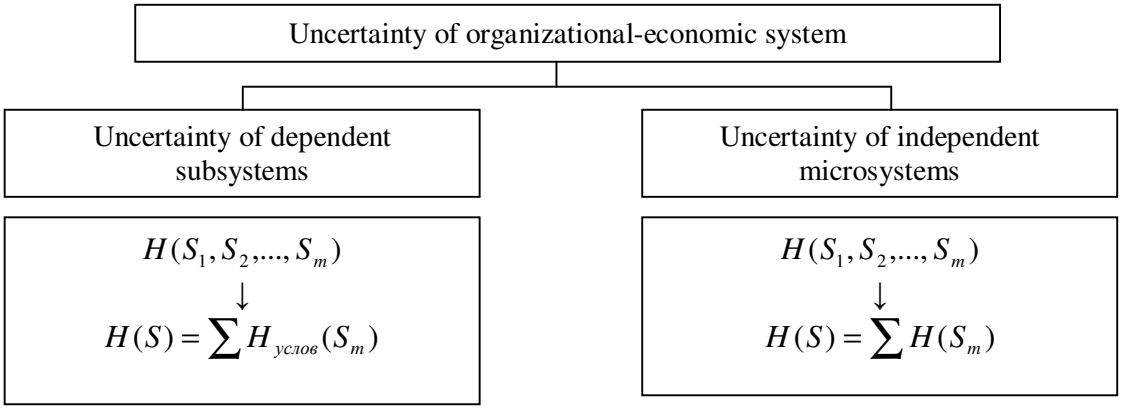

Figure 1 – The Estimation of uncertainty of organizational-economic system[27]

[26] Kulikova E.E. Management risks: innovative aspect. – M: Berator-Pablishing, 2008. – 112 p.
[27] Tihomirova N.P., Tikhomirov T.M. Risk Analysis in Economics: the Monography. – M: Publishing house: Economy, 2010. – 318 p. – P. 222

Subsystems and microsystems which are used as synonyms and are used for differentiation of dependence and independence of proceeded processes and the phenomena, contain internal estimations of uncertainty. Entropy and negentropy, calculated through presented mathematical the device, allow to characterise a system condition as a whole through conditions of its elements.

4. Derivative analytical indicators

The analysis of entropy and negentropy has led the author to the formulation of derivative indicators which deepen an estimation of «knowledge» of organizational-economic system and expand possibilities of interpretation of the given estimation.

Operating with exclusively absolute and relative sizes measures of uncertainty and symmetric certainty of organizational-economic system, the author comes to conclusion that the system effectiveness can be expressed various under the maintenance derivative indicators. The derivative indicators of a system effectiveness constructed on various parities of sizes of entropy and negentropy, are grouped by the author on four classes:

1. Capacity indicators;
2. Return indicators;
3. Elasticity indicators;
4. Parity indicators.

Each class of derivative indicators can characterise one of the parties of «knowledge» of organizational-economic system. And by that, will allow to define those or other tools of management of uncertainty for the purpose of conversion of system from a condition of chaotic development in a self-organising condition.

Considering, that functions of entropy and negentropy are symmetric, in each class of derivative indicators probably construction at least two indicators counted as a return parity, and the indicators using absolute and relative estimations of entropy and negentropy.

The first class of derivative indicators of efficiency of organizational-economic system is made by capacity indicators. The hypothesis of the author about calculation of indicators of capacity is based that the size of entropy as well as size negentropy

changes at realisation of some administrative actions from the subject of the organizational-economic system, resulting or to increase, decrease or fixing of level of uncertainty in system. A consequence of the given hypothesis is similar change of stability and controllability of system. Thereby, capacity indicators characterise the size of administrative influences falling to entropy/negentropy in the form of preventive measures. Thus the system effectiveness will be characterised by decrease in indicators of capacity for entropy and their increase for negentropy. Generally formalized kind of calculation of indicators of capacity can be presented as follows:

(3)

$$Z^{H} = \frac{H}{R_m} \text{ or } Z^{HE} = \frac{HE}{R_m}$$

where

Z^{H} – capacity of entropy of organizational-economic system;

Z^{HE} – capacity negentropy organizational-economic system;

R_m – resources of management of uncertainty/certainty.

Absence of comparable units of measure of entropy and negentropy lead to that the capacity of the given indicators also is deprived possibility of use of traditional means of an estimation and the analysis. When comparability of units of measure of sizes reflects their conditional dependence among themselves and opens possibility of direct updating as numerator, and denominator. However, in this case cost sizes or natural can be a unit of measure of resources (if the resource is same and standardised), and size of entropy and negentropy has no accepted units of measure but only use selective measuring instruments in the form of the certain size of a signal (b). Therefore, for simplification of perception of administrative process regarding influence on uncertainty it is offered to enter the unified unit of measure for entropy and negentropy in a kind «recerte» (rc) [by analogy to a Latin word «certe», meaning «definitely»] – a standard unit of measurement of uncertainty. Thus, it is possible to express capacity indicators as a rc/unit of cost or a rc/unit of volume of a resource.

The second class of derivative indicators of efficiency of organizational-economic system includes return indicators. Being based on economic essence of the given indicators it is possible to define, that their size is to inversely proportional size of indicators of capacity and consequently look like:

(4)

$$W^H = \frac{R_m}{H} \quad \text{or} \quad W^{HE} = \frac{R_m}{HE}$$

where

W^H – return of entropy of organizational-economic system;

W^{HE} – return negentropy organizational-economic system.

The size of indicators of return is expressed as a unit of cost of a resource/rc or a unit of volume of a resource/rc. The administrative sense of indicators of return of entropy and negentropy is extremely opposite to indicators of capacity and means achievement of a condition of efficiency at its growth for entropy and decrease for negentropy. As capacity and return indicators are diametrically oppositely it is possible to present the simplified kind of their calculation as:

(5)

$$W^H = \frac{1}{S^H} \text{ or } W^{HE} = \frac{1}{S^{HE}}.$$

The third class of derivative indicators expands representations about elasticity and offers use by a principle of analogies of indicators of elasticity both on a management resource, and on entropy/negentropy. At use of dual calculation in relative and absolute sizes. Thus, the given class of derivative indicators includes 4 basic of the indicator which can be used for an estimation of effect and a management efficiency uncertainty for achievement of the purpose of stability of organizational-economic system and its general controllability.

In classical understanding elasticity shows change of one indicator to other indicator and initially assumes revealing of size of their percentage change. However, the author considers, that in the conditions of limitation of measures of the

information for organizational-economic system, construction of an indicator of elasticity in absolute measuring instruments is expedient. The given introduction will expand the estimated and analytical device of research of uncertainty and will present additional possibilities for acceptance of administrative decisions.

The basic indicators of capacity can be expressed as follows:

1) for entropy at absolute change of sizes –

(6)

$$E_a^H = \frac{\Delta H}{\Delta R_m} = \frac{H_0 - H_1}{R_{m0} - R_{m1}},$$

where

E_a^H – absolute elasticity of entropy of organizational-economic system concerning administrative resource influence on given system,

2) for negentropy at absolute change of sizes –

(7)

$$E_a^{HE} = \frac{\Delta HE}{\Delta R_m} = \frac{HE_0 - HE_1}{R_{m0} - R_{m1}} \text{ Or, } E_a^{HE} = \frac{\Delta HE}{\Delta R_m} = \frac{H_1 - H_0}{R_{m0} - R_{m1}}$$

where

E_a^{HE} – absolute elasticity negentropy organizational-economic system concerning administrative resource influence on given system,

3) for entropy at relative change of sizes –

(8)

$$E_r^H = \frac{\Delta H^{\text{relative}}}{\Delta R_m^{\text{relative}}} = \frac{H_0^{\text{relative}} - H_1^{\text{relative}}}{100 - \frac{R_{m1}}{R_{m0}} \times 100},$$

where

E_r^H – relative elasticity of entropy of organizational-economic system concerning administrative resource influence on given system,

4) for negentropy at relative change of sizes –

(9)

$$E_r^{HE} = \frac{\Delta HE^{\text{relative}}}{\Delta R_m^{\text{relative}}} = \frac{HE_0^{\text{relative}} - HE_1^{\text{relative}}}{100 - \frac{R_{m1}}{R_{m0}} \times 100},$$

where

E_r^{HE} – relative elasticity negentropy organizational-economic system concerning administrative resource influence on the given system.

Possibility of use of the basic derivative indicators of elasticity of entropy negentropy encounters natural restriction to a scale of changes of indicators and their influences on system depending on the given conditions.

As author's representation of calculations of derivative indicators is based on classical understanding of entropy only in its economic value and has undergone a number of changes traditional properties of elasticity[28] which characterise a system condition at value of elasticity equal to zero, there is less than unit, equal to unit, it is more than unit and belonging to infinity cannot be used. For the decision of the given problem the author the classification matrix of influence of conditions of elasticity to a condition organizational-economic systems (table 1) is offered.

Table 1 – The Matrix of influence of elasticity on organizational-economic system[29]

Вариативные intervals of a condition of elasticity	Elasticity indicator							
	E_a^H		E_a^{HE}		E_r^H		E_r^{HE}	
	$R_m \uparrow$	$R_m \downarrow$	$R_m \uparrow$	$R_m \downarrow$	$R_m \uparrow$	$R_m \downarrow$	$R_m \uparrow$	$R_m \downarrow$
$E = +\infty$	$H \downarrow\downarrow$	$H \uparrow\uparrow$	$HE \downarrow\downarrow$	$HE \uparrow\uparrow$	$H \downarrow\downarrow$	$H \uparrow\uparrow$	$HE \downarrow\downarrow$	$HE \uparrow\uparrow$
$E > 1$	$H \downarrow$	$H \uparrow$	$HE \downarrow$	$HE \uparrow$	$H \downarrow$	$H \uparrow$	$HE \downarrow$	$HE \uparrow$
$E = 1$	const		const		const		const	
$0 < E < 1$	$H \uparrow$	$H \downarrow$	$HE \uparrow$	$HE \downarrow$	$H \uparrow$	$H \downarrow$	$HE \uparrow$	$HE \downarrow$
$E = 0$	$H \to 0$	$H \to 0$	$HE \to 0$	$HE \to 0$	$H \to 0$	$H \to 0$	$HE \to 0$	$HE \to 0$
$-1 < E < 0$	$H \downarrow$	$H \uparrow$	$HE \downarrow$	$HE \uparrow$	$H \downarrow$	$H \uparrow$	$HE \downarrow$	$HE \uparrow$
$E = -1$	$H \downarrow$	$H \uparrow$	$HE \downarrow$	$HE \uparrow$	$H \downarrow$	$H \uparrow$	$HE \downarrow$	$HE \uparrow$
$E < -1$	$H \downarrow$	$H \uparrow$	$HE \downarrow$	$HE \uparrow$	$H \downarrow$	$H \uparrow$	$HE \downarrow$	$HE \uparrow$
$E = -\infty$	$H \downarrow\downarrow$	$H \uparrow\uparrow$	$HE \downarrow\downarrow$	$HE \uparrow\uparrow$	$H \downarrow\downarrow$	$H \uparrow\uparrow$	$HE \downarrow\downarrow$	$HE \uparrow\uparrow$

[28] Nureyev R.M. Microeconomics: a textbook for high schools. – M.: Norma, 2005. – 576 p. – P. 98

[29] It is made by the author.

The note:
↑ – increase in an indicator (entropy/ negentropy);
↓ – decrease in an indicator (entropy/ negentropy);
const – absence of changes of an indicator (entropy/ negentropy).

The classification matrix of influence of elasticity on organizational-economic system shows possible change of entropy or negentropy at change of a resource of a data control by indicators. According to it, influence on functioning of the system is reflected through adherences or not commitment to uncertainty. Thereby, the conditional criterion of utility of uncertainty for system is entered. That fact is absolutely logical, that organizational-economic systems are non-uniform and consequently functions of utility of their existence include various components. However, taking into consideration, that the big uncertainty attracts approximately proportional increase in risks[1], that, accordingly, the system can count on the big potential utility. Here the author places emphasis on direct dependence of uncertainty and the risks, subordinated to certain distribution. And elasticity of uncertainty in relation to risks in the given question plays a significant role.

Besides the basic derivative indicators of elasticity, the author considers possibility of construction of additional indicators of the elasticity possessing special properties and limited possibilities of application. Is conditional-dependent indicators of elasticity which pay off for the subsystems which are dependent under relation to each other concern the given indicators of elasticity. For eliminated by calculation of these indicators resources of management of dependent system should not change, thereby at set of set of dependent subsystems the management resource will change only at one subsystem.

The principle and logic of calculation of is conditional-dependent indicators of elasticity does not differ from the calculation of indicators described before the approach under formulas (6) – (9) except that the resource of management of a base subsystem will not change. Thereby, mathematical expression of calculation of is conditional-dependent indicators of elasticity of entropy/ negentropy can be presented as:

[30] The note: approximately the proportional increase in risks, according to the author, reflects positive elasticity in relation to risks, which can be more (E> 1), it is less (0 <E <1) or equal than unit (E=1).

1) for entropy at absolute change of sizes –

(10)

$$\hat{E}_a^{(H_l|H_m)} = \frac{\Delta H^l}{\Delta R^m{}_m} = \frac{H^l{}_0 - H^l{}_1}{R^m{}_{m0} - R^m{}_{m1}},$$

where

$\hat{E}_a^{(H_l|H_m)}$ – absolute is conditional-dependent elasticity of entropy of organizational-economic system concerning administrative resource influence on the given system;

ΔH^l – change of entropy (base) l-subsystem;

$\Delta R^m{}_m$ – change of a resource of management by uncertainty of a m-subsystem provided that, $\Delta R^l{}_m = const$

2) for negentropy at absolute change of sizes –

(11)

$$\hat{E}_a^{(HE_l|HE_m)} = \frac{\Delta HE^l}{\Delta R^m{}_m} = \frac{HE^l{}_0 - HE^l{}_1}{R^m{}_{m0} - R^m{}_{m1}} \text{ or } \hat{E}_a^{(HE_l|HE_m)} = \frac{\Delta HE^l}{\Delta R^m{}_m} = \frac{H^l{}_1 - H^l{}_0}{R^m{}_{m0} - R^m{}_{m1}}$$

where

$\hat{E}_a^{(HE_l|HE_m)}$ – absolute is conditional-dependent elasticity negentropy organizational-economic system concerning administrative resource influence on the given system;

ΔHE^l – change negentropy (base) l-subsystem,

3) for entropy at relative change of sizes –

(12)

$$\hat{E}_r^{(H_l|H_m)} = \frac{\Delta H^{l\,\text{relative}}}{\Delta R^m{}_m{}^{\text{relative}}} = \frac{H^l{}_0{}^{\text{relative}} - H^l{}_1{}^{\text{relative}}}{100 - \frac{R^m{}_{m1}}{R^m{}_{m0}} \times 100},$$

where

$\hat{E}_r^{(H_l|H_m)}$ – relative is conditional-dependent elasticity of entropy of organizational-economic system concerning administrative resource influence on given system,

$\Delta H^{l\,\text{relative}}$ – percentage change of entropy (base) l-subsystem;

$\Delta R^{m}{}_{m}^{\text{relative}}$ – percentage change of a resource of management by uncertainty of a m-subsystem provided that, $\Delta R^{l}{}_{m}^{\text{relative}} = const$

4) for negentropy at relative change of sizes –

(13)

$$\hat{E}_r^{(HE_l|HE_m)} = \frac{\Delta HE^{l\,\text{relative}}}{\Delta R^{m}{}_{m}^{\text{relative}}} = \frac{HE^{l}{}_{0}^{\text{relative}} - HE^{l}{}_{1}^{\text{relative}}}{100 - \frac{R^{m}{}_{m1}}{R^{m}{}_{m0}} \times 100},$$

where

$\hat{E}_r^{(HE_l|HE_m)}$ – relative is conditional-dependent elasticity negentropy organizational-economic system concerning administrative resource influence on the given system.

The analytical perception of is conditional-dependent elasticity of entropy or negentropy allows to formulate a number of partial conclusions about definition of correlation dependence between subsystems on the basis of elasticity of entropy and negentropy. Correlation communication between subsystems will give the bases for revealing of duplicating or counteracting elements, management with which should be carried out first of all.

In the first case when value of is conditional-dependent elasticity of entropy/ negentropy there is more than zero, it is possible to analyze subsystems about presence of duplicating elements. Presence at the dynamic horizontal analysis of positive deviations of elasticity will testify to growth of correlation communication between subsystems, and will be indirectly the indicator about increase in number of duplicating elements or about growth of the importance of the given elements in functioning of subsystems.

In the second case when value of is conditional-dependent elasticity of entropy/ negentropy there is less than zero, there is a question on existence of return correlation dependence. Return correlation dependence between subsystems shows presence of counteracting elements. As well as in the first case when the dynamic horizontal analysis reveals presence of positive deviations, the similar approach in

this case is used. However, at the analysis of is conditional-dependent elasticity of entropy/ negentropy for an establishment of strengthening of correlation interrelation the opposite variant is used – growth of a negative deviation of elasticity is investigated.

From the point of view of management of difficult organizational-economic system, existence of duplicating and counteracting elements of a subsystem can have diametrical variants of use. As it has been noted by the author, such position of ambiguity is determined by objective presence of the various purposes of organizational-economic system and its adherence or not commitment to uncertainty.

The management of organizational-economic system focused on adherence to uncertainty, will use the strategy directed on an exception both duplicating, and counteracting elements. In the given situation, dependent subsystems it will be transformed in independent, that finally greetings to that cumulative uncertainty of system will increase.

Considering administrative strategy concerning the uncertainty, having for an object its decrease, that is use of the strategy, characterised not commitment to uncertainty, it is possible to tell, that these strategy will have at least two directions of realisation. First, a number of strategy will aspire to increase number of duplicating elements in subsystems. In that case, is conditional-dependent elasticity will be positive and in due course will steadily increase. Besides the number of dependent subsystems will increase also, that objectively greetings to growth of conditional entropy for organizational-economic system. Duplicating elements, absolutely logically, will raise reliability functioning of system and, thereby, will lower uncertainty. Research of effects of creation of duplicating elements is not a subject of the present research, therefore the author specifies only a number of the brightest and evident effects from use of the strategy directed on increase of number of duplicating elements in subsystems. Such strategy, according to the author, it is possible to name internal when the emphasis becomes on increase in stability of functioning of system, that is realisation of its operational function, and decrease in refusals of system as a whole.

Secondly, a number of opposite strategy will be focused on increase in negative correlation of elements between subsystems. These strategy are mainly directed on maintenance of stability of work of organizational-economic system through decrease in influence of an environment. Counteracting elements act in a balance weight role in system, when uncertainty of environment as however and uncertainty of decision-making and consequences of the given decisions, is authorised by creation for system of such elements at which any occurrence of uncertainty will not render any significant or essentially effect. Such strategy, according to the author, it is possible to designate as external as mostly the bias in the given strategy becomes on uncertainty of an environment.

Is conditional-dependent elasticity of entropy and negentropy is not a unique additional derivative indicator of a class of elasticity. Use of other parametres regarding replacement of parametre of resources of management with uncertainty by others which are capable to reflect influence on entropy and negentropy difficult organizational-economic system, will allow to make various indicators of elasticity. Comprehensible by quantity and quality elasticity indicators make an analytical basis of management of uncertainty. In turn, addition of the methodological device of research of uncertainty, makes a basis for expansion of theoretical sights at essence of uncertainty, its expression through entropy, use negentropy as stability and controllability measures, and also possibility of management of uncertainty.

The fourth class of derivative indicators opens parities between entropy and negentropy the organizational-economic system which calculation can be made both in absolute, and in relative calculation. The author allocates eight direct indicators which structure can be increased at the expense of mixture of absolute and relative parametres, and also dot and dynamic parametres. The pluralism of calculation of derivative indicators of a parity is limited only by quantity of possible combinations. The purposes of use of each of indicators will predetermine interpretation of their values, including an establishment of critical levels and other potentials of measurement of derivative indicators of a parity of entropy and negentropy.

The basic indicators of a parity of entropy and negentropy are grouped by the author by a principle of presence of absolute and relative expression. Thereby drawing up of 4 basic groups of derivative indicators of a parity is possible:

1) factors of the relation of entropy to negentropy –

(14)

$$k_1 = \frac{H}{HE} \text{ and } k_2 = \frac{H^{\text{relative}}}{HE^{\text{relative}}} = \frac{H^{\text{relative}}}{1 - H^{\text{relative}}}$$

where

k_1 – factor of the relation of entropy to negentropy (in absolute calculation);

k_2 – factor of the relation of entropy to negentropy (in relative calculation).

For k_1 and barrier k_2 value is 1 when equality of entropy and negentropy testifies about presence паритетности in a choice of directions of development of organizational-economic system. Value of more unit characterises a nearness condition to chaotic development, at value there is less than unit – to the structured development, being stabler and operated.

2) parity factors negentropy and entropy –

(15)

$$k_3 = \frac{HE}{H} \text{ and } k_4 = \frac{HE^{\text{relative}}}{H^{\text{relative}}}$$

where

k_3 – relation factor negentropy to entropy (in absolute calculation);

k_4 – relation factor negentropy to entropy (in relative calculation).

Economic value of factors also k_3 is k_4 to the opposite factors, presented in the formula (14). Therefore specification of their essence and criteria is not expedient.

3) factors of a parity of change of entropy to negentropy –

(16)

$$k_5 = \left| \frac{\Delta H}{\Delta HE} \right| = const \text{ and } k_6 = \frac{\Delta H^{\text{relative}}}{\Delta HE^{\text{relative}}}$$

where

k_5 – factor of the relation of change of entropy to negentropy (in absolute calculation);

k_6 – factor of the relation of change of entropy to negentropy (in relative calculation).

The factor is k_5 one their factors which does not bear the analytical maintenance as realises an aprioristic principle of an estimation of entropy and negentropy when absolute changes of entropy and negentropy are equal on the module. The given principle is put in pawn in the logician of all research and consequently, the factor is k_5 identity of check of correctness of realisation of calculations.

Concerning factor the stated k_6 aprioristic principle of an estimation cannot be applicable, as the bases of an estimation of relative changes in entropy and negentropy are not equal. Hence, percentage growth of one parametre is not equal to percentage growth of another.

4) factors of a parity of change negentropy to entropy –

(17)

$$k_7 = \left|\frac{\Delta HE}{\Delta H}\right| = const \text{ and } k_8 = \frac{\Delta HE^{\text{relative}}}{\Delta H^{\text{relative}}}$$

where

k_7 – factor of the relation of change negentropy to entropy (in absolute calculation);

k_8 – factor of the relation of change negentropy to entropy (in relative calculation).

As well as concerning factors and, k_5 k_6 factors also k_7 are k_8 their symmetric prototypes to which similar conclusions regarding their conformity to an aprioristic principle and неэквивалентности relative calculation on change of parametres are applicable.

5. Conclusion

Thus, base and derivative indicators of entropy and negentropy in one way or another allow to characterise efficiency of managerial process of uncertainty through probabilities (frequency) of approach of the phenomena and events, and also uses of resources of management by uncertainty.

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