

## Structural contradictions in control system by enterprise as function of associate administrative decisions

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**Abstract.** The key role of organizationally-functional structure improvement of management is reasonable in the increase of efficiency of preparation processes, acceptance and realization of administrative decisions on an enterprise. The algorithm of structural exposure contradictions is offered in control system by an enterprise. The morphological matrix of description of structural contradiction as functions of associate administrative decisions is formed. Sources 22.

**Key words:** control system, administrative decision, algorithm, structural contradiction, morphological matrix.

### PROBLEM

Obvious pre-condition of effective administrative decisions acceptance on an enterprise is an exposure of reasons of subzero (or insufficient) quality of management and ground of suggestions in relation to perfection of organizationally-functional structure of management. Corresponding suggestions can foresee reduction of managerial staff, redistribution of functions between managers, clarification of order of their work, fixing of new functional duties, etc. Thus, backlogs for increasing an efficiency of decisions which are accepted, it follows to search, foremost, in providing of rational distribution of management functions between post positions and structural subdivisions of control system.

### ANALYSIS OF RESEARCH AND PUBLICATIONS

In works of author [9] reasonably, that, according to the generally accepted algorithm of administrative activity structure [6, 15] concrete maintenance of administrative function opens up through the great number of administrative tasks, that she is folded, and the decision of that is needed for realization of this function. It is possible to assert that a function represents

the rich in content side of management only, while administrative task as complex of calculation, conciliatory and organizational administrative works, specifies maintenance of this function, determining actions necessary for her realization. Expediency of distribution exactly of administrative tasks as to the element in the structure of administrative activity, that is subject to regulation, and quality of implementation of that can be appraised, stipulates efficiency of realization of corresponding functions of management. Accordingly, an exposure and removal of structural contradictions that arise up as a result of inefficient distribution of administrative tasks can be examined as foreground job, that must be decided with the aim of perfection of processes of preparation, acceptance and realization of administrative decisions on an enterprises.

### THE AIM OF THE ARTICLE

Is development of tool of exposure of structural contradictions in control system by an enterprise in the context of their interpretation as function of administrative decisions.

### THE MAIN MATERIAL

The process of exposure of structural contradictions in control system by an enterprise appears expedient to begin the systems of decisions with an analysis, as a central element of that will examine the executive actions of leaders [17]. During a management must be made decision, that determine basic descriptions of future actions of inferiors: aims of actions, objects of action, time of realization of actions, resources necessary for realization of actions et cetera. These

decisions are documentarily recorded as plans that become firmly established corresponding chiefs. Orders that are to the inferiors and serve as basis for preparation and realization of executive actions give oneself up after it. Actions change the guided process that is fixed by control system and founding for adjustment earlier made decision state, then management cycle.

Between executive actions objectively there are the copulas of cross-coupling, conditioned by that they lean on general or such, that administrative resources (economic, normatively-legal, methodical, organizational, informative, skilled and other) cross. The said allows set forth the first and basic property of the system of decisions: decisions, that is accepted in organs the managements related to each other and thus, must be accepted not separately, but taking into account the tie-up of corresponding executive actions.

Next property of the system of decisions can be named structural inlaid. This property is expressed in that all decisions are accepted by one organizational not element, but up-diffused between many elements that present the multilevel structure of management. The structural inlaid generates additional relations in the system of decisions, for example such, as: relation of seniority (from two decisions older that accepts chief of higher grade); relation of sanctioning (the decisions concerted on bottom levels must be ratified (sanctioned) by a chief). A necessity so to distribute a decision between the elements of control system flows out from here, that, from one side, it did not conflict with the set relations of seniority between these elements, and from other would not violate connections between decisions.

Other property of the system of decisions is her character with the aims of separate decisions that comport not always. Conflict character of the system of decisions results in a volume, that decisions, that she is formed, are divided into three types: managing, conciliatory and coordinating.

Managing decisions (namely speech went higher about them), accepted in relation to directly inferior and determine the area of possible descriptions of their actions. Conciliatory and coordinating decisions formally do not have a direct relation to the executive actions, they are sent to the change (clarification) of possible legitimate values of decisions that manage, with the aim of removal of possible harmful connections and strengthening of useful connections in behalf on providing of most efficiency of all system. A difference between them consists in the following.

Conciliatory decisions are accepted or by the elements of one level of hierarchy (one of that is the initiator of concordance), or elements of different levels at the direction of senior leader. An acceptance of coordinating decisions always is the prerogative of senior leader. In a result, the system of decisions accepts a heterogeneous structure in that managing decision are constrained inter se by means of conciliatory and coordinating decisions. Thus composition of the last is determined by character of connections between the

actions of inferiors. In particular, if copulas between some actions are not relevant, then corresponding to these actions managing decisions are unconnected, and in relation to them the acceptance of coordinating (conciliatory) decision is not required. In addition, maintenance of coordinating (conciliatory) decisions to a full degree depends on character of connections between actions. Id est, if between some actions there is conflict connection, for example, as a result of community of the used resource, then maintenance of coordinating (conciliatory) decision will be rational distribution of this resource.

Thus, the system of decisions can be examined as a, hierarchical structure the central element of that are administrative tasks, that the systems of management definitely distributed between organizational elements. Process of exposure of structural contradictions in control system by an enterprise in accordance with the system of decisions, that was folded, can be given as a sequence of the stages (fig.1). Will consider essence of these stages more detailed.

*Stage 1. Forming of the system of executive actions is control system by an enterprise.* Determination of array of executive actions, as is soil for forming of the system of administrative decisions, can be carried out on the basis of decoupling of strategic aims of enterprise to the level of separate strategic processes, and taking into account distribution of corresponding strategic tasks after functional subdivisions of control system. Coming from that on the level of structural subdivisions is passed only system of strategic aims in herent to concrete functional subdivision, the types of works that is executed in him will assist an achievement at first of aims of this subdivision, and through them and high-level goals. Exactly from it becomes clear, what payment in realization of strategy belongs to every functional structural subdivision, and systematization of array of executive becomes possible action.

Strategic aims on the level of functional structural subdivisions for determination of totality of executive actions in each of them is base on statement, that realization of strategy of enterprise envisages of him strategic aims on the aim of separate structural subdivisions [3, 277]. Possibly, that in the achievement of strategic aims existing in the system managements are involved an enterprise functional structural subdivisions. Each of them decides a task in accordance with functions, certain in Statutes about functional subdivisions, that provide the achievement of strategic aims of enterprise. To typical functional subdivisions of enterprise, coming from strategic directions of creation of cost [12, 11], it is possible to take: sale/marketing, research-and-development, supplies, productive, economic block (planning, finances, account), external economic subdivision, organizationally-prescriptive block (administration).

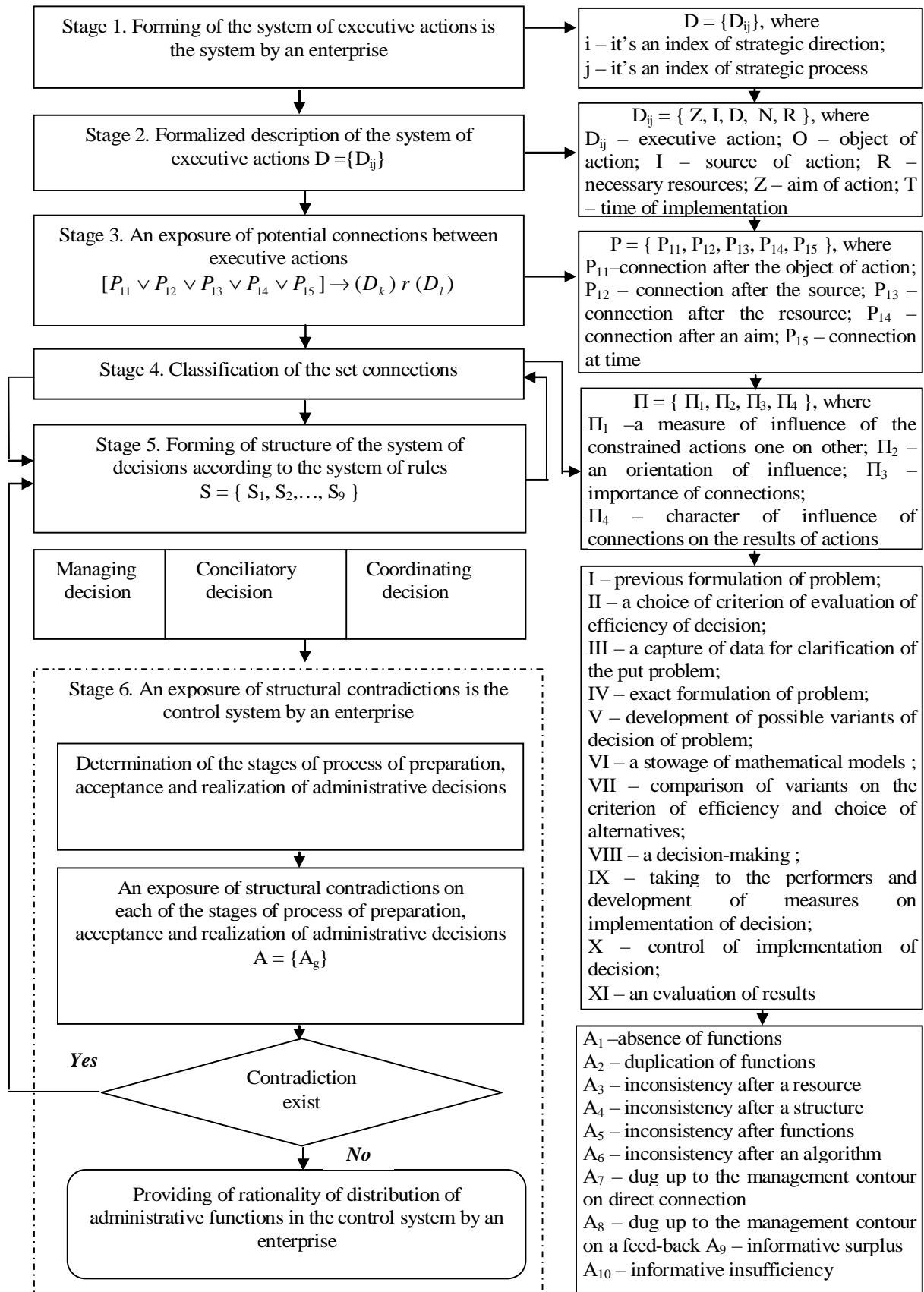


Fig. 1. Algorithm of exposure of structural contradictions in control system by an enterprise\*

\* Developed by authors.

Thus, the array of executive actions in control system can be described as

$$D = \{D_{ij}\}, \quad (1)$$

where:  $i$  – is an index of strategic direction,  $i = 1, \dots, 4$ ;  $j$  – is an index of strategic process, that will be realized within the limits of  $i$ -th strategic direction,  $j = 1, \dots, 12$ .

Setting of array of executive actions and their distribution after separate functional subdivisions of control system assists the logical understanding of activity of enterprise, and allows to translate base strategy in the set of concrete executive actions that behave to that or other prospect. Will mark that strategic aims and their further decoupling, that answer every strategic prospect, and, accordingly, certain on their basis set of executive actions, is specific and individual for a concrete enterprise.

*Stage 2. Formalized description of the system of executive actions.* The second stage envisages development of means of the formalized description of the system of executive actions, as exactly copulas between them determine composition and structure of the system of decisions. The basic requirement to such description consists in unambiguous authentication of actions. In other words, it is necessary to set such descriptions of actions, that would determine all possible actions simply, and simultaneously allowed to find out potential copulas between them.

Will consider that actions are constrained, if the change of descriptions of one action results in the change of descriptions of other action. Accordingly, for the exposure of connections it is necessary between actions, firstly, to set descriptions of actions, set of linguistic variables that describe (identify) every action simply, and, secondly, define terms at that the change of descriptions of one action can cause the change of descriptions of other action.

An executive action can be identified by the cortege of linguistic variables:

$$D_{ij} = \{O, I, R, Z, T\}, \quad (2)$$

where:  $D$  – is an action;  $O$  – is an object of action;  $I$  – is a source of action;  $R$  – are resources, necessary for implementation actions;  $Z$  – is an aim of action;  $T$  – is time of implementation of action.

In case if such cortege not enough will appear for adequate description of actions taking into account the specific of the investigated problem situation, he can be complemented by new variables with the aim of providing of the additional working out in detail of descriptions of executive action. It is so, for example, possible to enter additional variables that characterize the method of action, place of realization of action and other.

*Stage 3. An exposure of potential connections is between executive actions.* On the second stage development of the formalized vehicle of exposure of potential connections comes true between executive

actions. It is necessary at the decision of this problem, foremost, to formalize the own concept of connection between actions, and also to set rules that allow to reduce the presence (absence) of potential connection between them. Such rules must be an against the descriptions of executive actions entered on the first stage, operate their values and provide possibility of next classification of educed connections.

Let some actions be described as values of the indicated variables. Then natural terms at that the change of descriptions of one action can cause the change of descriptions of other action are facts of coincidence or crossing (partial matching) of values variable, that determine descriptions of actions. Coming from it, it is possible to set forth next rules that determine the terms of potential connection between actions.

$P_{11}$  – between the actions  $D_k$  and  $D_l$  there is a relation of "copulas after the object of action" ( $r_1$ ), if they have the same object of influence ( $O_1 = O_2$ ), or sent to the different objects that are parts of one object  $O$ :

$$\{(O_1 = O_2) \vee [(O_1 \subset O) \wedge (O_2 \subset O)]\} \rightarrow (D_k) r_1 (D_l). \quad (3)$$

$P_{12}$  – between the actions  $D_k$  and  $D_l$  there is a relation of "copulas after the source of action" ( $r_2$ ), if they have a the same source of action ( $I_1 = I_2$ ), or their sources of action are parts of one source  $I$ :

$$\{(I_1 = I_2) \vee [(I_1 \subset I) \wedge (I_2 \subset I)]\} \rightarrow (D_k) r_2 (D_l). \quad (4)$$

$P_{13}$  – between the actions  $D_k$  and  $D_l$  there is a relation of "copulas after the resource of action" ( $r_3$ ), if they are executed with the use of the same resource ( $R_1 = R_2$ ), or these resources are parts of shareable resource  $R$ :

$$\{(R_1 = R_2) \vee [(R_1 \subset R) \wedge (R_2 \subset R)]\} \rightarrow (D_k) r_3 (D_l). \quad (5)$$

$P_{14}$  – between the actions  $D_k$  and  $D_l$  there is a relation of "copulas after an aim" ( $r_4$ ), if their aim coincides ( $Z_1 = Z_2$ ), or is directly inferior to the achievement one, more general aim  $Z$ :

$$\{(Z_1 = Z_2) \vee [(Z_1 \subset Z) \wedge (Z_2 \subset Z)]\} \rightarrow (D_k) r_4 (D_l). \quad (6)$$

$P_{15}$  – between the actions  $D_k$  and  $D_l$  there is a relation of "copulas at times" ( $r_5$ ), if the moments of their beginning ( $T_1^n = T_2^n$ ) and completion ( $T_1^z = T_2^z$ ) coincide, or the sentinel intervals ( $\Delta T_1, \Delta T_2$ ) of implementation of actions cross:

$$\{(T_1^n = T_2^n) \vee (T_1^z = T_2^z) \vee (f_c / T_1 \neq f_c / T_2 \neq 0)\} \rightarrow (D_k) r_5 (D_l). \quad (7)$$

Summarizing, will consider that the actions  $D_k$  and  $D_l$  are bound by a relation ( $r$ ), if takes place ( $P_{11}$ ), or ( $P_{12}$ ), or ( $P_{13}$ ), or ( $P_{14}$ ), or ( $P_{15}$ ):

$$[P_{11} \vee P_{12} \vee P_{13} \vee P_{14} \vee P_{15}] \rightarrow (D_k) r (D_l). \quad (8)$$

*Stage 4. Classification of the set connections.* On this stage classification of the educed connections is with working out in detail, that in future soil for determination of structure of the system of decisions.

Classification of connections has for an object to get backgrounds that would allow to set forth the rules of generation of conciliatory (coordinating) decisions and rule of their distribution between organizational elements.

Will consider that achievement of such purpose is possible during classification of connections on next signs: measure of influence of the constrained actions one on other ( $\Pi_1$ ); orientation of influence ( $\Pi_2$ ); importance of connections ( $\Pi_3$ ); character of influence of connections is on the results of actions ( $\Pi_4$ ).

Then connection between actions can be described by the cortege  $\Pi$ , the elements of which are linguistic variables  $\{ \Pi_1, \Pi_2, \Pi_3, \Pi_4, \Pi_5 \}$ , that acquire next values:

$\Pi_1 = \langle \text{relevant} \rangle$  or  $\langle \text{unrelevant} \rangle$ ,

$\Pi_2 = \langle \text{mutual} \rangle$  or  $\langle \text{one-sided} \rangle$ ,

$\Pi_3 = \langle \text{very important} \rangle$ , or  $\langle \text{important} \rangle$ , or  $\langle \text{not very important} \rangle$ , or  $\langle \text{not important} \rangle$ ,

$\Pi_4 = \langle \text{useful} \rangle$  or  $\langle \text{harmful} \rangle$  or  $\langle \text{neutral} \rangle$ .

Will set forth possible rules that will allow define values of the indicated linguistic variables.

$P_{21}$  – connection is relevant, if even one of the constrained actions renders substantial influence on the result of other action. Importance of influence is estimated by a quality measure, for example, thus: there is not a result, weak result, middle result, strong result, maximal results. For the quality evaluation of importance the functions of belonging, that determine dependence of measure of achievement of result of one action on other by rule, are set: connection between two actions is relevant, if the change of result of one operating on a quantum results in the change of result of other action not less than what on quantum.

$P_{22}$  – connection is mutual, if actions have influence on results each other, and one-sided, if one action influences on other results, and reverse influence is not observed, or he is unimportant in this situation.

$P_{23}$  – importance of connection answers maximal importance of actions. For example, if the action  $D_k$ , related to the action  $D_1$ , behaves to the important actions, and  $D_1$  – to the not important actions, then connection between  $D_k$  i  $D_1$  is important. Importance of actions is set for concrete terms.

$P_{24}$  – is connection useful (for the source of actions), if he assists gaining end of his action, connection harmful, if prevent to him to attain the put aim, and neutral, if gaining end of this action does not depend on a tie-up with other action. For example, let the aim of action  $D_k$  consist in maximization of efficiency, so in the achievement of maximal result, and without connection with  $D_1$  the result  $D_k$  is estimated as "middle". Then, if at presence of connection between  $D_k$  i  $D_1$  a result is estimated as "strong", then connection is considered useful, and if a result is estimated as "weak", then connection confesses harmful.

*Stage 5. Forming of structure of the system decisions.* Realizable on the previous stage classification

of the educed connections allows for dates the rules of determination of composition of managing, conciliatory and coordinating decisions, and also distribution of these decisions between the organizational elements of control system.

Forming of managing, conciliatory and coordinating decisions will produce according to the system of rules  $S = \{ S_1, S_2, \dots, S_9 \}$ :

$S_1$  – a managing decision must answer every action, thus only one,

$S_2$  – the acceptance of managing decision on realization of action must be included in the function of chief, that directly inferior performer that carries out this action,

$S_3$  – constrained managing decisions must be concerted (made decision in relation to their concordance), if copulas are "not very important" or "not important",

$S_4$  – if connection is one-sided, then the initiator of concordance is an organizational element, that accepts managing decision in relation to an action the result of that depends on the action related to him,

$S_5$  – if connection is bilateral and harmful only for one organizational element, then he must be the initiator of concordance,

$S_6$  – if connection is bilateral, then the initiator of concordance is an element the actions of that have most importance,

$S_7$  – constrained managing decisions must be coordinate (a coordinating decision is accepted), if copulas  $\langle \text{very important} \rangle$  or  $\langle \text{important} \rangle$ ,

$S_8$  – at presence of general direct chief of acceptance of coordinating decisions it must be included in his function,

$S_9$  – in default of general direct chief of acceptance of coordinating decision it must be included in the function of the nearest direct chief.

In relation to the presence of iteration intercommunication between the third and fourth stage of algorithm will notice the following. Naturally, that producing classification of connections is impossible without knowledge of rules of forming of the system of decisions (results of the fourth stage). At the same time, for development of rules of forming system of decisions it is necessary to know both the signs of classification of connections and results of this operation. The reserved circle goes out, an exit from that is iteration implementation of the third and fourth stages.

*Stage 6. An exposure of structural contradictions is in control system by an enterprise.* The approach to the problem of exposure of structural contradictions will go out from that for certain control system the complete list of administrative decisions that must be accepted is known, to achieve objective her functioning. Will consider that the formal task of management consists in execution operations converting every element of the system of decisions from some initial state in some

eventual state. Otherwise speaking, a task consists in implementation of operations in relation top reparation, acceptance and realization of the system of administrative decisions. Accordingly, from the technological point of view the process of preparation, acceptance and realization of any administrative decision can be presented as a sequence of the stages and procedures that have direct and reverse copulas.

Position about a presence in the process of acceptance of decisions of the certain basic stages is major at research of administrative activity. Specialists on a management are offer the different charts of development of decisions that differ in inter se the degree of working out in detail of separate procedures and operations process [1, 2, 5, 13, 14, 16, 18]. According to results researches of authors, that is thoroughly expounded in works [4, 10, 7, 8], it is possible to give the process of preparation, acceptance and realization of administrative decisions as a sequence of the next stages: previous formulation of problem; choice of criterion of estimation of efficiency of decision; a capture of data is for clarification of the put problem; exact formulation of problem; development of possible variants of decision of problem; stow age of mathematical models; comparison of variants on the criterion of efficiency and choice of alternatives; decision-making; taking to the performers and development of measures is on implementation of

decision; control of implementation of decision; evaluation of results and generalization accumulated experience.

Accordingly, in the process of exposure of structural contradictions in control system by an enterprise, it is necessary to set contradictions that arise up on each of the set stages after every decision in the general system. It is possible to set forth next structural contradictions, that can arise up in the process of preparation, acceptance and realization of administrative decisions (table 1).

Generalizations of the got results in relation to the sequence of determination of structural contradictions in control system by an enterprise allow to form the morphological matrix of description of structural contradiction as functions of executive actions (fig. 2). At the construction of this matrix formative descriptions of structural contradiction between executive actions were systematized as corresponding morphological signs, each of that characterizes the certain parameter of structural contradiction. Forming of complete list of possible variants of values of the distinguished morphological signs allows to formalize description of structural contradiction between executive actions, and to carry out the analysis of the got combinations of alternative variants of the distinguished signs with the aim of setting of complete totality of structural contradictions in control system.

**Table 1.** Structural contradictions, that can arise up in the process of preparation, acceptance and realization of administrative decisions \*

Code	Source of contradiction	Essence of contradiction
A <sub>1</sub>	Incompleteness of the system of decisions	Absence of functions
A <sub>2</sub>	For the acceptance of certain decision one managing element answers more than	Duplication of functions
A <sub>3</sub>	Absence is concordances between decisions, realization of that assumes the use of shareable resource	Inconsistency is after a resource
A <sub>4</sub>	Absence of concordance is between decisions that is accepted on the different hierarchical levels of management	Inconsistency is after a structure
A <sub>5</sub>	Absence of relation is co-operations between managing elements, that is responsible for realization decisions	Inconsistency is after functions
A <sub>6</sub>	Absence of concordances between decisions, that present the successive stages of process of preparation, acceptance and realization of decisions	Inconsistency is after an algorithm
A <sub>7</sub>	The sanctioned decision on some reasons can not be well-proven to the performer	Dug up to the management contour on direct connection
A <sub>8</sub>	A managing element sanctioned a decision, and it is well-proven to the performers, but absent control of his implementation	Dug up to the management contour on a feed-back
A <sub>9</sub>	Information that is not used for a decision-making acts to the managing element	Informative surplus
A <sub>10</sub>	Information necessary to him for a decision-making does not act to the managing element	Informative insufficiency

\* Developed by authors.

Variants of values of morphological signs of structural contradiction are between executive actions											
Morphological signs of contradiction	Connection is after the object of action (P <sub>11</sub> )		Connection is after the source of action (P <sub>12</sub> )		Connection is after the resource of action (P <sub>13</sub> )		Connection is after an aim (P <sub>14</sub> )		Connection at times (P <sub>15</sub> )		
	Mayor of influence of the constrained actions one on other (P <sub>1</sub> )		Orientation of influence (P <sub>2</sub> )		Importance of connections (P <sub>3</sub> )		Character of influence of connections is on the results of actions (P <sub>4</sub> )				
Character of connection of executive actions	Relevant	Irrelevant	Mutual	One-sided	Very important	Important	Not very important	Not important	Useful	Harmful	Neutral
Type of corresponding decision	Managing decisions			Conciliatory decisions			Coordinating decisions				
Stages of preparation, acceptance and realization of corresponding decision	I – is previous formulation of problem	II – is a choice of criterion of evaluation of efficiency of decision	III – is a capture of data for clarification of the put problem	IV – is exact formulation of problem	V – making of possible variants of decision of problem	VI – is a stowage of mathematical models	VII – is comparison of variants on the criterion of efficiency and choice of alternatives	VIII – is a decision-making	IX – is taking to the performers and development of measures on implementation of decision	X – is control of implementation of decision	XI – is an evaluation of results
Essence of structural contradiction	A <sub>1</sub> – non-functions	A <sub>2</sub> – is duplication of functions	A <sub>3</sub> – is inconsistency after a resource	A <sub>4</sub> – is inconsistency after a structure	A <sub>5</sub> – is inconsistency after functions	A <sub>6</sub> – is inconsistency after an algorithm	A <sub>7</sub> – dug up to the management contour on direct connection	A <sub>8</sub> – dug up to the management contour on a feed-back	A <sub>9</sub> – is informative surplus	A <sub>10</sub> – is informative insufficiency	

Fig. 2. Morphological matrix of description of structural contradictions as executive action function\*

\*Developed by authors.

## CONCLUSIONS

Thus, the common task of exposure of structural contradictions in control system by an enterprise is taken to the decision of totality of private tasks within the frame work of six corresponding stages. These tasks are sent to the ground inwardly of non-conflicting organizationally-functional structure of control system, that is confined structural contradictions between executive actions. Forming of such structure will assist the increase of efficiency of processes of preparation, acceptance and realization of administrative decisions on an enterprise and, as a result, development of potential of control system.

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