

MODEL OF STRATEGIC PLANNING IN ACTIVE SYSTEMS

R. Nasim^{1,*}, A. Rustam², Z. Meiramkul³¹Doctor of Technical Sciences, Khoja Akhmet Yassawi International Kazakh-Turkish University (KAZAKHSTAN)²Candidate technical science, Khoja Akhmet Yassawi International Kazakh-Turkish University (KAZAKHSTAN)³Master – tutor at «Syrdarya» University

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ABSTRACT

Annotation The work is dedicated to the mathematical formulation of the needing for strategic planning in active systems. At the same time, the possibility of the TAC (theory of active systems) for an assessment of conditions of effective strategic planning and development of an active system are shown.

Keywords Active system, strategic planning, condition of open management, condition of NDA, TAS.

INTRODUCTION

The main components of any organization (active system A_c) are the people entering into this organization, tasks for decision which this organization exists, and management which forms, mobilizes and sets in motion the potential of the organization for the solution of the tasks facing it.

On the other hand the stable existence of any organizational structure depends largely on its capacity $\Pi_o^{A_c}$ [1], consisting of three components: the external potential $\Pi_{\text{BH}}^{A_c}$, internal potential $\Pi_{\text{em}}^{A_c}$, potential management $\Pi_y^{A_c}$, i.e.:

$$\Pi_o^{A_c} : \Pi_{\text{BH}}^{A_c} \& \Pi_{\text{em}}^{A_c} \& \Pi_y^{A_c} \quad (1)$$

Author Correspondence, e-mail: nassim.rustamov@ayu.edu.kz

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Without knowledge of the potential management of its organization the head would not be able to carry out strategic planning. To do this, he must be able to objectively assess and activate the potential management of organization on time.

In this regard, the management system of organization should have the features of a self-adjusting system that ensures solve problems: to respond effectively, adapt to changing external and internal environment for survive and achieve their goals, but taking into account the human factor [2].

For the unstable and inconsistent market environment for solving this problem essentially means the possibility of survival of the enterprise through active organizational behavior in this environment.

From here follows the need of the address to internal mechanisms of management in condition of market, laid down in the management of the organization. Such addresses are expressed at the right time, not only to make the right decision, but also to realize this decision. All this is due to the strategic planning activities A_c and activation of needing components in the management mechanism. [3] For this, the head of the organization should be able to assess the potential management of organization. How can this be implemented? Resolving this issue is the main objective of this work.

Purpose of work is to create algorithmic model of strategic potential planning of active systems, for effective management, i.e. $\xi: (II_{gu}^{A_c} \cap II_{gm}^{A_c}) \rightarrow II_y^{A_c}$

Method decision For achievement of a goal we will consider below the models of mechanisms of planning in organizational systems. Further, on the basis of this model we will formulate the model of *strategic planning* A_c .

Strategy of each of agents of A_3 is the message to the center of some information $\hat{S}_i \in \Omega_i$, $i \in N = \{1, 2, \dots, n\}$ to a great number of agents [4]. The center on the basis of information given it appoints to agents plans $x_i = \pi_i(\hat{S}) \in x_i \subseteq \mathfrak{R}^1$, where $\pi_i: \Omega \rightarrow x_i$, $i \in N$, - procedure (mechanism) of planning, $(\hat{S} = s_1, s_2, \dots, s_n) \in \Omega = \prod_{i \in \Omega} \Omega_i$ - a vector of messages of all agents.

Here X is the plan A_c , Ω is a set of types of A_3 (agents). If procedure of planning is function of displaying Ω to a set of the plan of X , thus the strategy of planning of the center will depend on type of active elements $A_3 r_i$. In its turn r_i is estimated by function of controllability of $A_3 MB_{A_i}$ [2], i.e. $r_i = \nu MB_{A_i}$, then procedure of planning looks as:

$$\pi_i : \Omega(v \cdot MB_{A_i}) \rightarrow X_i(\xi) \quad (1)$$

Here ξ reflects the strategy of the center A_c . At its core ξ includes those management activities which on prospect provided implementation of the plan $X_i(\xi)$, i.e

$$\eta \in \text{Arg max } K(\eta) = \{\eta \in U / \forall \gamma \in U \quad K(\eta) \geq K(\gamma)\} \quad (2)$$

Here U is a great number of managing directors of influences $\{\eta_1, \eta_2, \dots, \eta_n\} \in U$; K -efficiency management $\eta \in U$; these told procedures there is in space of states Ux_A , where the A -great number Ux_A , at states A_c .

Thus the mechanism of strategic planning looks as:

$$P_c = \begin{cases} \pi_i \rightarrow \max \text{ если } \xi \rightarrow \max \\ \pi_i \rightarrow \min \text{ если } \xi \rightarrow \min \end{cases} \quad (3)$$

Carrying out of procedure $\xi \rightarrow \max$ or $\xi \rightarrow \min$ depends on potential management $\Pi_y^{A_c}(a_1, a_2, a_3)$ - corresponding to internal and external potentials A_c , i.e. $\xi : (\Pi_{\text{en}}^{A_c} \cap \Pi_{\text{em}}^{A_c}) \rightarrow \Pi_y^{A_c}$. Potential of management $\Pi_y^{A_c}(a_1, a_2, a_3)$ is covered in tools the operating influences - intellectual (a_1), executive (a_2) and observant (a_3).

Degree of unity and expressiveness of three tools and also expresses strategic planning. It is clear that [1]:

$$\begin{aligned} \Pi_y^{A_c}(a_1, a_2, a_3) &\rightarrow \max \\ \xi : ((\Pi_{\text{en}}^{A_c} \cap \Pi_{\text{em}}^{A_c}) &\rightarrow \Pi_y^{A_c}) \rightarrow \max \end{aligned} \quad (4)$$

Algorithmic procedure (4) defines on the help of SWOT analysis [5] and APU analyses [3].

Thus, potential management A_c is the defining factor of strategic planning which depends on carrying out of a condition of *NDA* [2].

Condition of *NDA* of strategic planning:

$$\Psi_{A_c}(P_c(\Pi_y^{A_c}(a_1, a_2, a_3), X)) \rightarrow \max \quad \text{для } \Pi_y^{A_c} > \varepsilon \quad (5)$$

$$f_i(\text{MB}_{A_{\rho_i}}^{A_c}, X, \hat{S}) \rightarrow \max f_i(Z_i, \hat{S}_i, \text{MB}_{A_{\rho_i}}) \text{ для } \text{MB}_c(\text{MB}_{A_{\rho_i}}) \leq \varepsilon \quad (6)$$

Here, $Z_i \in A$ is a result of activity A_{ρ_i} , P_c expresses the center of interests of A_c , $\text{MB}_{A_{\rho_i}}$ a controllability of i active element A_{ρ_i} of active system A_c : MB_c is a controllability of structure of active system. \hat{S} is a message about implementation of the plan x_i by the agent A_{ρ_i} , which plans $x_i \in X$ has to carry out A_{ρ_i} . The condition (6) provides appointment to the agent of the plan, maximizing ξ , i.e. $\xi \rightarrow \max$. The condition (5) implicit look sets the procedure of strategic planning maximizing target function of A_c center. The procedure of satisfying conditions (5) and (6) call the mechanism of open management taking into account strategic planning. The main idea of the principle of the open management (OV) consists in optimum to use procedure of strategic planning, maximizing interests A_{ρ_i} in a assuming that messages \hat{S}_i A_{ρ_i} is not manipulated, i.e. center goes to meet an agent, relying on, that they did not cheat. [6]

Theorem 1 A necessary and sufficient condition for the existence of strategic planning for A_c is the existence of sets $x_i(\hat{S})$, for which carrying the condition of NDA.

Proof As the condition of NDA is the rule of existence of strategic planning. Carrying out of a condition of NDA for A_c does not demand the procedure of strategic planning. But not carrying out of a condition of NDA for A_c demands the implementation procedure of strategic planning.

Necessity We will allow that each type of agent is expressed as $r_i(\text{MB}_{A_{\rho_i}})$, and $\hat{S}_i \in \Omega_i$, and function of «penalty» for not fulfilling the plan $l_i(\pi_i(\hat{S}_i), r_i)$, $\pi(S_i)$ is the value of the plan which must comply with $r_i(\text{MB}_{A_{\rho_i}})$ if

$$\forall r_i(\text{MB}_{A_{\rho_i}}), \forall_i \in I, \forall \hat{S}_i \in \Omega_i, f(P_c, x_i, \hat{S}_i) \geq l_i(\pi_i(\hat{S}_i), r_i) \quad (7)$$

$$\forall r_i(\text{MB}_{A_{\rho_i}}), \forall_i \in I, \forall \hat{S}_i \in \Omega_i, f(P_c, x_i, \hat{S}_i) \leq l_i(\pi_i(\hat{S}_i), r_i) \quad (8)$$

There will be a condition an implementation of procedure of strategic planning.

Adequacy We take an arbitrary agent, $A_{\rho_i}, i \in I$ and the vector $\hat{S}_i \in \Omega_i$ and consider the types of vector $r_i(\text{MB}_{A_{\rho_i}}) \cdot \Pi_y^{A_c}(a_1, a_2, a_3) > \varepsilon_1$ from conditions NDA we have

$$f(P_c, r_i) = \max_{z \in X_i(\hat{S}_i)} f(z_i, \hat{S}_i, MB_{A_{\rho_i}}), \quad MB_{A_c}(MB_{A_{\rho_i}}) > \varepsilon_2 \quad (9)$$

That's why $\forall z \in x_i(\hat{S}_i)$, to $\forall \hat{S}_i \in \Omega_i, f(P_c, r_i) \geq f(\pi_i(\hat{S}_i, r_i), r_i(MB_{A_{\rho_i}} \geq \varepsilon_2))$ i.e. not manipulated message \hat{S}_i is a equilibrium condition of implementation of procedure of strategic planning. The function of the agent preferences A_{ρ_i} , reflecting the interests of the agent in the tasks of strategic planning $\varphi_i(x_i, r_i): \mathfrak{R}^2 \rightarrow \mathfrak{R}^1$, depending on the particular components of a designated center of the plan and a parameter – the type of agent. Manageability of active element A_c is estimated by the following formula [2]:

$$MB_{A_{\rho_i}} = AI/3(S+I+N) \quad (10)$$

Thus, the necessity to strategic planning arises when in organizational system manipulation with messages \hat{S}_i about implementation of the plan by the active elements A_c [6]. In this case, if A_{ρ_i} does not satisfy *NDA* condition, the center makes the decision about elimination of A_{ρ_i} from system. Such decision is the beginning of strategic planning. Not satisfactions of condition *NDA* A_{ρ_i} is expressed on its controllability, i.e. $MB_{A_{\rho_i}} \rightarrow \min MB_{A_{\rho_i}}$ is the mechanism of a susceptibility of the operating influences by the agent. Such susceptibility is reflected in reactions of the agent to the operating influences.

CONCLUSION

The condition of *NDA* gives us the chance to estimate need of strategic planning and shows that strategic planning in a straight line depends from social– psychological condition of agents of organizational structure. Thus, the solution of a problem of strategic planning depends on type $r_i(MB_{A_{\rho_i}})$ of agent A_c . If we conceptually present that the center gave the plan for implementation to an active element in compliances with mission of the organization and the active element on what those to the reason could not carry out a task, the center has to undertake what that measures, that this plan was executed. These actions make a basis of strategic management. The center when planning activity of the organization has to consider such situations. Procedures of the account of these situations make a basis of strategic

planning. And the truth conditional table of a formula (11) shows what type of managing directors of influence it is necessary to apply to the chosen strategy A_c .

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