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SYSTEMIC POTENTIAL OF ORGANIZATION

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Summary. The essence of the potential of the system with active elements disclosed in the analysis of its subsystems in terms the realization of their useful functions. Systemic potential that is expressed externally by useful function of the aggregation of resource potential (potential of elements) is considered at two levels: at the level of distributed decision-making system and at the level of managerial personnel as a system of active elements. The article elaborated the concept of active and passive element potential.

Key words: potential, active element, organization, distributed decision-making system.

INTRODUCTION

Any artificial system initially has some useful function that realized in the processes of it's functioning. Thus, the function is primary for artificial systems. As for the processes, there are static and dynamic types of artificial systems. In turn, dynamic systems should be regarded from the point of view of the human's participation as the active elements. We will consider the systems with active elements, because any economic system can not function without human as its most important element.

However there is one more feature of such systems: they are dissipative. The equilibrium states instability of systems with active elements imposes certain restrictions on the processes of their functioning: they can not functioning normally without the control system as an integral part of such systems.

Processes of the organization's functioning are artificial, because they are created and managed by human; that is the main difference from the natural processes, "managed" by the nature's laws. The nature's laws act constantly, continuously and simultaneously in all natural processes, regardless the place and time of their occurrence; ie the degree of controllability of natural processes is an unattainable ideal for a human, whose activity is discrete, consistent, associated with the current place and time of its implementation. Because of these limitations the people must divide the working functions, integrate and coordinate efforts, resulting in the formation of the group (collective) of actors.

In this sense, the management staff is a system of active elements that has a broader range of possibilities and competences than a single person, in particular, to provide a parallel although nonetheless discrete control [Chorniy 2001] multiple processes simultaneously.

"Crystal lattice" of organization where each job position is associated with a structural unit is, of course, the organizational structure [Mintzberg 1979, 1992; Hart & Moore

2005]. The job position determines the role and status of a person in organization relatively stably, while the employee is temporarily associated with the job position, that is, unstably. In itself employee is not determined by his job position.

Since the "function" of the workplace and the real capacities of the worker is never identical, the management of the systems with an active elements becomes the problem not only in terms of a possible opportunism of employees, but in sense of the deviations the real parameters of system from the planned ones.

In this sense, the potential of any system with active elements is an interesting subject for study.

REVIEW OF PUBLICATIONS

Summing up various definitions of potential, it can be concluded that it's traditionally regarded as exogenous characteristic of a totality of endogenous system parameters, or as possible result of it's functioning in conditions of full use of the internal resources [Darren Gibbs 1995; Kruglov 2009; Antonenko 2010; Harashchuk 2011; Konoshenko 2011; Kuzmina 2012]. Of course, nobody has used such formulation, but such is the essentiality of the existing approaches to defining the potential. In fact, in this sense the potential of the system may be characterized by production function.

We propose to go beyond this approach [Filippova & Sumcov 2012]. By extension, the understanding of the potential is a complex, multivariate, stochastic system parameter reflecting the dialectics of system's internal states in the interaction with the external environment. In the external environment potential of the system appears as its specific function. Within the system it will be a particular state, and the intrasystem self-organizing function provides the necessary functional states.

OBJECTS AND PROBLEMS

The aim of the article is an extended treatment of the category "potential" and elaboration its structure for the systems with active elements from the point of view of their useful function.

Enabling function of self-organization allows to map the external function of the system in the space of it's internal states, ie completely refuse from the assessment of the potential by the system output. If the intrasystem function of self-organization is one-to-one mapping the external function, we may not to consider system output in the evaluation of it's potential, and this greatly simplifies the analysis, because allows to eliminate the influence of the environment.

Start with the fact that the management's aim is useful potential of the system – namely, improving the probability and stability such of system's states that allows to effectively implement the operating function. In the absence of the management the system moves to more stable but nonfunctional internal states. In other words, management becomes the system's attribute that retains it in an unstable state that provides the execute operating function.

Then it is obvious that the discreteness of management [Chorniy 2001] means the reduction of the stability of the functional states of the object (performing system), ie reduction of useful potential of the system as a whole. Which is why management should be seen in close connection with the systemic potential of organization that provides a certain way of aggregating its resource potential.

RESEARCH RESULTS

Thus, we see two types of potential in mandatory manner inherent to systems with active elements: resources potential and systemic potential. However, in our view, the potential of the resource can not be considered as part of the organization's capacity, if the systemic potential of its use is equal to zero. In other words, if the system is "not able" to use some internal resources, their presence does not increase the total potential of organization.

In this perspective, a systemic potential of the organization determines its total useful potential. If some resources are absent they can be brought from outside, if the organization has the systemic capacity to use this resources. Otherwise the availability of this resource has no sense, because it does not mean the growth of organization's potential, but means the reduction of potential of some other organizations that are able to use this resource.

So, the subject of our interest is the systemic potential and its useful function, ie aggregating of the resource potential. We intend to show that eventually it is the potential of a distributed decision-making system.

We deliberately name this potential "systemic", not "managerial", to distance themselves from the existing definitions of the last one, which in most cases is considered rather as a potential of the system of active elements (management personnel) than the potential of a distributed decision-making system.

Indeed, as already noted earlier, each separate active element is not identical to its formal prototype. Also, the person in contrast to mechanical and electronic parts, can not consistently work with the equal efficiency. Therefore, the potential of the system of active elements, first, is always less than the sum of individual capacities of employees, and secondly, this potential is very dynamic in the sense that significant variation of this potential is observed even in the short term.

It's necessary to clearly distinguish the useful function of distributed decision-making system and the function of the management personnel of organization as the subject of management.

The distributed decision-making system is a formal system of distribution of authorities and responsibilities, which is available for modification, in contrast to the real subjects of control (active components), which can not be modified. The decisions are made the subject of management - management personnel, and not a formal system of distribution of powers. And what's the useful function of the last one?

Previously, we have concluded that, first, the management as the function of selforganization of the system with active elements is the intrasystem projection of its external function (Fig. 1), and secondly, the potential of the executive system (the object of management) is characterized by the degree of proximity of the actual state to

functionally optimal one. We proceed from the intrasystemic management function, ie apriori assume that external forces are beyond the sphere of control.

So, a useful function of a distributed decision-making system is the intrasystem coordinating function, directed at the management personnel as a system of active elements. A useful function of management personnel as the subject of decision-making is the intrasystem coordinating function, directed at the executive system. Thus, the function of self-organization of any system with active elements has two levels of implementation.

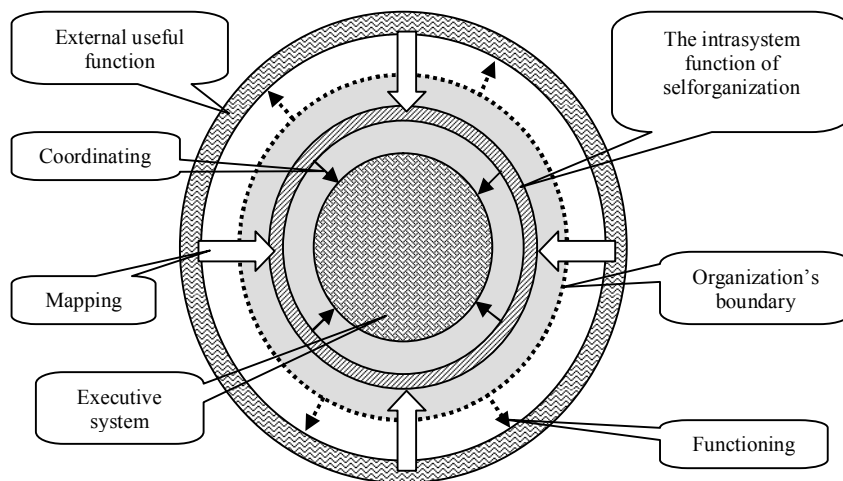


Fig. 1. The intrasystem function of selforganization as the mapping of external useful function of the system

Ad disputandum. If the distributed decision-making system will be considered as a system with active elements, ie including management personnel as an active subsystem, then the external functions of these systems will be identical. It contradicts to previous. Thus management personnel can not be regarded as an active subsystem of distributed decision-making system, though its systemic potential is determined by last one. This potential is in fact the level of systemic quality (Fig. 2).

Coordination function performed by a distributed decision-making system has to provide minimization of the internal costs of the implementation the useful function of management personnel, that is, the most effective (functional) state of the object, which is externally expressed in increasing its potential.

We are talking about the intrasystem losses of working time caused by the low level of the management processes reglamentation, inefficient way of authority delegation, excessive working load on the managers and a significant amount of routine activities, etc. [Filippova & Balakhnin 2008, 2010(1), 2010(2); Filippova & Sumcov 2008].

Now let closer look kinds of resource potential of systems with active elements (fig. 3). Passive potential of element means inability to make decisions and choose a mode of action. The function of passive element in the system is clearly defined and the quality

of its implementation depends on the physical condition of the passive element and the quality of its links with other elements of the system. The evaluation criteria a potential of passive element are external to it. For the active elements the external criteria system is supplemented by internal one: the active element is able to evaluate itself and its potential, its status and role in organization



Fig. 2. The hierarchy of systems in organization

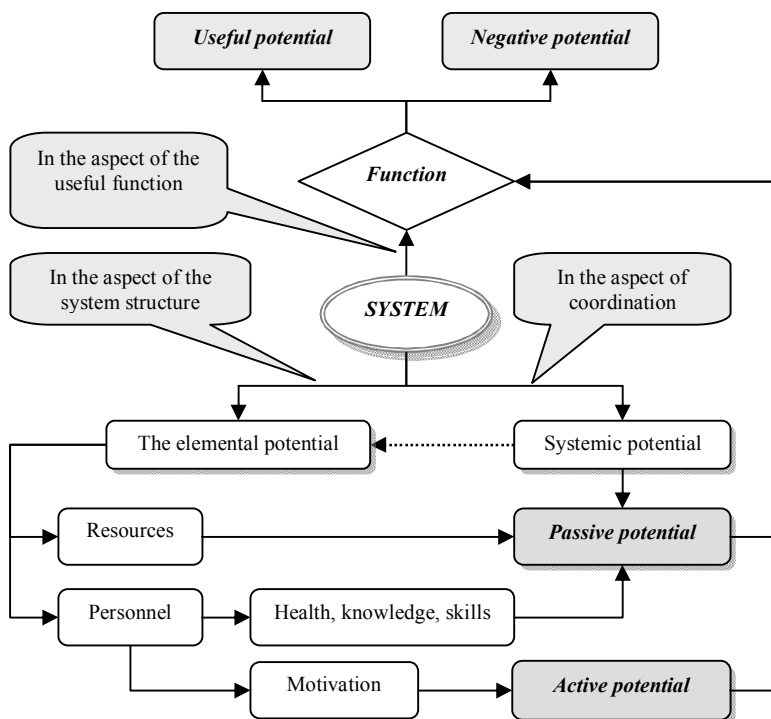


Fig. 3. Classification the types of the organization's potential

Active potential differs the degree of freedom to make decisions about element's own behavior (that means unpredictability of the element's behavior as part of the system). Active element has the internal motivation, with an impact on it's behavior. This motivation may be positive or negative in terms of useful function of the system in a whole. That means not only health, skills, knowledge (the passive potential), but motivation is the internal state of the active element, too. Motivation is more instable state of active element in comparison with its passive potential. Active potential of the element is determined by its motivation for the implementation of passive internal capacity. The total potential of the active elements of the system is the integral value:

$$\Pi^L = \int_0^N \mu_j \cdot \min(\lambda_j, \xi_j) \quad (1)$$

where: Π^L – aggregated potential of the active elements of the system; N – the number of active elements of the system; λ_j – passive potential of the active element j , $1 \leq j \leq N$; ξ_j – its external potential in terms of powers to decision-making; μ_j – index of its active internal potential ($-1 \leq \mu_j \leq 1$).

This determines the dynamic character of the potential of the systems with active elements, that creates a need for more control to maintain the state that provide performing useful function.

CONCLUSIONS

Thus, passive potential of system is its resource potential in the sense of the totality of material factors and in terms of the aggregate abilities of active elements to implement the useful functions taking into account the system limits. Distributed decision-making system determines the boundaries of realization the potential of the active elements by limiting their authorities of decision-making.

The external expression of potential is the system's useful function, but internally it is a state of the system itself, or the level of system's quality.

Systemic potential determines the total potential of organization, since provides the aggregation of the resource potential of the system elements. Systemic potential has two levels: firstly, potential of distributed decision-making system and secondly, of managerial personnel as the system of active elements.

At the first level it reduces the intrasystem losses of implementation the useful function of managerial personnel. At the second level it provides the functional status of executive system.

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СИСТЕМНЫЙ ПОТЕНЦИАЛ ОРГАНИЗАЦИИ

Виктор Сумцов, Ирина Филиппова

Аннотация. Суть потенциала системы с активными элементами раскрывается при анализе ее подсистем в аспекте реализации их полезных функций. Системный потенциал, полезная функция которого усматривается в агрегировании ресурсного потенциала (потенциала элементов), рассматривается на двух уровнях: на уровне распределенной системы принятия решений и на уровне управленческого персонала как системы активных элементов. В статье конкретизировано понятие активного и пассивного потенциала элементов.

Ключевые слова: системный потенциал, активный элемент, организация, распределенная система принятия решений

