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## METHODOLOGICAL MANAGEMENT SYSTEM IN SOCIO-ECONOMIC SYSTEMS

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## МЕТОДОЛОГІЧНІ СИСТЕМИ УПРАВЛІННЯ В СОЦІАЛЬНО-ЕКОНОМІЧНИХ СИСТЕМАХ

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## МЕТОДОЛОГИЧЕСКИЕ СИСТЕМЫ УПРАВЛЕНИЯ В СОЦИАЛЬНО-ЭКОНОМИЧЕСКИХ СИСТЕМАХ

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Systematic approach to economic management considering any economic object as a system of interdependent set of elements (subsystems) having input (resources), output (aim), the relationship with the environment, feedback. Systematic approach makes it possible to take into account the necessary linkages and interaction management systems, allows for the purposes of establishing fully weigh the factors and direct management mechanisms to achieve goals.

The question of the specific features of a systemic approach is largely determined by what is meant by the system. The works of systems theory and systems analysis carried out various definitions of the term "system", with no formation does not contradict the other. In our view, the essence of the term in relation to socio-economic systems is defined as a coherent set of interrelated components that has a special unity with the environment and is a subsystem of a higher order systems. Thus, the system has an external environment that includes input, output, communication with the environment; internal structure, ie, a set of interrelated components that provide business process management influence on object transformation entrance to the exit and the objectives of the system.

Characteristic features of the socio-economic systems are as follows [1]:

- The complexity of the problems and the need for unity in the definition of technical, economic, social, psychological, management and other aspects.
- The growing number of connections between objects.
- Dynamic changing situations.
- Shortage of all kinds of resources (material, labor, financial, etc. ...)
- Strengthening the role of the human factor in the management etc ...

These features cause the inevitability of a systematic approach, because only on this basis can provide quality management solutions.

Systems are characterized by many features and options generally accepted classification systems do not exist. A classification system appropriate to the following classification criteria:

1) As the degree of interaction of the system with the environment distinguished:

- a) insulated (artificial) systems have with the environment and direct feedback;
- b) the closed system with the external environment is only one link;
- c) open systems with the external environment and direct feedback, input and output;

2) the size allocated:

- a) small systems (the number of individual components less than 30);
- b) secondary system (number of single components from 31 to 300);
- a) large complex systems (the number of individual components 300).

3) For types are distinguished:

- a) biological systems (living organisms);
- b) technical systems (products, consisting of a specific set pieces and parts that perform specified functions);
- a) socio-economic system (integrated structure consisting of economic, technological and social

- structures that serve different purposes. For example, city, organization);
- d) production systems, acting as a kind of socio-economic systems (structure, consisting of functional and production units that produce products or performing production services. For example, industrial enterprises and transport);
- 4) the duration of the system is divided into:
- system of short-term action;
  - discrete systems that operate certain period of time;
  - long-term system operation duration are virtually unlimited;
- 5) description of the method of release:
- deterministic systems (functional) whose behavior accurately describes the unique function;
  - stochastic (probabilistic) systems whose behavior is described in terms of distribution of random values or probabilities;
  - unclear (descriptive) system, whose behavior is described qualitatively, not quantitatively;
  - the type of substances used in the system variables distinguished:
    - physical systems with material substance;
    - abstract systems with logical, mathematical and other intangible substance.

As with any fundamental concept, the term "system" [2] specified in the review process of its key properties. Different sources considered different number of properties from several units to several dozen. No coverage of properties leads to simplification of system analysis and not the adoption of quality management solutions. The most complete systems offered properties divided into four groups.

I group - the properties that characterize the nature and complexity of the system. Her integrity, dimension, complexity of the structure, rigidity, hierarchy and multiplicity.

The second group - the properties that characterize communication system with the environment. The interdependence of the environment, degree of independence, transparency and its compatibility with other systems.

III group - combining properties that characterize the whole installation methodology, commitment, continuity, quality priority, priority interest, reliability, optimal system uncertainty information management, and emergence multiplicativity system.

The fourth group includes properties that characterize the functioning parameters and system development. This includes properties of continuous operation and development systems; alternative ways of functioning and development of the system; synergistic and inertia, adaptability, organization system and level of standardization systems and innovative character of its development. Managed by the socio-economic systems in the broadest sense, be considered meaningful impact on the system and its elements to maintain its steady state or transfer it from one state  $S_n$  to the programmed state  $S_m$ . In the case where the S system is in steady state, while talking about its operation in a given mode. But keep in mind that that would inherently social and economic system would not be if it is open, it has a significant impact the environment (exogenous factors) and it removes it from the programmed mode. In addition, the operation of the system is constantly influencing factors of the internal environment (endogenous factors) that also affect the state of the system. Therefore, the interaction of the system components together and determine the effectiveness and quality of its operation. [3] In this case, the state formally record systems can be as follows:

$$S_{it}(t_i) = F_{it}(X_{it}; \bar{V}_i; \bar{P}_i; I_i; T_i), \quad (1)$$

where  $S_{it}(t_i)$  – state of the system in the i-th time t;

$F_{it}(X_{it}; \bar{V}_i; \bar{P}_i; I_i; T_i)$  – state function;

$\bar{X}_i$  - vector environment;

$\bar{V}_i$  - vector domestic environment;

$\bar{P}_i$  - parameters state;

$I_i$  - information;

$T_i$  – time

As follows from (1) the operator of the system is no control as performance impact. Obviously, if the organizational system has property lability and no bifurcation of exogenous and endogenous factors that exceed permissible, then the system does not exceed the established mode and does not require any administrative actions. But keep in mind that all organizational systems are dynamic and can not even for a short time lag to remain in the same state. It is therefore necessary to introduce vector  $\bar{U}_t$  - management actions.

Then (1) will be:

$$(2) \quad S_{1t}(\bar{X}_t) = F_{1t}(\bar{X}_{t-1}; \bar{V}_t; \bar{P}_t; \bar{I}_{(t)}; \bar{U}_t; T_t),$$

where  $\bar{U}_t$  - vector control.

If we consider the socio-economic system as a black box, then input it will be the environmental  $\bar{X}$  impact of various  $\bar{V}_t$  and set of administrative actions (Figure 1)

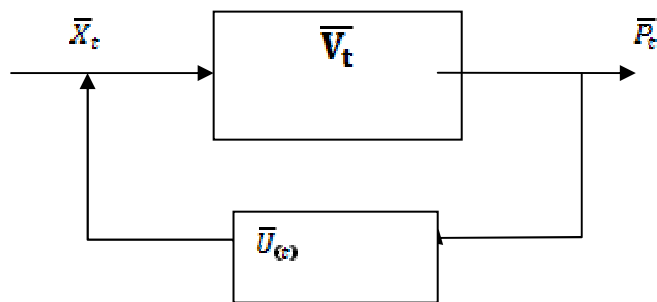


Figure 1 - Organizational system as a black box

The way of functioning of such a system will  $\bar{P}_t$  - a set of indicators characterizing impact ( $\bar{X}_t, \bar{V}_t, \bar{U}_{(t)}$ ) to control the operation of the organizational system.

As a set of indicators can be technical, technological, financial, economic, social, environmental, reflecting the efficiency and quality of the system.

Changing certain values of output parameters depends on the input parameters. But in addition to input parameters, the efficiency of operation, with significant influence and internal parameters  $\bar{V}_t$  of the system.

Then management can be expressed operator

$$(3) \quad ; \quad S_{B+1}(\bar{S}_B; \bar{U}_t; \bar{X}_t; \bar{V}_t; \bar{S}_{B+1}),$$

where  $\bar{S}_{B+1}$  - change of the system as a result of management decisions taken

From this it can be argued that the operator  $\Phi(t)_i$  is the **law of organizational systems** of whatever nature. Therefore, under complex dynamic system we mean a set of structural elements  $m \in M$  multiplies of which has a fixed properties,  $R_1$  and implement predefined ratio  $R_i$  have one goal C.

It should be borne in mind that the functioning of organizational change takes place against the background of all resources: materials, labor, energy, financial, information that significantly affects the efficiency of their operation.

Mathematical bases targeted approach of organizational systems is their structuring, the essence of which is the number of elements, their functionality and relation between them.

Each of the system correspond to the results of operation. Elements of the system and structural relation between them determined in terms of the rational organization and management based on laws of process goals. At the core of organizational systems is a clear realization of the operation of each element to achieve the general objectives oriented to meet social needs. For example, known  $\{m\}$  set of elements in the system with sufficient completeness of their functional characteristics satisfy these requirements. During the process space of possible states of the system must be understood

$$M_s = e_1 \times e_2 \times \dots \times e_m, \quad (2)$$

where  $N$  – number of elements in the system.

As  $S_i \in S_m = \{S\}$  be a tuple:

$$S_i = \langle S_{1i}, S_{2i}, \dots, S_{mi} \rangle, \quad (3)$$

where  $S_{2i}$  – meaning  $S_i$  – a state system  $S_i$ . As the main properties of the overall system  $S_i$  ordering adopted a clear organizational depending on its mission, structure and status of total internal process of achieving goals:

$$S_1 > S_2 > \dots > S_k,$$

where  $S_0$  – initial state organizational system and its functioning, for which the known

mode

$S_k$  – the equivalent of achieving the goal

$k$  – the set of states of the system

$C^v$  - requirements for external purposes

The criterion states adopt ordering the return characteristics completion operation in preset mode.

Then,

$$\forall S_i S_{i-1} \in \{S\}: (S_{i-1} > S_i) \leftrightarrow [P_i^v(S_{i-1}) < P_i^v(S_i)], \quad (4)$$

where  $P_i^v(S_i)$  – the probability of achieving the goals equivalent of the system.

As the general level of the management can identify the main components that are necessary to achieve their goals. This organizational support, logistics, labor, and financial information. Moreover most of the known functions of management organizational systems can be seen as typical of some standard procedures (operations) Search mandatory components specific content management process. For example, when operational management (standard solution) listed components implementing the operational nature of the decision is necessary and sufficient to fully process an end. Formally, the management of card-playing is characterized  $\langle S_0, S_m, F, K, O, C, Q, I \rangle$  and can be seen as

a process of achieving goals directly through the operator  $F$  - transition from initial state  $S_0$  to final state  $S_m$ . It should be noted that the operator  $F$  itself imposes requirements management process to ensure all components motorcade.

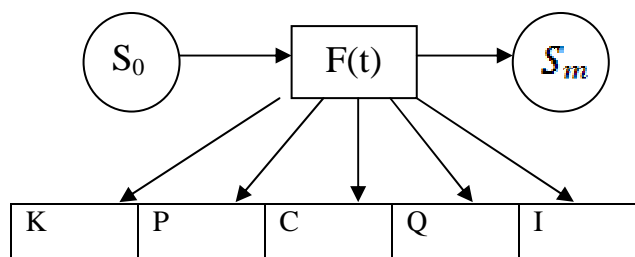


Figure 2 - Block diagram providing the necessary resources

Note that all components of the management linked to the process of decision making and can therefore be regarded as resources for administration.

Moreover, the real organizational systems known resource provision and therefore it should be seen as a limitation in management decisions. Characteristic and generalized components of governance is the basis for constructing organizational management structures in complex dynamic socio-economic systems.

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#### ABSTRACT

Bidnyak M.N., Methodological management system in socio-economic systems/ Bidnyak M.N // Project Management, systems analysis and logistics. Science journal: In Part 2. Part 2: Series: "Economic sciences " - Kyiv: NTU, 2014. - Vol. 13.

In the article management issue in socio-economic systems and its role and importance. The law of functioning of complex dynamic systems.

Object of research: socio - economic systems, as a complex of interrelated components. Method of research - a systematic approach in managing the economy.

Objective : to determine the specific characteristics of the system approach, based on the characteristic features of socio-economic systems.

All components of the process of control are connected to the process of decision making and therefore can be considered as resources management. It should be noted that the functioning of the organizational systems takes place on the background of changes of all kinds of resources: material, labor, energy, financial, information that substantially affects the efficiency of their functioning. Mathematical basis of a targeted approach functioning organizational systems is their structuring, the essence of which is the number of elements, their functional purpose and the relation between them.

KEY WORDS: MANAGEMENT, SOCIO-ECONOMIC SYSTEM, THE STATE SYSTEM RESOURCES

#### РЕФЕРАТ

Бідняк М.Н. Методологічні системи управління в соціально-економічних системах/ М.Н. Бідняк // Управління проектами, системний аналіз і логістика. Науковий журнал: в 2 ч. Ч. 2: Серія: „Економічні науки” – К. : НТУ, 2014. – Вип. 13.

В статті розглянуті питання управління в соціально-економічних системах та його роль і значення. Визначений закон функціонування складних динамічних систем загального характеру.

Об'єкт дослідження: соціально - економічні системи, як комплекс взаємозалежних компонентів. Метод дослідження – системний підхід в управлінні економікою.

Мета роботи : визначення специфічних ознак системного підходу, на основі характерних рис соціально-економічних систем.

Всі складові процесу управління взаємопов'язані з процесом прийняття рішення і тому можуть розглядатись як ресурсне забезпечення управління. При цьому слід враховувати, що функціонування організаційних систем проходить на фоні змін всіх видів ресурсів: матеріальних, трудових, енергетичних, фінансових, інформаційних, що суттєво впливає на ефективність їх функціонування. Математичною основою цільового підходу функціонування організаційних систем є їх структуризація, сутність якої полягає в кількості елементів, їх функціонального призначення та відношенні між ними.

КЛЮЧОВІ СЛОВА: УПРАВЛІННЯ, СОЦІАЛЬНО-ЕКОНОМІЧНА СИСТЕМА, СТАН СИСТЕМИ, РЕСУРСИ.

#### РЕФЕРАТ

Бедняк М.Н. Методологические системы управления в социально - экономических системах / М.Н. Бедняк // Управление проектами, системный анализ и логистика . Научный журнал: в 2 ч. Ч. 2: Серия: „Экономические науки” – К. : НТУ, 2014. – Вип. 13.

В статье рассмотрены вопросы управления в социально - экономических системах и его роль и значение. Определенный закон функционирования сложных динамических систем общего характера.

Объект исследования: социально - экономические системы, как комплекс взаимосвязанных компонентов. Метод исследования - системный подход в управлении экономикой .

Цель работы : определение специфических признаков системного подхода , на основе характерных черт социально - экономических систем .

Все составляющие процесса управления взаимосвязаны с процессом принятия решения и поэтому могут рассматриваться как ресурсное обеспечение управления. При этом следует учитывать, что функционирование организационных систем проходит на фоне изменений всех видов ресурсов : материальных, трудовых, энергетических, финансовых, информационных, что существенно влияет на эффективность их функционирования. Математической основой целевого подхода функционирования организационных систем является их структуризация, сущность которой заключается в количестве элементов, их функционального назначения и отношении между ними.

КЛЮЧЕВЫЕ СЛОВА: УПРАВЛЕНИЕ, СОЦІАЛЬНО - ЕКОНОМІЧЕСЬКА СИСТЕМА, СОСТЯННЯ СИСТЕМИ, РЕСУРСИ .

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