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Research Article

SYSTEM TYPES AND ANALYTICAL APPROACHES

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Akhrorova Umida Khamidullayevna
"University Of Business And Science" Non-State Higher Educational Institution, Teacher Of The Department Of Social And Humanitarian Sciences, Uzbekistan

ABSTRACT

This article talks about the types of systems and analytical approaches in the science of pedagogy. Opinions of scientists in the field of scientific research on this research problem are presented.

KEYWORDS

Types of systems, closed (closed) systems, open systems, class of systems, natural systems, artificial systems, abstract systems, logical systems, large systems, complex systems, systems approach, systems approach, modern systems approach, characteristics of main approaches in systematic analysis, structure of systematic approach, types of analysis, analytical approach in designing.

INTRODUCTION

First of all, from the fact that we defined that the entire existence of matter has a systematic structure, from the multifaceted and diverse nature of systems, their components, quantitative and qualitative connections between them, from the large number of structures, functions and other attributes of systems, and finally, from their different manifestations in space and time, it can be noted that there are many types of systems.

Types of systems are the subject of many studies, and the aspect of which types are being studied is relevant. As we recognize that matter is infinite and limitless, as we affirm that its systematic structure is in the position of other properties

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such as motion, space, and time, there are correspondingly many types of systems. It is necessary to consider not only material (material) systems, but also ideal systems. Therefore, the approach to classifying systems into types is also different. They have different bases according to their character:

- depending on the integrity of the system and the connection between its parts, it is strongly and loosely connected;
- mechanical, physical, chemical, biological, social according to the forms of movement of matter;
- dynamic and static according to their relationship to the laws of motion;
- functional, non-functional, developing according to the types of changes;
- closed, open, isolated according to the nature of exchange with the environment (exchange of matter, energy, information);
- simple and complex according to the level of organization;
- is one-valued determined according to its internal determination and associated with probability.
- lower and higher according to the level of development;
- according to the basis of origin, natural, artificial, mixed (for example, man-machine, in quantum mechanics: observer, measuring instrument, object.);
- progressive and regressive according to the direction of development.

So, the system and its organizational elements, components, as we said above, represent an infinite chain of structure. Modern science has managed to study 9-10 systematic structures of the world around us. If we begin this division with elementary particles, then atoms, molecules, macrobodies (including living organisms), systems of macrobodies (biological and social systems), systems of cosmic bodies, galaxies, metagalaxies. However, in philosophy, there is a saying that the electron, like the atom, is infinite, nature is infinite. In this sense, the study of elements from saws to oil (up to the whole universe) is the subject of the future development of science. Modern science of cosmology encourages us to draw a general philosophical conclusion that the number and amount of worlds in the universe (therefore, also metagalaxies) is infinite. As we said above, not only the material world, but also its reflection in the human mind has a systematic structure. Man does not have the task of knowing all the corners of the infinite universe, but he has the opportunity to know any area of the external world, any problem related to its knowledge.

Table 1:

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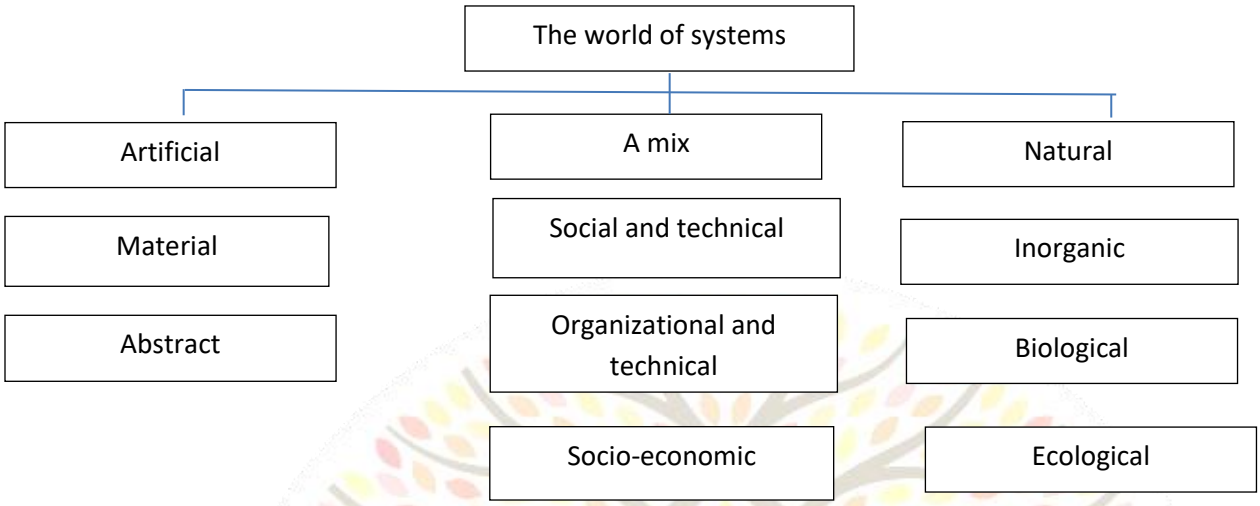

System types are divided according to their characteristics as follows:

I. According to genetic characteristics;

1) Material systems:

a) Physico-chemical systems. Elements are particles, atoms, molecules, macro bodies of the inorganic world, planets, stars, galaxies, metagalaxies.

b) Biological systems on Earth. DNA, RNA acids, cells, organs of living organisms, organisms, their associations (classes, species, etc.), flora, fauna, the entire biosphere of the Earth.

c) Social systems. These material systems include a person, small social groups (family, production teams), medium social systems (small settlements, medium and small enterprises, trade unions, workshops of large enterprises), large systems (large cities, factories production networks, political parties, trade union associations) and, finally, the largest systems (states, unions of states, the whole society, if the process of globalization is taken into account, the whole of humanity).

We know that the social life of people creates technical systems. Among them are small (machine, machine tool, set of tools), medium systems, large systems (a set of enterprises, technical networks), the largest systems (the entire working tools of human society).

2) Ideal systems:

These systems include the entire content of a person's self-awareness of the objective world (philosophical worldview, political and legal consciousness, ethics, aesthetic views, national ideology, religious consciousness, set of scientific knowledge, etc.). Ideal systems are also subordinated. (For example, a general outlook-a theory of objects, a network of knowledge-individual consciousness, etc.).

II. According to the nature of the laws:

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1) Deterministic systems.

These systems are objects, legal summaries of objects that operate in specific directions under certain conditions (for example, any automaton working according to a strictly limited program). This type of systems usually includes various technical devices working according to a given plan (material systems) and a set of rules and instructions aimed at solving a certain category of problems (ideal systems). It must be said that the number of deterministic systems is very small compared to the number of probabilistic systems that modern science has revealed.

2) Probabilistic systems.

A set of systems whose elements (components) can interact in a certain number of options. An influence on a deterministic system produces a definite reaction, and on a probabilistic system such an influence produces at least two or more reactions. All physico-chemical systems, social systems (many ideal systems, except technical systems) in non-living nature are probabilistic systems.

We will dwell in detail on another type of division, which will be very necessary in the future course of our topic of systems. This division is based on the nature of their interactions with the environment.

III. According to the nature of interactions with the environment.

1) Berk (closed) systems - have strictly defined boundaries. Its action does not depend on the surrounding system and the external environment.

An open system interacts with the external environment. Such a system cannot support itself. It depends on energy, information, and materials coming from outside. An open system will be able to adapt to changes in the external environment in order to continue its operation.

2) Open systems - this concept arises from the fact that there is a development in the form of mutual connection and interconnection, which exists in the whole world at all levels. In this sense, it is possible to talk about the effect of external conditions on the system and the external conditions of the system. In external conditions, there are primary connections and secondary connections. First-order connections have a significant impact on the system, others less so. However, these statements are also conditional, we will see this in the future. At the time when dialectical-materialist philosophy claimed to be the only correct methodology explaining all the processes in the world, we hesitated to "protect" it with a sphere of protection from the views of any philosophical trends developed in the West. Now we see that it is possible to do this artificially for a certain period of time, but only for a certain period and in a certain place.

We note that systems are divided into small, medium, large and very large systems. Large and the largest systems are systems with a multi-level (level) structure, internal adjustment and self-movement, development. Such systems are called "human-sized systems" in modern science, that is,

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systems in which a person is an element of these systems. It should be noted that the division of systems into such types, the limits of their separation are relative, changeable and interchangeable.

As it can be seen from the above ideas, the material world exists in the form of a multi-level construction (manual) formed by the structural levels of matter. Their mutual relations are subject to the following rules:

1) all structural levels of matter are genetically (i.e., by origin) interrelated, each "above" level arises and exists only on the basis of the "below" structural level. (i.e. atoms from elementary particles, molecules from atoms, macrobodies from molecules and so on up to metagalaxies);

2) higher levels of matter cannot be reduced to relatively lower levels, because, as explained above, at each new level, the (systematic, integrative) properties of the material object that did not exist at the previous level, which formed the new one, appeared. (a water molecule has properties that are drastically different from the properties of its constituent oxygen and hydrogen atoms);

3) the fact that material systems belong to a certain class (level) is determined by its structure, i.e., by the method of interconnection and interaction of system elements, so there are laws of influence at each structural level. (the law of interaction of quarks that make up hadrons is completely different from the interaction of hadrons; the laws of interaction of the organization system are different from the interaction of cells). In principle, the characteristics of higher-order systems cannot be explained by the laws of lower-order system interaction. (the characteristics of human atoms are not explained by the laws of interaction of atoms);

4) however, the existence of different types of material systems at different structural levels does not destroy the fact of their commonality (such systems are common in terms of their origin or belonging to a single material world). So, in general, it does not prevent the search for single, universal laws of the structure and functioning of all systems.

In addition, based on the system-structural similarity, the certain dimensionality of all material objects, for example, the discovery of the laws of the micro world is large-scale. It allows a better understanding of the structures of the universe, and the same can be said, on the contrary; This is actually happening in modern science. In this case, the closer the structural levels are, the more similar the systems are interconnected. (eg biological and social systems).

It is known that in modern science, the concept of the organization of matter in the form of structural levels, the organization of the material world, arose as a result of the long-term evolution of the current system-structural structure of the universe. In this process, all structural levels of matter that are known today appeared one after the other. Thus, the current structure of the

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material world is the result of movement and development.

We know that modern science is based on the structure and structural modeling of the material world.

Table 2.

Classification of systems

Criteria	Systems
According to the connection with the external environment	open, closed, mixed
According to the structure	simple, complex, big
According to the nature of tasks	special, multitasking (universal)
According to the nature of development	stable, developing
According to the level of organization	well organized, not well organized (diffuse)
According to the complexity of behavior	automatic, solving, self-organizing, predictive, shape-shifting
According to the relationship between elements	deterministic, stochastic
According to the management structure	centralized, decentralized
By appointment (purpose)	Manufacturer, manager, service provider

System types include:

Material systems are real-time objects. Material systems are divided into natural and artificial systems.

To natural systems:

- The structure of the human nervous system, the blood circulation system in the body;
- In natural phenomena - weather system, water circulation system, year and seasons;
- Growth, flowering, fruiting, etc. of the world of plants;
- It is divided into astrocosmic and planetary, physical and chemical types.

To artificial systems:

- Economic system;

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- Education system;
- Health care system;
- Military system;
- Cultural system;
- Political system;
- Spiritual system.

Abstract systems are representations of material images or models with the help of thinking, which are divided into descriptive (logical) and symbolic (mathematical) systems. In other words, it is a product of human thinking. They consist of knowledge, theories and hypotheses.

Logical systems are deductive or inductive representations of material systems.

1. Deductive method - a method of studying specific cases of general cases.

2. The inductive method is a method aimed at studying the laws, laws and rules of private contradictions of general characteristics.

Mathematical systems:

Statistical mathematical systems or models - they can be viewed as a statement of the mathematical apparatus of the state of material systems (equation of state).

Dynamic mathematical systems or models - they can be considered as a mathematical representation of processes in material (or abstract) systems.

Large systems (CT) are systems that cannot be observed simultaneously by a single observer in time or space. In such cases, the system is looked at in successive parts (subsystems) and gradually rises to a higher level. For example, separate whole different layers of the universe (atmosphere, biosphere, stratosphere).

Complex systems (MT) are those systems that cannot be created by adding some parts of the system.

Approaches in systematic analysis:

- Systematic
- Structural-functional
- Constructive
- Collective
- Problematic
- Status
- Innovative
- Normative
- Targeted
- Activity-related
- Morphological
- Programmatic

1. Systematic feature:

- both the system and individual elements are defined by the features of their structure;
- there is a connection between the internal and external functions of the system;
- the system interacts with the external environment and has a corresponding internal environment;
- the system reflects the developing integrity.

2. Structural and functional features:

- determination of system structures;

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- determining the relationship between system structure and functions;
- creation of system functions.

3. Constructive feature:

- realistic analysis of the problem.
- analysis of all possible options for solving the problem.
- system structure, problem solving activity.

4.Composite feature:

- review of all aspects, features, functions of the system, its relationship with the environment.
- consider them as a whole.
- determining the level of importance.

5.Problem feature:

- distinguishing conflicts and problems between some aspects of the development-determining object, determining the type, evaluating it.
- development of problem solving methods.

6. Status feature:

- separation of the problematic complex based on the situation;
- distinguishing the main features of the situation;
- to determine the causes of the situation and its consequences;
- assessment of the situation and its forecasting;
- development of an activity program in this case.

7.Innovative feature:

- definition of update problems;
- creation of new models to solve the problem;
- -introduction of news;
- management of innovation, its acquisition and implementation.

8. Normative feature:

- -constantization of the system problem;
- setting system standards;
- change the system according to the norm.

9.Target feature:

- determination of system goals;
- reconstruction of the goal in simple components;
- justification of goals;
- creating a family tree of goals;
- -expert assessment of all branches, goals tree.

10. Functionality:

- identifying problems;
- defining the object of activity;
- -formation of activity goals and tasks;
- identification of the subject of activity;
- formation of activity models;
- implementation of the activity.

11. Morphological feature:

- maximally accurate determination of problems;
- find the largest number within all possible options for solving the problem;

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- implementation of the system by mixing the main structural elements and symbols;
- application of morphological modeling methods, systematic area coverage, morphological box, generalization, etc.

12. Programmatic feature:

- identifying the problem;
- formation of goals;
- creating a program to achieve the goal.

In this sense, the term "system" should be understood not only as a set of interconnected components of the system (a control object) and its levels of interdependence. Perhaps it is appropriate to take into account the degree of external relations included in it. This, in turn, requires determining the way to implement a systematic analysis, that is, the approach.

A systematic approach is a methodology based on the study of an object as a whole, a "way" that provides scientific understanding. In science, the systematic approach has been developed by representatives of various scientific fields. A systematic approach is a set of interrelated aspects that can serve as a methodology for analysis. For example, the systematic approach methodology consists of the following criteria:

- systematic - characteristic (elemental), what is the system composed of? serves to find an answer to the question;

- systemic-structural, serves to determine the internal structure of the system, provision of its contents;

- systemic-functional, serves to distinguish the system and what tasks it creates;

- systemic-communicative, serves to determine the nature of horizontal and vertical relationships of the system with other systems;

- systemic-integrative, serves to determine the system maintenance mechanism, maintenance factors and improvement;

- systematic - historical, "how was the system formed?", "what stages did it go through during development?", "what is the perspective of the system?" serves to answer the questions.

As you can see, the systematic approach is a complex that serves to define the way to implement a systematic analysis.

The systematic approach directs researchers to the study of the unity of the object, the multifaceted nature of relations and their unified theoretical image.

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