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THE SYSTEM-TRANSDISCIPLINARY CONCEPT OF THE SYSTEM APPROACH (PARADIGM AND DISCIPLINARY MATRIX)

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Abstract
The article is devoted to the presentation of the concept of solving a puzzle - how to explore any object as a system. As a disciplinary paradigm of systems science, the idea is put forward that any system is an order that determines the unity and integrity of an object. The proposed system-philosophical picture of the World postulates a single order that manifests itself in each fragment of the World. A single order provides a functional isomorphism of the transformation process and uniform patterns of transformation of the object's state in time and space. These patterns are described by models of units of order, which form the basis of the disciplinary matrix of systems science. The article shows the application of this paradigm and models for the study of socio-economic development of mankind. As a result, the systemic causes of social and economic development have been identified. The systemic goals of socio-economic development are outlined, the systemic causes of crises and the methodology for calculating the time of their onset are outlined, hypotheses are made about the influence of the structure of space on the nature of socio-economic processes, determining the endemic socio-economic development of countries and regions.
Keywords
General theory of systems, system paradigm, transdisciplinarity, transdisciplinary models of order, disciplinary matrix of system science.

1 | Introduction

As you know, science studies the world around it in order to gain new knowledge. And like any field of activity, science must have a certain set of ways (methods) of obtaining such knowledge. The methodology of scientific research, as a field of knowledge of the organization of scientific activity, offers a fairly broad classification of these methods for various reasons.
The classification of methods according to the degree of ontological justification of the research object is as follows:
- *methods -tools*. These methods do not require an ontological justification of the research object. For example, observation and measurement or logical research methods – deduction, induction, abduction.
- *methods-approaches.* Depending on the understanding of the essence and meaning of the object, the image of the research object is formed, its essential features are determined. These signs may vary, which determines the emergence of scientific trends, trends, and scientific schools. In this sense, this research method can be interpreted as a method-approach. For example, in economic theory, classicism, institutionalism, monetarism are distinguished; in philosophy, idealism, materialism, etc.; in mathematics—the formalist school and logicism.
- *methods are paradigms.* Despite the difference in the theoretical basis of the object of research and the presence of different schools and directions, in each field of knowledge there may be a certain generally accepted image of the object of research or the so-called disciplinary paradigm. The paradigm method necessarily provides for a picture of the world or a certain worldview.
It should be noted here that it is customary to distinguish between special or disciplinary scientific pictures of the world and the general scientific picture of the world.
Disciplinary scientific pictures of the world are introduced through representations: about the fundamental objects studied by this discipline; about the topology of the studied objects, about the general patterns of their interactions. For example, in the chemical picture of the world, objects are a collection of chemical elements and compounds and are viewed through the prism of the laws of chemical transformations. The biological picture of the world considers life at various levels of organization, from molecular to biospheric, etc.
The general scientific picture of the world usually refers to a philosophical understanding of the surrounding world. This is due to the fact that philosophy as a discipline has a universal character, that is, it covers all aspects of being.
Continuing to concretize the concept of "paradigm", it should be noted that T. Kuhn, having discovered that the concept of a paradigm caused an interpretation inadequate to the one he gave it, he supplemented

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it with the concept of "disciplinary matrix" (Kuhn T.1977). So the paradigm is the basic idea. Based on this paradigm (the main idea), the researcher interprets the World ontologically and interprets the facts of the surrounding world and formulates problems, and the disciplinary matrix provides the researcher with epistemological tools for studying the object. The creation (or change) of a paradigm is the formation (or change) of a point of view on the object of research or the switching of the Gestalt. This understanding of the relationship between the paradigm and the disciplinary matrix, in our opinion, reflects the meaning of the paradigm method.

It follows from the above that systems science, like any field of science, should have its own paradigm and disciplinary matrix.An analysis of the state of affairs in systems science from the perspective of the above allows us to conclude that systems science is at a pre-paradigm stage of its development. Despite the existence of about 10 international organizations, including the International Federation for Systems Research (IFSR), which unites about thirty organizations of systems science around the world (https://en.wikipedia.org/wiki/List_of_systems_sciences_organizations). There is no generally accepted definition of the term "system". That is, at present we can talk about the existence of a set of approaches. There are quite a large number of schools and trends whose representatives describe and interpret the concept of "system", its features and laws of development in different ways. These interpretations are based on various methodological and philosophical justifications. This is evidenced by the analysis of monographs, articles and reports at conferences of these organizations. Historians of the development of systems science distinguish four epochs or four waves of the systems approach (Volkova V.N. 2023), (Cabrera, D., Cabrera, L. and Midgley, G. 2021). Moreover, the fourth period, according to the authors, should be characterized by "universality and diversity" (according to Derek and Laura Karbera) or the discovery of "general scientific" laws (according to Volkova). Since 2024, the SIG General Theory Systems of ISSS has intensified efforts to discuss new approaches to the creation of such a theory. However, in our opinion, in the proposed approaches, the proposed "world view" and the definition of systems do not have the necessary degree of universality.

This is not surprising, since the main difficulty in creating a systemic paradigm and disciplinary matrix is that it is a paradigm, the proposed theses, rhetoric and methodology of the disciplinary matrix should make it possible to explore any object of the surrounding world and the surrounding world itself as a system. That is, the disciplinary system picture of the world, the paradigm and the disciplinary matrix of systems science should be universal or multidisciplinary. This feature is pointed out by David Rousseau and colleagues in a special issue of the journal Systema: General System Transdisciplinarity. In full accordance with T. Kuhn's views on the content of the paradigm and the disciplinary matrix, David Rousseau and his colleagues propose steps to create a general theory of systems as a transdiscipline, which includes:

• a General Systems Worldview (GSW)
• a General Systems Theory (GST*) that includes:
• an ontology of systems that can be used to describe systems and classify them in an unambiguous way
• models that characterize the kinds of processes that support the evolution, expression or degradation of systemic behaviours;
• models of the mechanisms that underpin systemic evolution or systemic behaviour;
(Rousseau,D., Wilby, J., Billingham, J., & Blachfellner, S (2016). pp 76-99).

2 | Rationale and Method

According to the methodological provisions outlined in the introduction, we will talk about the method approach. However, this approach offers not only its own ontology of the system (Mokiy, M. 2024), but also a picture of the world, a paradigm and a disciplinary matrix that allow for the necessary transdisciplinarity.

Basic notions about «an ontology *of systems that can be used to describe systems and classify them in an unambiguous way.»* In our concept, by a system in general, we mean an object that performs the transformation of energy and matter. The main essential attribute of the system is the order in which the transformation process takes place, the elements of the system and the connections between them arise. In this sense, a system is always an order that ensures the unity and integrity of an object.

Basic notions about a General Systems Worldview (GSW) and paradigm.

- The philosophical basis of our concept is the synthesis of holism and unitricism, according to which the World is a One Orderely Medium. All objects of the surrounding world (both known and unknown) are

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considered as fragments of this unified ordered environment. The surrounding world and all its fragments transform matter, energy and information in time and space.

- The transformation process, as well as the appearance and existence of fragments, occurs according to a one order. It should be noted here that from the point of view of this worldview, there is no chaos in the world. What seems like chaos to us is actually an order that we don't understand. That is, the World and each of its fragments represent a one-whole. Then it is necessary to look for the manifestation of this unified order in every object or phenomenon.
- The statement of the simultaneous existence of the World as a whole and as a whole determines systemic dualism, according to which the *SYSTEM* exists in two guises at once – as a kind of standard of the object (the one) and as its real embodiment (the whole).
- The function of converting matter, energy and information involves the implementation of a set of functions for which a mechanism is needed – the structure of the system. This is a set of elements and connections between them, through which functions are performed.

The elements of the system structure are built from the basic elements.

- The preservation of the unity and integrity of the object is possible only if the coevolution of the development of all basic elements is observed. Coevolution of development or joint directed development, in turn, requires a strictly defined amount and quality of matter and energy consumed by the basic elements. Violation of the latter requirement violates the coevolution of the system's development and is perceived by it as a dysfunction and needs to be eliminated.
- For a correct study of an object as a system, it is necessary to correctly identify it, that is, to determine the boundaries of the object in time and space. Depending on this, four types of systems can be distinguished with a greater or lesser degree of conditionality of limitation: *environmental, process, design and object* (Kleiner, G., 2007, pp. 141-149).

Environmental systems are the boundaries of the environment, its distribution is determined only by factors external to it. For environmental systems, the concept of a time horizon as a boundary in time does not make sense. They have conditional spatial boundaries. For example, the universe, the Windows environment, the Internet, morality.

Process systems – the boundaries of a process are mostly limited in time and relatively unlimited in space (for example: broadcasting a sports event).

Object systems with an indefinite lifecycle, localized in a specific place of geographical space (for example: enterprise, city, humanity). These objects are limited in space and relatively unlimited in time.

Design systems are systems with a short lifecycle, localized in a specific place in space (for example: cooking scrambled eggs, writing an article, building a building); that is, it is relatively easy to see the limitations in time and space.

***Basic notions about "models** that characterize the kinds of processes that support the evolution, expression or degradation of systemic behaviours and models of the mechanisms that underpin systemic evolution".*

In the process of transformation of matter, energy and information, the state of the system changes in time and space. At the same time, a change in the state of a system is a change in the quantity and quality of its basic elements and the relationships between them. The systemic isomorphism of the transformation order can be described by models of *informational, temporal and spatial* units of order created within the framework of the methodology of transdisciplinarity-4. (Mokiy V.S., 2011).

Rethinking the concepts of information, time and space in this concept allowed us to build their models.

- *Information is interpreted as **a form** of manifestation of the object's condition in its entirety.*

In this context, all information (the state of the object) or complete information should consist of quantitative and qualitative information or represent an information dipole. Quantitative information characterizes an object in terms of size and volume. Qualitative information is the properties of an object that distinguish one object from another in terms of its essence. The model of the information unit of order is a sequential differentiation of information according to this simple principle - the principle of the information dipole (Fig.1). Eight features are a necessary and sufficient level of differentiation of information. That is, when examining an object as a system, it is necessary to identify either two, four, or eight features or immanent attributes of the object. There are many examples of such differentiation of information. For example, in information theory, there are eight bits in a byte. In music– it is an octave, that is, eight notes, etc.

An object considered as a system has both a reference and a real state. Manifesting itself in time and space, the system must evolve according to the standard.. Then we can talk about a certain balance between

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elements and processes that have different characteristics. However, the concept of balance does not mean equality between attributes.
The concept of balance means "norm", and this norm is individual for each object, and it characterizes the information feature of the object that we consider as a system. In other words, if it is hot in the Sahara, it is normal, but if snow falls in the Sahara, it is not normal, it is a deviation from the standard or an imbalance.

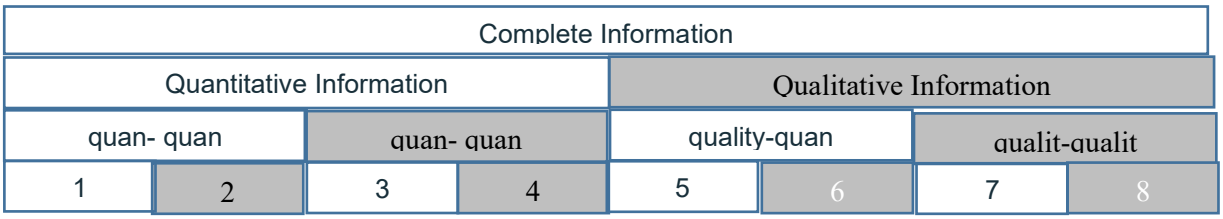

Fig.1. Information unit of the order

The concept of balance means "norm", and this norm is individual for each object, and it characterizes the information feature of the object that we consider as a system. In other words, if it is hot in the Sahara, it is normal, but if snow falls in the Sahara, it is not normal, it is a deviation from the standard or an imbalance. Deviation of the object's state from the reference state is a violation of the information balance. There are only two types of imbalances.: 1) - a lot of quantity and little quality (see Fig.2b) and 2) - a lot of quality and little quantity (see Fig.2c). And both types are perceived by the system as a dysfunction and require the inclusion of a mechanism for eliminating dysfunctions.

a) Normal balance b) Type 1 imbalance c) Type 2 imbalance

Fig. 2. Information balance and types of imbalance

➢ *Time is interpreted as **a form** of transformation of the object's state, which is shaped by duration.* The postulation of a single order, indicated in Fig.1, suggests that the complete process of transformation of the system state in time requires allocation of two, four or eight time intervals, respectively (Fig.3). For example, the process of breathing is a combination of inhalation and exhalation. You can't just inhale or just exhale. There are either two, four, or eight periods in a year, etc.д.

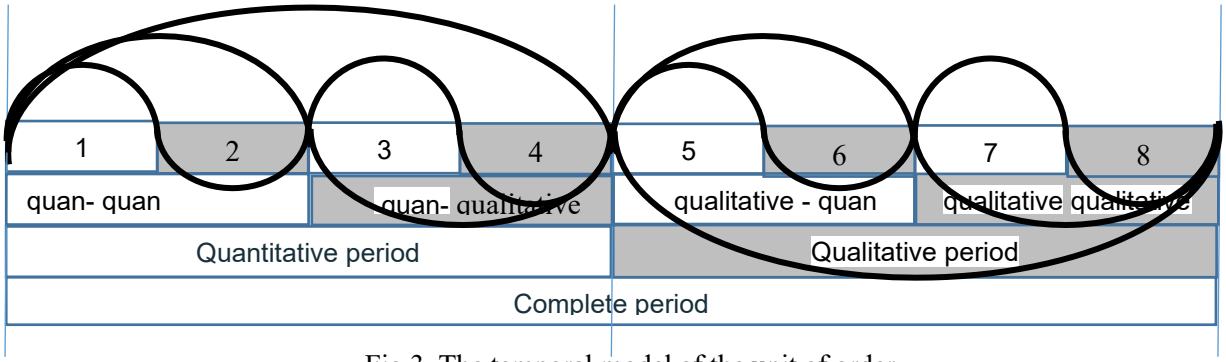

Fig.3. The temporal model of the unit of order

Please note that in the fifth period, quantity turns into quality. Therefore, this period is interpreted as the level of the physical form of the process or object.

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Depending on the nature, content, and role in the transformation process on time , it is necessary to identify *periods, stages, and cycles* of its development over time.
Period – a period of time during which a process begins and ends (the period of cooking breakfast, the period in a hockey match);
Stage - a separate moment, a stage in the development of a process (childhood, adolescence, adulthood);
A cycle is a collection of some phenomena, processes, and works that complete a complete cycle of development over a period of time. time interval (annual agricultural cycle, daily cycles in the body, economic cycles, etc.)
The scope of the article does not allow us to describe all the varieties of temporal models. Their detailed description and experimental confirmation are described in the works of Vladimir Mokiy (Mokiy V. 2021).

- *Space is **a form** of existence of an object 's state.* The model of the spatial "unit of order" is the unity of the construction of fragments of space, which determines the physical boundaries of the object studied as a system (Fig. 4,5). The principles of building a spatial model are discussed in more detail in the work (Mokiy, V.S. 2020)

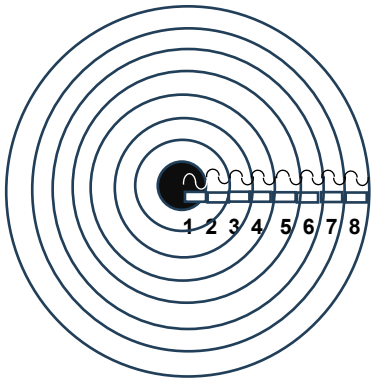

Fig 4. Planar spatial model

As we noted above, the fifth level in the spatial model is the physical form of the object being studied as a system.

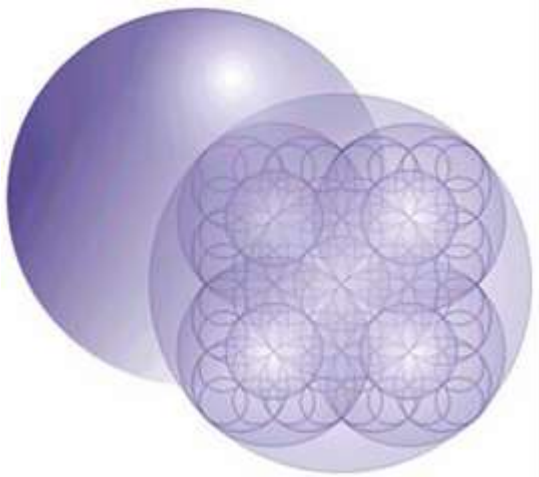

Fig. 5. Spherical spatial model

These patterns and models are transdisciplinary, that is, universal in nature. The forms of information, time, and space described by the models are constant, that is, isomorphic. However, when talking about the degree of adequacy of models, one should keep in mind the statement: "a terrain map is not a terrain, but it allows you to make a fairly complete impression of it." In this sense, the presented concept describes an idealized image of the system and model. They should be reduced to objects considered as systems.

3 | Reaults

Let us illustrate the described ontological positions and models using the example of humanity and socio-economic relations, studied as a system. We will show how the considered patterns and models can be used

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to describe the types of systems.,the types of processes evolution, manifestation, or degradation of systems. Humanity is an object system. It is localized on planet Earth and the development of mankind is relatively unlimited in time. Every person and humanity is engaged in the transformation of matter and energy every second. Participation in this process determines the appearance of needs for each person and humanity as a whole. The existence of needs requires the creation of goods, the exchange and distribution of created goods between people. As a result, there are individual creators of benefits and organizations that carry out the above processes. But the existence of people in groups requires the development of rules of human behavior in the processes of creation, exchange and distribution of goods. These rules are based on values. These values determine the quantity and quality of goods, the ways they are created, exchanged, and distributed. The main role in the formation of values in the minds of every person is played by society, starting with the family and ending with international organizations.

The basic elements of the "humanity" system are humans. All organizations in the economy and society are formed from people. Then the systemic goal of human development is the development of every human being. Just as a change in the state of the human body is a change in the state of cells and the connections between them, so a change in the state of humanity is a change in the state of people and the connections between them.

The development of humanity as a system requires the unity of economic (quantitative component of the system) and social (qualitative component of the system) development (Fig.6).

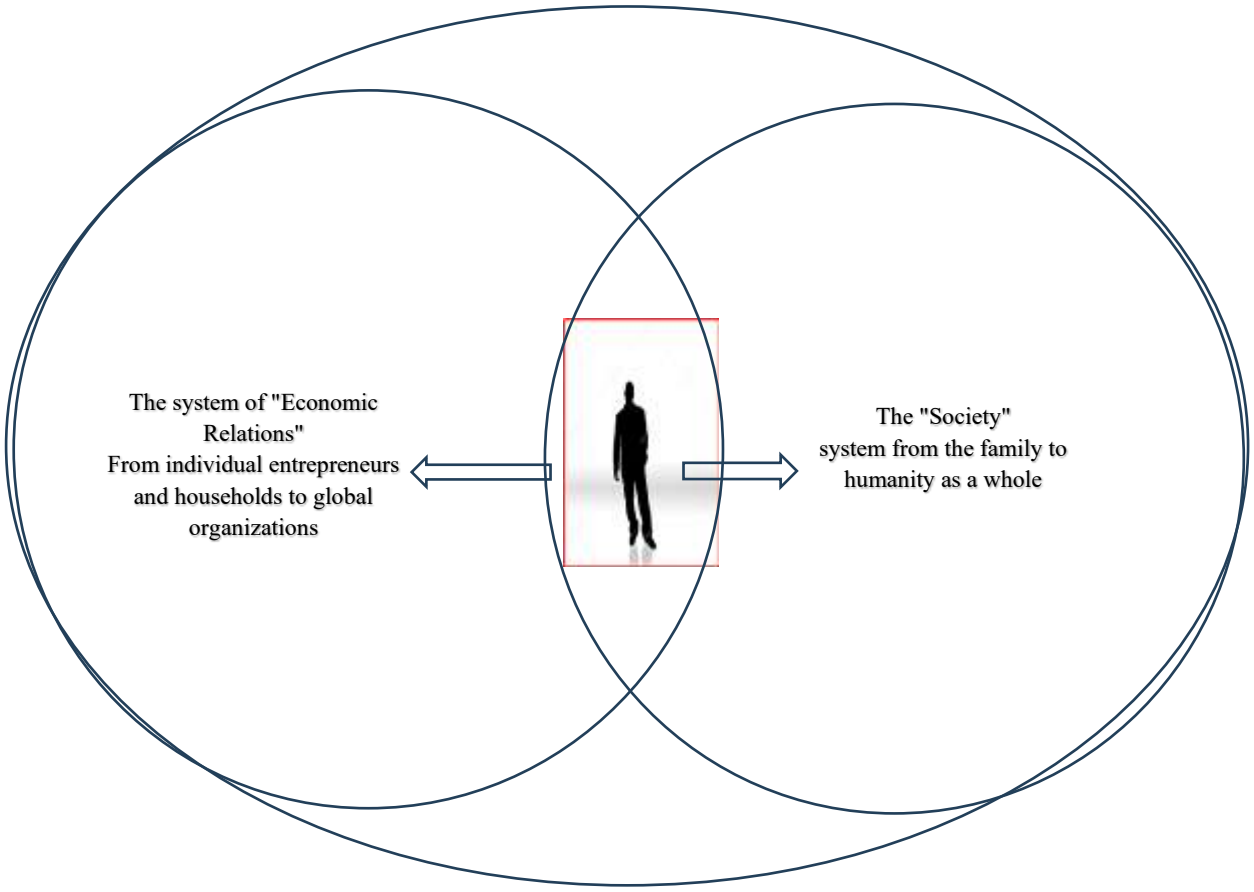

Figure 6. Humanity as an object system

Consideration of economic relations as a system allows us to draw the following conclusions. The basic elements of this system are people who create goods and their households. Then the systemic goal of the development of economic relations is to meet the development needs of all households.

According to the informational unit of order, an object considered as a system should have eight information features. Then the signs of economic relations will be: values, needs, people as workers-creators of goods, tools and objects of labor, ways of creating goods, ways of their distribution and exchange. The combination

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of the first four elements creates conditions for the production of goods. As a result of the production process, necessary goods appear that need to be distributed or exchanged to meet people's needs. At the same time, values determine the quantity and quality of goods, the ways of their creation, exchange and distribution. It is these elements that have the character of parameters, since all of them have always been present and will be present at any stage of economic development.

According to the temporal model, the full transformation period includes eight stages. The history of economic relations provides us with the opportunity to clearly identify the primitive, primitive communal, slave-owning, feudal and capitalist stages of the development of economic relations, or more precisely the

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Stages of development of socio=economic relations

Parameters of socio-economic relations

	The primitive	**Primitive communal**	**Slavery**	**Feudal**	**Capitalistic**	**Post-industrial**	**intro Noospheric**	**Noospheric**
People's needs	Awareness of needs	Quantitative	Quantitative qualitative	Quantitative qualitative	Qualitative-Quantitative	Qualitative-Quantitative	Qualitative-Quantitative	Qualitative - Qualitative
People as producers of goods	Awareness of the need	All members of the community	Slaves	Peasants and artisans	Employees	Entrepreneurs and employees	Entrepreneurs, freelancers, and employees	Free entrepreneurs are all the inhabitants of the planet
Tools of labor	Awareness of the need	Камни, палки	Working cattle, the simplest tools of labor	Working cattle, machinery	Machines and mechanisms	Partial automation	Full automation and computerization	Mechanisms with artificial intelligence
Labor items	Awareness of the need	Wild Nature	Lend	Land, semi-finished products	Materials and semi-finished products	Materials and semi-finished products	Information	Nature
Production method (technology)	Awareness of the need for production	hunting and gathering	Manual labor	Manual labor	labor with the use of mechanisms	labor using machines and automata	Information and Biotechnological technologies	Environmental technologies
Benefits (goods)	Awareness of the need	Quantitative	Quantitative qualitative	Quantitative qualitative e	Quantitative qualitative	Qualitative-Quantitative	Qualitative-Quantitative	Qualitative - Qualitative
A methods to exchange benefits	Awareness of the need for exchange	Natural barter	Based on precious metals	Based on metal money	Based on paper money	Based on paper and non-cash money	Based on non-cash electronic money	based on the global electronic currency
A method of distribution of benefits	Awareness of the need for distribution	Functional Primitive communism	According to the degree of ownership	Class and caste	According to the degree of ownership	By the degree of ownership of capital	By the degree of ownership of intellectual property	From each according to his abilities, to each according to his work

Fig.7. Parametric model of development of socio-economic relations

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industrial stage, since at this stage, along with the capitalist stage, there is also a socialist form of organization of economic relations. According to the thermal model, these periods should be complemented by a stage at which people realize their needs, the need for tools, objects, and labor processes to create goods and the processes of distributing and exchanging goods to meet needs. The systemic goal of the development of socio-economic relations outlines the eighth stage of the development of modern humanity, which has been called the noospheric. At this stage, work should become a conscious necessity for free creators of goods, and the ways of exchanging and distributing goods between people should meet the needs of all people-creators of goods and their households and families. Then the process of development of economic relations can be represented in the form of a parametric table (Fig.7).

Even the hypothetical nature of the parametric table allows us to propose a new interpretation of the development of socio-economic relations and their state.The table allows you to identify trends in the development of each of the designated elements of economic relations.

To the greatest extent, the nature of the development of socio-economic relations is influenced by a set of values that determine the nomenclature of goods, the ways of creating the exchange and distribution of goods. Other factors such as scientific and technological progress, demography, and climate play only an auxiliary role or do not play it at all, despite the fact that their rapid changing. Unfortunately, the set of values is changing very slowly. It is obvious that it is the set of values underlying the distribution of benefits that determines social changes and is the main cause of social unrest. Each person, being a fragment of the human system, intuitively feels the systemic purpose of society's development. The need for coevolutionary development has been transformed in people's minds into the concept of social justice. And if the totality of values, and therefore the ways of creating, exchanging and distributing goods, ensure the well-being of only a certain part of households, this is perceived as an injustice, or from the point of view of our concept as a systemic dysfunction. And when a certain "critical mass" is reached, social unrest will arise as a mechanism for eliminating this dysfunction. On the other hand, the systemic concept of coevolution of development should be transformed in people's minds into the need for conscious limitation of needs. The development and adoption of such a value system will ensure the reasonable needs and sustainable development of mankind.

The use of information balance concepts allows for a new interpretation of the causes of economic crises and the form of their manifestation in different countries. The desire for more and more consumption determines the desire for constant economic growth. Planning for continuous growth is like planning for continuous inhalation or exhalation. It is possible to plan, but it is impossible to continuously inhale or exhale. The man will faint. The economic crisis is a natural reaction of the economy as a system to the wrong actions of people, which lead to an information imbalance. According to J. Schumpeter, the crisis is a "cold shower" for the economy, which makes it shake up. This "shaking" occurs during strictly defined periods. During these periods, there is an overlap of activity due to the sign of the period and activity due to the type of information imbalance. As a result, resonant phenomena occur. The periods during which such phenomena occur are called individual periods of special sensitivity (IPSS). There are four such IPSS in each complete conversion period (fig.8). At the same time, with an imbalance of type b), the strongest appearance will be in the first qualitative period of the full transformation period, with an imbalance of c) – in the last qualitative period. The greater the deviation of the general condition from its individual norm, the greater the manifestations of imbalance.

During periods of special sensitivity, the system must "draw conclusions", that is, compare the parameters of real development with reference ones.

For "planet-sized" objects, such as the global economy, crises must coincide with the IPSS of planet. If we assume that the planet Earth exists in the orderly environment of the Solar System, then the duration of the Earth year of 365.26 days should be synchronized with a certain reference year of the Solar system. They must be coherent.

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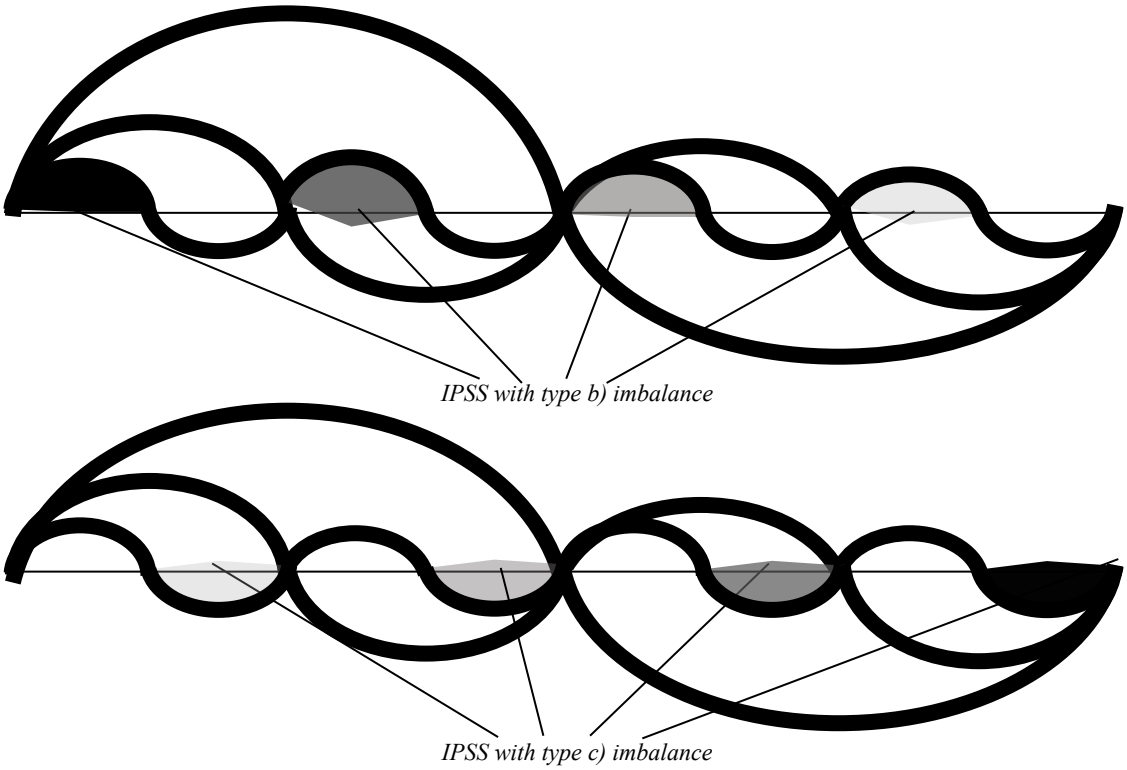

Figure.8. The occurrence of IPSS in case of imbalance

For "planet-sized" objects, such as the global economy, crises must coincide with the IPSS of planet. If we assume that the planet Earth exists in the orderly environment of the Solar System, then the duration of the Earth year of 365.26 days should be synchronized with a certain reference year of the Solar system. They must be coherent. The absence of such synchronization would lead to a complete loss of the meaning of the coevolutionary development of the planet and the surrounding world. Hence, the conclusion is that at some point in time, the end of the real Earth period and the reference period of the solar system must coincide in character. Calculations have shown that the reference year of the Solar System coincides quantitatively in 3.5 Earth years. Qualitatively, these periods coincide at the end of 7 earth years. In other words, it takes 7 Earth years to complete the synchronization cycle of the real and true (reference) year. Therefore, being in a certain "time layer", we will observe phenomena that can be attributed to:

- to the cycles of the true (reference) periods, the duration of which in Earth years is equal, respectively: 1.4; 2.8; 5.6; 11.2; 22.4; 44.8; 89.6; 179.2, 358.4, 716.8 etc. of the year.
- to cycles of real periods, the duration of which is respectively: 2; 4; 8; 16; 32; 64; 128; 256, 512, 1024 etc. years
- to the synchronization cycles of the real period with the true (reference) period, the duration of which is equal to, respectively: 3.5; 7; 14; 28; 56; 112; 224: 448 etc. of the year.

It is easy to verify that the indicated numerical values from one year to 64 years coincide with the experimentally discovered cycles of Kitchin, Zhuglyar, Kuznets, Kondratiev, etc.. Overlapping each other, coinciding and not coinciding with each other, the combination of these cycles has led to the polycyclic development of the economy and the "blurring" of its picture, especially relative to average cycles.

Extrapolation of these patterns to economic relations allowed us to hypothesize that economic crises are a manifestation of N.D. Kondratiev's law of elimination of dysfunctions on long waves lasting 28 years and the duration of IPSS should be 3.5 years. For verification, data were taken from the Soviet researcher L. A. Mendelssohn, described in the book "Theory and History of Economic Crises and Cycles", who studied

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world crises since 1825 (Mendelson, L.A., 1964). Studies have shown the high representativeness of this calculation method (Mokiy, M. 2000). Similar results were obtained by Robert Barro and Jose Ursua, who in their work "Macroeconomic crises since 1870" indicate a figure of 3.5 years [Robert J. Barro & Jose F. Ursua, 2008].

However, the crisis manifests itself in different ways in different countries. The principles of this can be the following:

- countries have their own individual spatial norm or individual spatial information feature (for example, Ireland and Indonesia);
- Countries are at different stages of their development (for example, Japan and Afghanistan);
- Countries have different types of imbalances;
- Each country has its own temporal patterns of development, which either enhance or mitigate the impact of the global crisis.

These factors determine the features of the course of global crises in different countries, from almost imperceptible to deep and severe. To illustrate, let's look at the history of two countries, the USA and the USSR, then Russia. There is a point of view that the socialist planned economy did not suffer from crisis phenomena. However, this statement is at least incorrect. Even a cursory analysis shows that the crisis phenomena in the global economy and the economic reforms in the USSR coincide in time. For example, the crisis and the Great Depression in 1929-1933 in the USA coincides with the crisis in the economy of the USSR. The difference lies in the nature of the manifestation of this crisis. In the USA, this crisis was a crisis of overproduction, and in the USSR at the same time there was famine, the signs of which were already noted in 1928, when bread cards were introduced in some cities of the USSR. Such coincidences in time are in to other crises.

Based on theoretical generalizations, the nature of each crisis can be determined by the sign of longer development cycles, the duration of which is respectively 56; 112; 224: 448 years. However, the confirmation of these hypotheses requires additional research.

Extrapolation of the spherical spatial model to the surface of the planet allows us to put forward the following hypotheses (Fig. 9). Being a form of existence of potency, space should have a reference and real zones, respectively, of quantitative and qualitative information. The reference state of the object is presented in spatial fragments I and II, information of quantitative and qualitative type. The reflection of the real state of quantitative and qualitative processes can be observed in fragments III and IV. Confirmation of these patterns on biological objects is given in the work mentioned above. The spatial model radically changes the idea of the physical boundaries of the object that we consider as a system. The projection of spherical spatial fragments onto the surface of a planet has strictly defined physical dimensions and has its own status as a reference or real spherical fragment of space. This suggests that within the framework of the global economy, the economy of each country has a special spatial feature, which is determined by its location in reference or real, quantitative or qualitative fragments of the space of a particular biogeocenosis. This feature determines the nature of the national economy, the specifics of its development, and most importantly, the effectiveness of individual economic processes. In this case, we can talk about the endemicity of all processes occurring in a given territory, including economic processes.

In any case, the trends in the development of the global economy indicate that as the degree of maturity of national economies increases, international specialization increases. This is evident even on a cursory examination, at the level of consumer goods. For example, despite the fact that the entire range of goods is mainly produced in developed countries, Japanese or Korean household audio and video equipment, German household appliances and cars, Italian clothing or shoes, etc. are considered the best in quality at the end of the twentieth century. In other words, if the spatial feature of a territory (quantitative, qualitative, reference, real) coincides with the information feature of a business, then this business has the opportunity to become more efficient. In other words, for example, the high concentration and efficiency of the banking and watchmaking business in Switzerland can be explained not only by historically established traditions, but also by the fact that the information feature of the territory coincides with the feature of this type of activity. Of course, the territory of countries may include the projection of more than just one spherical fragment, and then this will inevitably affect the nature of its development. A fact well-known to scientists

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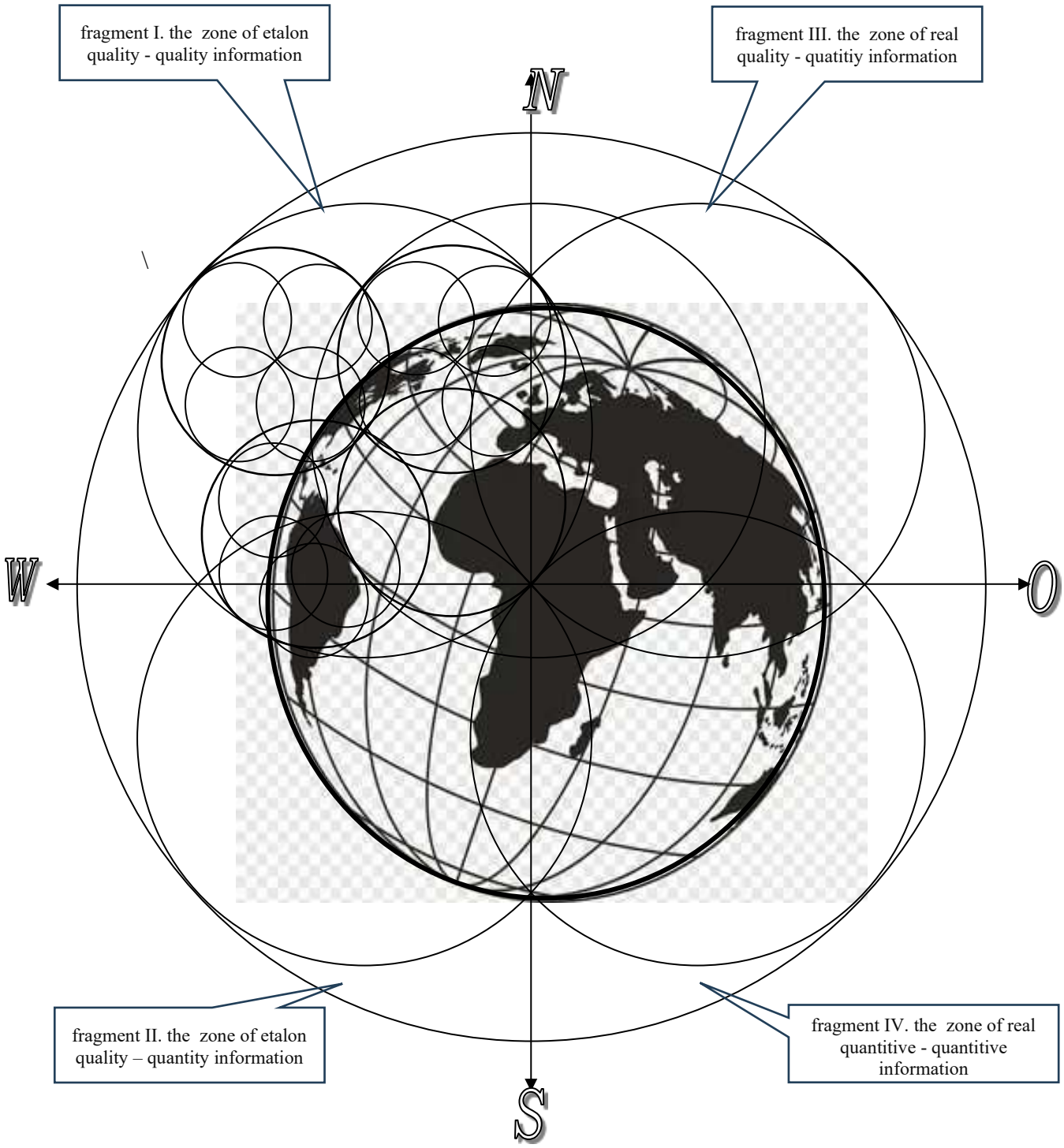

Fig. 9. An example of extrapolation of a spatial model in the study of the global economy

in the field of natural sciences can serve as a confirmation of this dependence. There are cases when it is difficult to accurately reproduce the results of the same experiment in identical research laboratories located in different countries, or even in the same country but in different regions.

There is every reason to believe that the reasons for the failures and problems of programs implemented by the World Bank for Reconstruction and Development and the International Monetary Fund in different

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countries is that the successful experience of some countries has spread to other countries without taking into account the spatial information characteristic of the country's territory. Of course, such dependence in economic relations needs additional research.

4| Conclusions

There are many objects in the world that people have already called systems: the solar system, the nervous system, the political system, the Windows operating system, etc. However, there are still many objects that are not named as systems. The puzzle is to find the answer to the question - How to study any object as a system?

The proposed concept of a system-transdisciplinary approach makes it possible to do this.

From the point of view of such a paradigm (basic idea), "system in general" will be understood as an object in which the process of transformation of matter and energy, the emergence and existence of elements and connections between them occurs according to a single order and through which the integrity of this object is ensured. The postulation of the thesis that the World is an ordered environment and that this unified order manifests itself in any fragment of the World in which the transformation of matter and energy takes place.

In our opinion, such a paradigm and definition provides General Systems Worldview and the necessary transdisciplinarity of an ontology of systems that can be used to describe systems and classify them in an ambiguous way. In order to correctly identify an object in time and space, it is necessary to assign it to one of the specified types - environmental, object, process, project. The models of information, temporal, and spatial units of order form the basis of the disciplinary matrix. Their application allows us to describe models that characterize the kinds of processes that support the evolution, expression or degradation of systemic behaviors and models of the mechanisms that underpin systemic evolution.

In particular, in my opinion, the classification of systems proposed by Kleiner can help in defining the boundaries of systems, models of information units of order can be used to create the necessary and sufficient differentiation of the levels of system research. Models of the temporal unit of order can be used to study cycles and process concept, and models of the spatial unit of order in concept of energy landscapes.

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