

Principles of self-organization and sustainable development of the world economy are the basis of global security

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Abstract

The phenomenon of states changes of the world economy during the last 200 years shows that there is a certain 70-year regularity in its development, which is expressed in increased structural complexity of the global economic system every 70 years.

The development happens after certain periods of bifurcation (up to 50 years) accompanied by the lower rates of economic development, and periods of adaptation (up to 20 years) with the higher rates.

The theoretical reasoning of this process shows that complication in the structure of the global socium is the external demonstration of the self-organization process in a large complex system we call the “world economy”. This process of development is based on two fundamental laws of nature: the principle of minimum dissipation of energy (or resources), and the law of conservation of accumulated energy (economic efficiency); and is realized via two types of development mechanisms – bifurcation and adaptation.

Formation of the world-security system should rest on applying the natural laws of development, and lead towards the creation of a complex, two-level (regional and global) structure with the institution of geopolitical pluralism, based on implementing the “principle of minimum dissipation”. This will contribute to the development of the global system on the conflict-free base.

Introduction. The objective of the work is to reveal and define phenomena, which are characteristic for the behavior of complex systems in the process of their development on the basis of factual material of the world economy development during the period of 1825-2000. Some elements of the work were presented at scientific forums taking place in the USA, Spain, Italy, and Russia. Theoretical issues are explained in monograph “Self-Organization of the World Economy. Euro-Asian Context”.

Social system – “the world economy” – is considered as a complex system consisting of two global subsystems: economic and political. Common agents for both subsystems are national economies, which interact in economic and political spheres and form connections and structure of social system of the world economy.

Here we could use the term “the world system” (or global system), which could include both economic and political subsystems. But we believe that the term “social system – world economy” is more suitable because we assume that political system being an object of non-economic scientific disciplines should be included into economic scientific domain. Such approach allows us to view political system as an object of economy through the understanding that a certain type of political system can influence economic result of the functioning of the world socium. Thus, hereinafter the term “world economy” will mean complex, combined social system. Economic system of the world can be regarded as combinations of the subjects of the world economy – national economies and economic relations between them. These relations arise in the process of exchanging international resources on the basis of international division of labour. The economic system “the world economy” can be represented as a system of international economic relations: geographical and production structure of international trade and services movements; geographical and social structure of international migration of labour resources; international capital movements. International economic relations function on the grounds of already formed system of international monetary relations. Political system of the world economy is the combination of direct and indirect diplomatic relations among countries that participate in international labour division. (The indirect relations are represented as taking joint decisions in supranational institutions). This division provides legal aspect in functioning international economic relations.

Functioning of a social system “the world economy” means implementation of economic and political relations in the process of international exchange of resources basing on international labour division. This process is aimed at allocating resources more effectively for production in the circumstances of their scarcity. One more purpose is to distribute manufactured products in the circumstances of unlimited growth of consumption. The main functional purpose of a social system “the world economy” is to implement self-regulation among agents of an economic system via political system (since national economies are ordinary agents). This process leads to the state of maximum dynamic equilibrium in an economic system “the world economy and consequently, to economic growth of the world economy.

It is a well-known fact that at the present time the main problems of the world economy are as follows: the threat of ecological disaster, two thirds of the population live in poverty, mass famine, illiteracy and many others. At the same time the population is increasing and the global resources are decreasing. Therefore, to solve these urgent problems we should have a mechanism which will effectively help us to reallocate the limited resources in the context of growing the world economy.

Development of a social system means a process of increasing its stability under the influence of environment (maintaining stability within the given limits – homeostasis) by accumulating structural information which changes the quantity of organization (efficiency) of the system and makes its structure more complicated. Increase in stability is expressed in accumulating economic efficiency and forming more complicated structure of a society.

Development of the world economy means a co-evolution of development of economic and political subsystems resulted in further gradual complication towards environment effect, pressure of population growth and limited resources.

Development means a change of equilibrium states with different macroeconomic characteristics. Each state is expressed in structural and quantitative characteristics. For the world economy the international monetary system (IMS) will be considered as a structural characteristic. The growth rate of the gross national product of countries participating in international economic relations will be regarded as a quantitative characteristic.

We consider that our task is to form the verbal model of development and self-organization of the world economy as a social system. Having basic regulations of the theory on social development [1], we should define and formulate system regularities. The world economy develops on the basis of these regularities and, correspondingly, a new structure and organization of the world economy will be formed according to them. There follows an assumption that basing on these regularities we can formulate a forecasting version as to development of the world economy in the nearest future.

1. Idea and Description of the Model of the World Economy Development.

In order to explain the process of self-organization of a social system “the world economy” more properly and to demonstrate correlation between these processes as well as interaction between economic, political subsystems and evolutionary development of a social system we decided to use a theoretical space-time, three-dimensional model of self-organization. As a basis we used R.F. Abdeev’s model by introducing structural and quantitative characteristics – criteria. According to them different states of the system “the world economy” are defined in the process of its development. The idea of the model consists in the simple assumption: “the phenomena of development can generally be viewed as the struggle between two opposite tendencies – organization and disorganization. At the same time the process of development that begins with the maximum disorganization can be described as a process of gathering structural information. The information is estimated as the difference between true and maximum value of entropy. Consequently, phenomena of development should be examined in coordinates which are connected with such category as entropy (information) and with the opportunity to measure the level of organization or disorganization of a system at all stages of its development. Therefore, the theoretical model obtains its (polar-potential) system of coordinates and the hypothetical three-dimensional space where disorganization is decreasing from periphery towards the center (to the axis of the model) as information becomes available. It means increase in the level of organization of the given object as this object is developing...”. [2] The model of self-organization of “the world economy” system is represented in the form of vertical convergent spiral around the axis. The axis reflects economic efficiency as quantitative expression of its development. The spiral itself is a trajectory that shows development of the world economy within a certain period of time. Coils of development demonstrate recurring cycles of development but at a qualitatively high organized level. The projection of coils on a plane along with the radius of moving away from the axis of efficiency shows a quantity of organization in the world economy system for every state under study. Gradual decrease in radius from coil to coil illustrates the process of diminishing the quantity of disorganization (entropy) and increasing the quantity of organization of an economic system. This process reveals the essence and dynamics of the development.

2. Structural and Quantitative Characteristics as to the States of the World Economy System.

Development of the world economy as a large complex system represents the change of its states. Each state has structural and quantitative characteristics. Thus, we should determine the states of a social system “the world economy” during development so that we could better describe and model the process of its development. We also need to define structural and quantitative characteristics for every particular state. Taking into account the fact outlined before, we can state that many scientists that conduct researches into development of the world economy consider relations among countries of Western Europe, the USA, Canada and Japan as major relations in the sphere of development of international economic relations between 1875 and 2000.

Trade, migration of population and capital flow among the countries of Western Europe, the USA, Canada and Japan make up international economic relations for the period which is under study. International monetary system is a base for all abovementioned elements of international economic relations. This system enables all these relations to be implemented. **Therefore, we regard the structure of the international monetary system as the structural characteristic of organization of both the international economic relations and the world economy system.** It is a well-known fact that international monetary system has the following structural characteristics: type of international money (gold, USD, SDRs); type of world reserves (gold, USD, SDRs); type of currency exchange (the system of exchange rates); availability or absence of supranational institutions that regulate international monetary relations. The basic changes of at least one of these characteristics lead to changes in the system structure, in its transformation as well as to changes in the way the world economy system is organized. That is how the system state is changing during its development. According to the way these characteristics are combined the international monetary system is classified into three types: the gold standard system; the Bretton Woods system, the Jamaican currency system. Basing on these types we can determine three states of the world economy system.

The period when one state of the world economy system exists throughout its development is the period during which the main structural elements of international monetary system are being formed and maintained. One state corresponds to a single cycle of development. One cycle of development of the world economy system includes two different periods which are determined by the type of development mechanism and by the quantitative characteristic for making a description of a model: the period that is characterized by bifurcation mechanism of development; the period that is characterized by adaptation mechanism of development. Accordingly, every type of international monetary system during its development and functioning goes through two periods. The system is being formed at the stage of bifurcation mechanism whereas at the stage of adaptation mechanism the system is functioning.

Different rates of the world economy growth are connected with these periods: there is a decrease in the rates of the world economy growth during the period when the bifurcation mechanism of development actions; there is a spasmodic increase in the rates of the world economy growth during the period when the adaptation mechanism of development actions. **Synergetic effect is implemented.**

We also take into consideration this supposition in order to simplify calculation of quantitative parameters introduced into the model. **Thus, we calculate the quantitative characteristic of the states of the world economy system for the period from 1875 to 2000 as an average value of gross national product growth for abovementioned countries for every period under research (in %). For the period up to 1875 we determine the value of the growth rate of the world economy as 1, 5%.**

3. Development and Self-Organization of the World Economy System.

According to already defined criteria, the historical period, that is being studied, concerns development of the world economy system for over the period from 1825 till 2035. Basing both on the periods when indicated systems of international monetary relations are functioning and on the quantitative characteristics we define the time limits when three states of the world economy system exist in the process of its development. In other words we determine the time periods as to three cycles and six periods of development of the world economy system. These time periods are represented as follows:

The first state. The first cycle of the world economy system development is the period when the gold standard system functions; 1825 – 1875 – 1895.

The first period in the first cycle of the world economy system development: the period from 1825 till 1875; transformational period; the period of forming the gold standard system; the period when the bifurcation mechanism of development actions; rate of the world economy growth corresponds to 1.5%

The second period in the first cycle of the world economy system development: the period from 1875 to 1895; the period of active functioning of the gold standard system; the period when the adaptation mechanism of development actions; rate of the world economy growth corresponds to 2.6%.

In the sphere of policy: countries participating in international economic relations came to mutual agreement about substituting their currencies for gold; this agreement was reached on bilateral basis; the principle of implementation of social and joint agreement in international economic relations was carried out in the sphere of monetary relations. Therefore, the world political system was formed on the basis of direct diplomatic relations and took shape of military alliances, coalitions, etc.

The second state. The second cycle of the world economy system development is the period when the Bretton Woods system functions – 1895–1945–1965.

The third period in the second cycle of the world economy system development: the period from 1895 till 1945; transformational period of forming the Bretton Woods system; the period when the bifurcation mechanism of development actions; rate of the world economy growth corresponds to 1.8%.

The main result of the third period in the second cycle of the world economy development was the forming of supranational institution. The institution included the system for regulating international financial and trade relations. The institution also performed the principle of social, joint agreement between countries participating in the process of establishing and developing international economic relations. Such relations suggested mutual regulating of exchange rates,

crediting balance of payments of participating countries, mutual reducing tariff restrictions in international trade, etc.

The fourth period in the second cycle of the world economy system development: 1945 – 1965. In the sphere of economy: during this period; rate of the world economy growth development was high and with great advance it increased up to 5-6 % comparing to the similar indices of the previous period. The mechanism of development was of adaptation type. By the end of 60-s - the beginning of 70-s (1972 – 1973) the system of international economic relations reached its maximum efficiency for the current state and began its transformation into the next stage. The change of the principles of monetary relations approved at Jamaican conference became a logical conclusion as to the fourth period of the world economy system development. The formations of conditions for international monetary relations were not finished yet. Jamaican conference just initiated these changes.

In the sphere of policy: regional and international supranational institutions began their formation and development. However, they received further development in the next fifth period of the third cycle of development. On the whole, a bipolar political system and an ideological opposition supported the global political and economic stability. The world political system obtained an instrument of solving conflict situation by mutual agreement – the United Nations. The UN includes not only institutions that regulate the world economy but also the Security Council in order to regulate war and conflict situations.

The third state. The third cycle of the world economy system development is the period of Jamaican system – 1965 – 2015 – 2035.

The fifth period in the third cycle of the world economy system development is the period of transforming the system of international monetary relations and forming its new structure; the period from 1965 till 2015; the action of the bifurcation mechanism of development; the rate of the world economy growth corresponds to 3.4%.

During this period two phenomena of the global development were formed. One of them was the phenomenon of regionalization: 23 international organizations of integrative character with regional location had already been created by the 90-s of the XX th century (EU, NAFTA, MERCOCUR, ASEAN etc.). They have more than 60 % of the world gross domestic product and the major part of international trade - about 8 trillion dollars. Furthermore, 85 regional trade and economic agreements were concluded in 90-s. The second phenomenon is globalization. There exist thousands of transnational corporations in the world. 50 % of the world production and 63 % of the world trade are concentrated in these corporations. This flow of capital and resource is uncontrolled by the state. Moreover, these resources are allocated in an efficient way. **A national state as a form of organizing people activity is connected with resources allocation and distribution of goods within the limited territory and the limited number of people. Hence, we can state that the national state became less effective compared to a regional version of forming a number of countries and with global resources movement.**

The political situation suggests two conclusions. The first one lies in forming new political structure on multipolar and two-level basis: regional and global. (It is connected with appearance of new leading countries that have economic and military potential: the EU, China, India and Japan). The second conclusion corresponds to the fact that the structure of the political system should stipulate the implementation of principles of joint agreement between developed, developing and undeveloped countries

The sixth period in the third cycle of the world economy system development is the period which can be forecast, the period of active functioning of a new system of the international monetary relations; the period lasts from 2015 till 2035 (predicted); the action of the adaptation mechanism of development; the rate of the world economy growth corresponds to 8-9% (predicted).

According to already defined structural and quantitative characteristics as to organizing the world economy system we point out its three states. Every state corresponds to one of three types of the system of international monetary relations and three cycles of development. Six periods of the world economy system development correspond to these cycles. The first five periods are real and the sixth one is theoretical or predicted.

Basing on the system states outlined above we form a model of self-organization and development of the world economy. (Figure 1)

Conclusions:

1. Each subsequent (out of distinguished) state of the world economy has more complex organization of political and international monetary system. And this fact demonstrates the tendency towards complication of the structure of the world community.
2. Each subsequent state is more effective from economic point of view and has the higher rate of economic growth. This allows the world economy to develop steadily in conditions of swollen population on the planet along with limited resources. A tendency towards increase in economic efficiency of the whole system is observed during a long period of time.
3. The process of forming subsequent structures of both political and economic organization of the world economy took place in conditions of non-equilibrium environment. It was expressed by numerous military and civil conflicts as well as economic crises.
4. All facts outlined above lead to the following conclusions: the world economy system has the feature of the complex systems, i.e. self-organization. The Oksanger-Prigogin's principle of minimum energy dissipation is implemented in the process of development. Each subsequent organization of the world economy produces less entropy than the previous one. The category of energy in physical system corresponds to the category of resources in social system. Thus, principle of minimum dissipation of limited resources functions in social systems. The model reflects the implementation of this phenomenon in the process of development and self-organization of the world economy. Direction of the world economy system development is defined by the conservation law of accumulated efficiency and it means that the model has the predicted potential for making prognosis of future organization of the world economy.
5. The global socium security assumes its self-preservation under the impact of various destructive processes: increasing risk of ecological disaster, mass dissemination of the epidemic diseases that cannot be cured yet, growing death-rate due to the ubiquitous poverty and famine, increasing deficit of finite energy

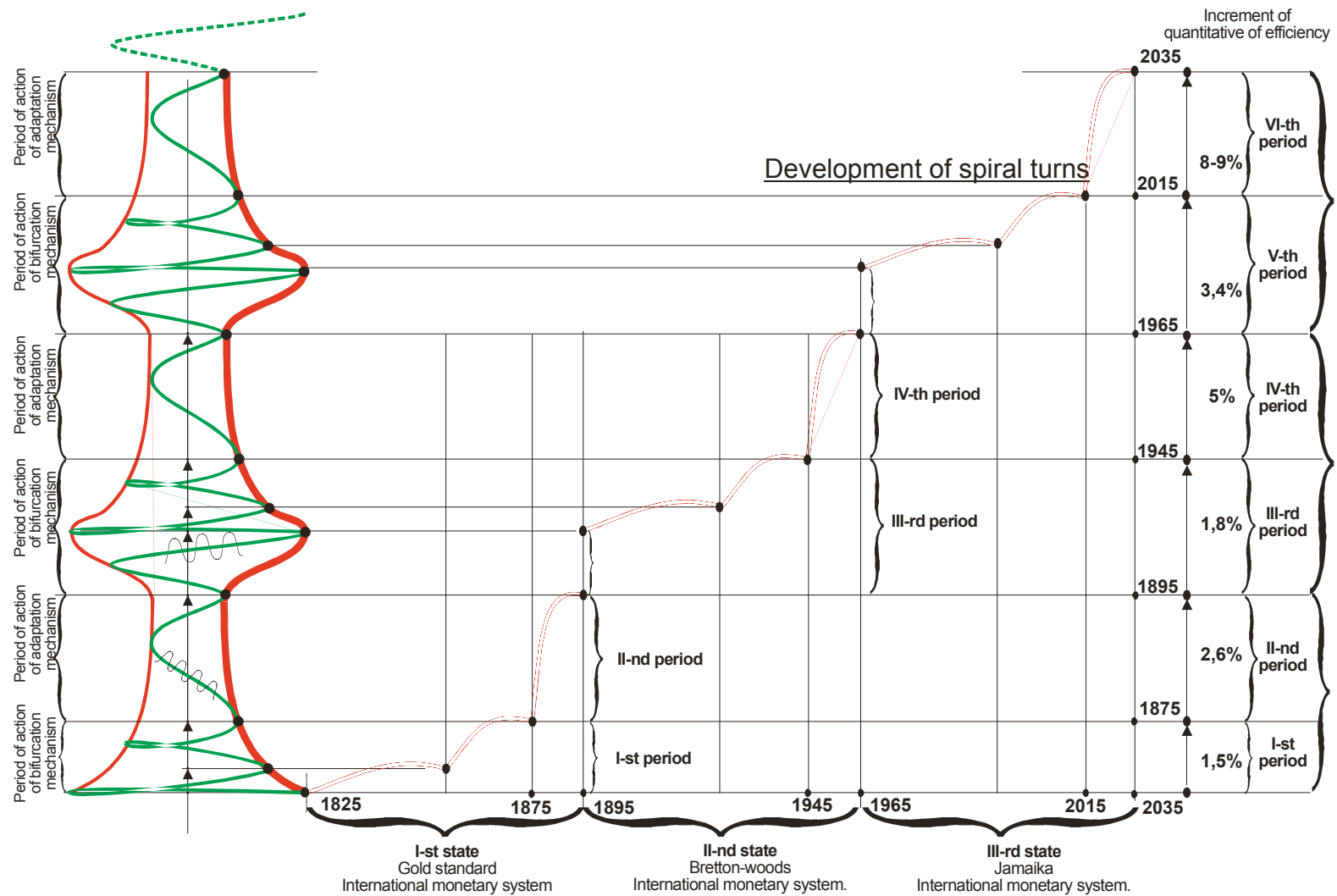


Fig.1 The model of development and self-organization of the World Economy for interval of time 1825-2035 years

resources because of their non-renewable (the world oil and gas reserves are available for 30-35 years of the civilization existence). According to experts, the global warming (greenhouse effect) could happen within the nearest 50 years. In addition, there still exists a threat of nuclear catastrophe and war conflicts.

The possible ways of solving the above problems are complicated by multi-religious and multi-cultural environment, peculiarities of mentality of the population in the whole world, differences in natural resources availability in various regions of our planet.

Thus, guaranteeing the worldwide security means the necessity to create institutions of the global socium which would support its stability in above circumstances. The worldwide security is impossible without joint interests of different geographical, cultural, ethnic and other groups of population being implemented.

The population joint interests could be pursued via establishing the institutions of geopolitical pluralism on the basis of the principle of public harmony at regional and global levels. The institution of the public harmony is a mechanism for optimal solving the existing problems. This institution rests on the functioning of natural laws: the principle of minimum energy (recourses) dissipation and the law of conservation which forms the trajectory of the civilization development. As it could be seen from the aforementioned facts, such laws underlie a large and complex system of the world economy. The worldwide security implies establishment of the institutions which can embody and support these laws of Nature. Such institutions will provide stable development of the global socium without any conflict for the long-term period of time.

For the time being we could speak about reforming the Organization of the United Nations into a system that could pursue both joint regional and national interests of developed, developing, backward countries, countries with transitional economy and others in the context of solving all-planetary problems. This assumes the necessity of creating the institutions able to conduct the worldwide controlling over the scarce resources (energy resources) being in terms of crisis and over the process of preserving the ecosystem. At the same time there has to be a clear understanding of the fact that the planet is one and for everybody – both for the USA, Iraq and for a primitive tribe somewhere in Africa. Within the system, effective mechanisms should be created to restrict the activity of those countries or group of countries whose military potential incite them towards the actions that do not take into consideration interests of some nations or the whole planet. The system should rest on the adoption of All-Planetary Constitution – the Fundamental Law, which all existing forms of the people organization shall observe. Within the Fundamental Laws, the wide spectrum of problems as to preservation of the global socium, starting from local conflicts and ending with preservation of the ecosystem and life on the Planet as a whole can be and must be solved.

References

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