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Global Forecast “Future of Civilizations” for 2050

Part 9 The Future of Civilizations and Strategy of Civilizational Partnership (abridged version)

Under the editorship of Yu. V. Yakovets
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Moscow, SKII
2009

The Future of Civilizations and Strategy of Civilizational Partnership. Part 9 of the Global Forecast “Future of Civilizations” for 2050. Under the editorship of Yu.V. Yakovets, B.N. Kuzyk, N.S. Bekturganov. M: SKII,2009, 600 p.

The closing, overall part of the global forecast “Future of Civilizations” for 2050 worked out by the Russian and Kazakhstan scientists powered by the RF Ministry of Foreign Affairs and President of the Republic of Kazakhstan summarizes the results of researches performed in 2007-2009 and validates recommendations for a long-term partnership strategy of civilizations.

It addresses the contents and specifics of the methodology for integral global macro forecasting elaborated by the Russian scientists, explores the essence of a cluster of global crises of the beginning of the 21st century and the outlooks for recovery based on the civilizational revolution of the 21st century. It addresses the prospects for overcoming the global energy-ecological crisis on the path of the establishment of the energy-ecological mode of production and consumption, problems of socio-demographic dynamics of civilizations and a growing migration, priorities of the global technological revolution and the establishment of the sixth technological order, formation of the integral economic system and transformation of globalization, prospects of the formation of the multi-polar world order based on partnership of civilizations and transition to the integral socio-cultural system. The outputs of the overall macro economic estimations based on macro models, geo-civilizational and strategic matrix are given.

Much focus is laid on the validation of recommendations for the formation, based on the forecast, of a long-term strategy of partnership of civilizations, allowing the implementation of the innovative-breakthrough of scenario of dynamics of civilizations.

The ninth part of the Global Forecast is envisaged for discussion at the 3rd Civilizational Forum in Almaty on 18 September 2009 and for presentation at the roundtable session within the 64th session of the UN General Assembly in October 2009.

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Nursultan Nazyrbaev

THE TIME OF GLOBAL STRATEGIC DECISIONS *

Waves of global crises in various areas hit the planet from the turn of the current millennium make thinking more and more deeply on the common fate of humanity. The mutual connection and dependence of development of the world and local civilizations, the need for uniting the efforts of countries and nations in seeking the ways of joint survival, prosperity and well-being manifest itself more and more obviously.

Among the most urgent, burning issues for all the humanity, the following is put forward:

- The first – the energy-ecological crisis which has put in doubt the opportunity to establish a balanced energy security and preservation of the environment;
- The second – the global food crisis arisen despite agricultural successes in the developed countries. Where the hundreds of millions of people, especially in Africa, starve, and thousands die of hunger;
- The third – the current system of economic relations has led to a drastic polarization of the level of income, increase in the gap between a small number of the rich “golden billion” countries and the majority of poor countries with no necessary resources for modernization of economy and ensuring a decent life level of their population.

The range of crisis occurrences is far from being limited to such problems. The lessons of the financial crises broken out in 2007 indicate that the established monetary-financial system targeted at a maximum deriving of profits and speculative activities at the stock exchange markets lead to virtualization of capital and its breakaway from the real economy, the emergence of multiple “soap bubbles” which burst and bring the disasters to millions of people.

It should also be noted that the present-day development level of science, education and culture does not meet the realities of the new historical period, targets of the innovative development and requires a drastic renovation of the socio-cultural sphere.

Then it becomes clear that all the system of relations of the global society finds itself in the face of major upheavals and new challenges the appropriate system-based answer should be given to.

I believe that this is the prime target of the UN as the only overall global institute able to ensure not only dialogue and partnership of civilizations but overcoming the crises of the new century.

Addressing the Session of the UN General Assembly on 25 September 2007 I proposed the formulation of the global energy-ecological strategy to be discussed at the World Summit on Sustainable Development which might be held in 2012 in the center of the Euro-Asian continent, in the capital of the Republic of Kazakhstan – Astana which has all necessary conditions for it.

It appears now that one should go further in the context of major changes occurred since that period and lessons of global crises. It is necessary to speak not only about the energy-ecological but also common global strategy. It should give a system-based response to the challenges of the new century and together with energy-ecological cover the problematics of the dimension common to all mankind, socio-demographic, innovative-technological, economic, geopolitical, socio-cultural, etc.

Put this another way, a system-based approach to transformation and drastic renovation of all life sides of the world community is necessary. Where it is possible to do it only on the path of uniting the efforts and implementation of the partnership principles of civilizations in the wide range of transformations.

* Nursultan Nazyrbaev, “The Strategy for a Drastic Renovation of the Global Community and Partnership of Civilizations”, p. 5-10

I endorse the initiative of the Russian and Kazakhstan scientists who have assumed a complex and responsible mission to make a long-term forecast of the future of civilization to the mid-21st century.

They propose a methodology for the integral macroforecasting as a basis for the global forecast. It unites the study of cycles, crises and innovations of Nikolai Kondratieff and Joseph Schumpeter, the theory of civilizations and socio-cultural dynamics of Pitirim Sorokin, Arnold Toynbee, Fernand Braudel, the theory of noosphere of Vladimir Vernadsky and Nikita Moisseev, the balance method of economic macroforecasting of Nobelist in Economics Wassily Leontieff, and also other researches.

I believe that the cornerstone foundations of the new paradigm of the future, world global and local civilizations should be grasped and developed with respect to the realities of the period already in.

A long-term forecast made based on the researches of the scientists of Russia and Kazakhstan may be delivered to the UN and taken as a basis for the formulation of a long-term global strategy to be implemented on the principles of dialogue and partnership of civilizations.

The aim of this book is in providing the first outlines and proposals for the formulation of a system-based strategy for the drastic renovation of the global community and their discussion at the World Summit.

If our initiative is received positively then we could have a scientifically validated reliable action plan for all the global community in a relatively short term. And within two-three decades to implement for the first time in the history of the world community its well-aimed transformation targeted at the assimilation of the post-industrial civilization embodying the aspirations and interests of the most of the population on the earth.

Foreword. The World of Civilizations under Transformation¹.

Modern humanity is not only more than two hundred sovereign states, large and small, each of which expresses and protects its national interests. This is also concurrently the world of local civilizations of the fifth generation – mega societies, the totality of ethnoses and nations united by the common system of civilizational values and historical fate; relations between civilizations also determine the choice of the future of all humanity. This is also the global civilization going through a transitional period in its historical dynamics.

In the first half of the 21st century the world of civilizations faced new challenges of the next whorl of historical progress, hit with a wave of global crises – financial-economic, energy-ecological, food, technological, socio-cultural – is on the crossroads. The international organizations – G-20, G-8, the UN undertakes urgent steps for recovering from the crises. But these steps may occur low efficient with no far vision or understanding the essence and the outcomes of that historical rift in the world history.

A far vision is proposed by scientists who have mastered a new scientific paradigm. This is the historical mission of science. The scientists of Russia and Kazakhstan with the involvement of scientists from other countries have ventured to implement this mission. At the roundtable session at the permanent mission of the Russian Federation to the UN in October 2006 the Russian scientists proposed to revive within the UN the efforts for a long-term global forecasting which was headed in the 70s by Nobelist in economics Wassily Leontieff. This initiative was endorsed by RF Ministry of Foreign Affairs S.V. Lavrov. Later it was endorsed by President of Kazakhstan N.A. Nazarbaev, and the Kazakhstan scientists joint the research. The program for making the Global Forecast “Future of Civilizations” for 2050 was elaborated; the international scientific force was formed. Step by step eight parts of the forecast were made, published and discussed.

The distinctive features of this global project is **first** that it rests on the unique scientific base, achievements of the Russian civilizational school leading in the world and **methodology of integral macro forecasting**. This methodology synthesizes and develops system-based the theory of foresight and the doctrine of cycles, crises and innovations of Nikolai Kondratieff and Joseph Schumpeter, the school of the Russian cyclism; a civilizational approach and the doctrine of socio-cultural dynamics of

¹ The author of the foreword – Professor, R.A.N.S. Academician Yu.V.Yakovets

Pitirim Sorokin, Arnold Toynbee and Fernand Braudel, modern Russian civilizational school; the theory of noosphere of Vladimir Vernadsky and Nikita Moisseev; a balance method of analysis and macro forecasting of Wassily Leontieff. This has allowed seeing in a new light both the tendencies established in dynamics of civilization, cyclical-genetic laws of their development, roots for overcoming modern global crises and outlooks for their surmounting but determining the main lines of the establishment of the post-industrial, integral civilization coming to replace the industrial world civilization prevailed within two centuries.

Second, not the great number of national states and their relations became the object of the foresight but tendencies and prospects for dynamics of twelve local civilizations of the fifth generation, their groups and the global civilization in general, and also a transformation of the industrial civilization.

Third, of many possible options and scenarios of the future development, only two are selected and researched into. The *inertia-based* scenario of continuing confrontation of civilizations giving rise to possible conflicts and clashes and making the path to the future more elemental, chaotic, painful and risky, including a threat of self-destruction of humanity as a result of the clash of civilizations. And the *innovative-breakthrough* scenario resting on a scientifically validated long-term strategy of partnership of civilizations ensuring the union of efforts in the surmounting of the cluster of global crises and well-directed moving to the humanistically noospheric post-industrial society. **Forth**, each part of the forecast and the global forecast in general are completed with the *recommendations* for a global strategy of partnership of civilizations ensuring the implementation of the innovative-breakthrough scenario.

In the context of such features of the global forecast the logic of the research was built, stages of its performance, at the preparatory stage in 2007 the concept and program for the forecast was formulated and discussed and the international constructive force was formed. At the second stage, in the second half of 2008 the first two parts of the forecast “Theory, Methodology and Experience of Global Civilizational Forecasting” and “Tendencies, Crisis Situations and Scenarios for Dynamics of Civilizations” were elaborated, published and discussed at the Civilizational Forum in Moscow. The methodological foundations of the research were thus laid and the foundations of its concept were determined.

At the third stage, in the second half of 2008 and the first half of 2009 the long-term forecasts by six components of the genotype of civilization (part 3-8 of the Global Forecast): “Energy-Ecological Future of Civilizations”, “Socio-Demographic Dynamics of Civilizations”, “Forecast of Innovative-Technological Dynamics of Civilizations”, “Forecast of Economic Dynamics of Civilizations and Transformation of Globalization”, “Geopolitical Dynamics and Interaction of Civilizations” and “Socio-Cultural Future of Civilizations” were elaborated, published and discussed at the 2nd Civilizational Forum, International Scientific Conference dedicated to the 120th birth anniversary of Pitirim Sorokin and at the 25th cross-disciplinary discussion.

At the closing, fourth stage of the research the summary, closing part of the global forecast “Future of Civilizations and Strategy of Civilizational Partnership” will be published, discussed at the 3rd Civilizational Forum in Almaty in September 2009, translated into English and presented at the roundtable session in New York in October 2009 within the 64th session of the UN General Assembly.

Thus, as a result of a strenuous work the unique pilot project – vision of the prospects for development and interaction of local civilizations and dynamics of the global civilization in general in the first half of the 21st century will be completed within three year and presented to the global community as well as recommendations with the validation of the strategy of partnership of civilizations for a worthy answer to the challenges of the new century and implementation of the innovative-breakthrough scenario.

We believe that this forecast coupled with recommendations may become a basis for the establishment of the high-level Commission (and a scientific force under it) by the UN under the initiative of Russia and Kazakhstan to formulate the draft long-term strategy for partnership of civilizations so that to discuss it then and adopt at the World Summit on sustainable development envisaged in 2012 in the center of Eurasia – Astana, the capital of Kazakhstan.

According to the conception the structure of the summary ninth part of the global forecast is determined.

The first two sections set forth the methodology of the forecast, global crises, critical situations and scenarios for dynamics of civilizations of the first half of the 21st century are researched into.

The next six sections address the development prospects for a long-term outlook of the six components of the genotype of civilization: energy-ecological, socio-demographic, innovative-technological, economic, geopolitical and socio-cultural.

Two closing sections give the outputs of the summary estimations using a macromodel and matrix and validate the recommendations for a long-term strategy of partnership among civilizations.

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5.4 Perspective on the 21st Century

☐The Fifth Kondratiev Upswing²

This short article is the summary of an extensive survey to predict the development of the modern society for the coming 50 years in the first half of the 21st century. The construction of the modern industrial society started at the Industrial Revolution which resulted in the first Kondratiev cycle. Since then, several clusters of innovations have induced Kondratiev cycles intermittently up to now. This prediction for the forthcoming cycle is carried out by extending the study on the past cycles especially focusing on the scientific and technological background.

1. Genealogy of the Construction of the Modern Industrial Society under Kondratiev Cycles

The ancient civilization developed in Greek and various philosophical backgrounds were built up. This brilliant age was, however, interrupted by the medieval period until Renaissance in the 15th century. The Renaissance endowed us a scientific background and induced scientific thoughts, e.g., by René Descartes and Francis Bacon, and Newtonian dynamics in the 17th century. Actual development towards the modern civilization society started by the settlement of natural sciences: physics, chemistry and biology in the 18-19th centuries. At the same time, the origin of the modern industrialization was built by the development of steam engines, iron smelting, and spinning machines: that is, the Industrial Revolution. This was the first cluster of technological innovations and formulated the first Kondratiev cycle which is located between 1789 and 1846. Since then, four Kondratiev cycles were built by innovation clusters and now we are on stream of the fifth upswing of Kondratiev cycles. The second Kondratiev cycle was derived by the development of iron production and development of railways. The

² Masaaki Hirooka Institute of Technoeconomics, Japan

third cycle was the actual takeoff towards modern industrialization formulated by steel making, oil production, automobiles, and electric power generation. The fourth cycle was attained by the cluster of electric appliances, aircrafts,

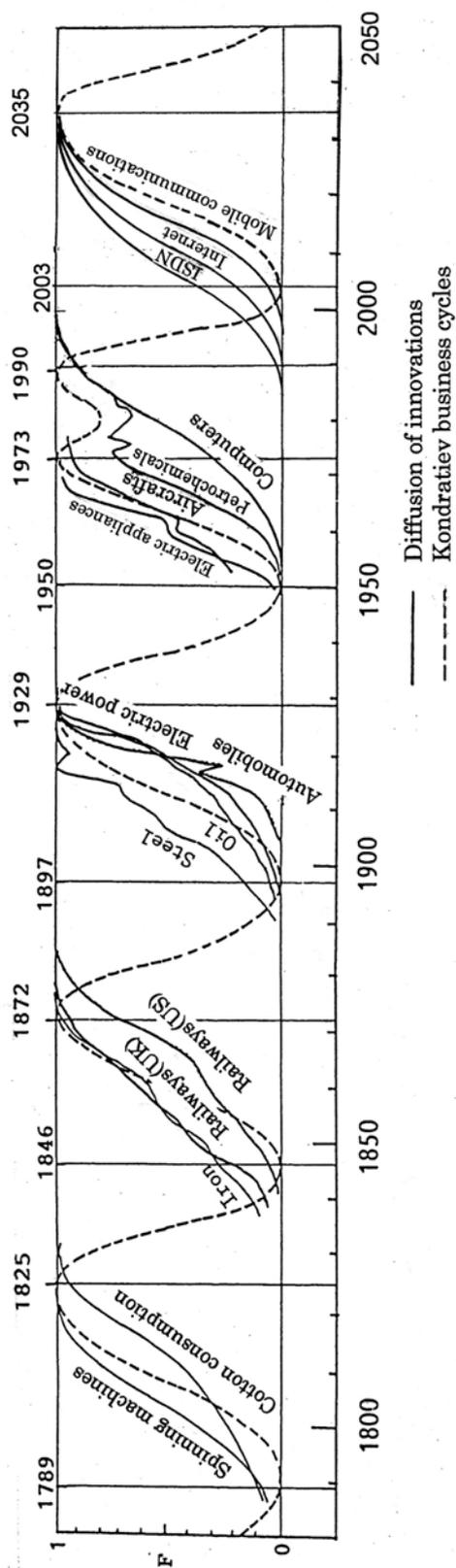


Figure 1 Kondratiev business cycles and diffusion of innovations

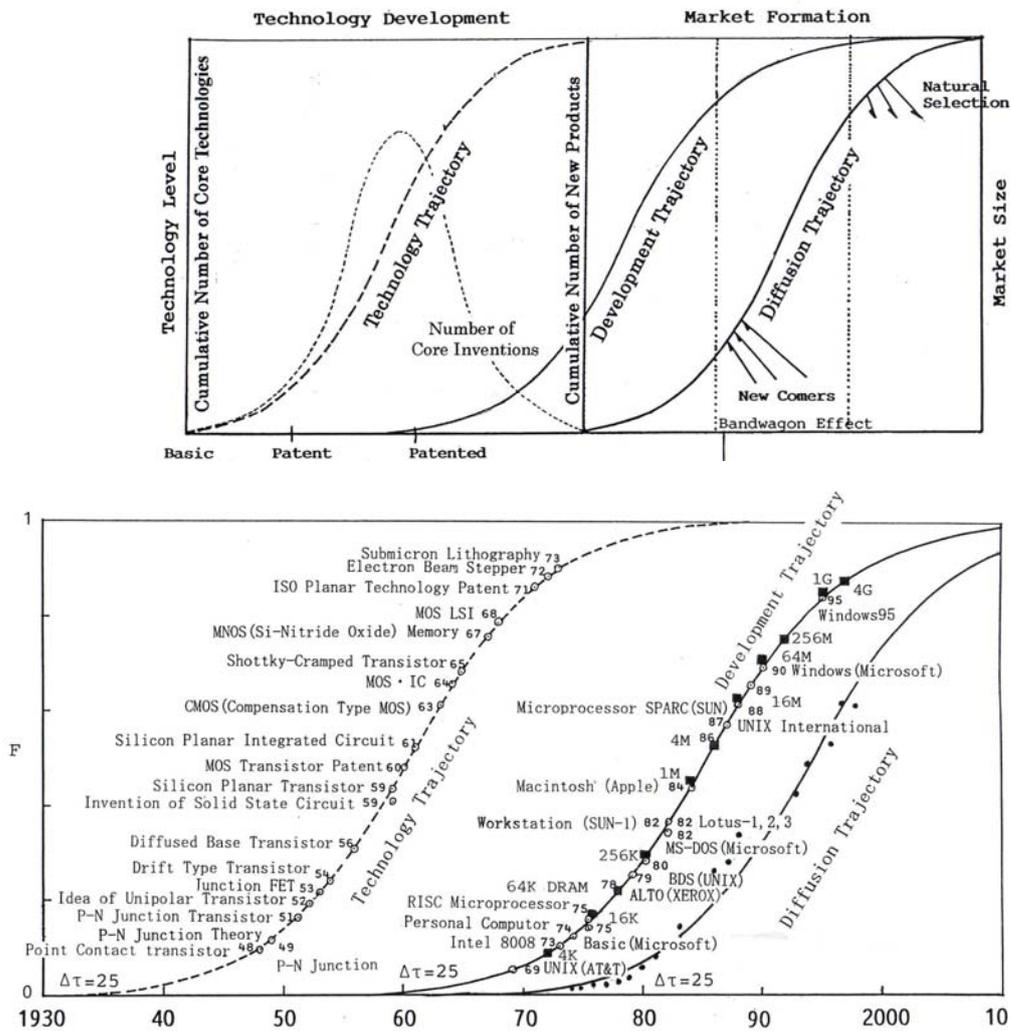
petrochemicals, and computers.

Now, we are on the way of the fifth cycle under the development of information technologies and other high technologies. That is, every Kondratiev cycle is built up by a cluster of innovations as shown in Figure 1.

2. Description of the Innovation Paradigm

The diffusion of innovation can be described by a logistic equation as shown by Griliches (1957). An innovation paradigm consists of three trajectories: technology, development and diffusion in this order (Hirooka, 1998). The technology trajectory appears first. The technologies developed formulate a technology trajectory and the matured technologies begin to produce new products which formulate a development trajectory. The market of new products develops a diffusion trajectory. Thus, an innovation paradigm can be described by a series of three trajectories as shown in Figure 2.

An example of innovation paradigm is exhibited in the case of electronics paradigm. The technology trajectory started from the radical invention of transistor by Shockley et al. and integrated circuits pushed up the development. Through the inventions of MOS IC and submicron lithography technology, the technology trajectory was completed with about 25 years time span. The development of integrated circuits with ca. four years steps in each degree of integration formulated the development trajectory. The diffusion trajectory can be described by chasing the market development of the ICs. These trajectories are shown in Figure 3.



3. Turnover of Bubble Economy to Depression at the Peak of Kondratiev Cycles

The upswing of Kondratiev cycle is constructed by the accumulated cluster of innovation diffusions. A trajectory of innovation diffusion is formed by taking about 30 years from the beginning to the matured market. This is the reason why the upswing of a Kondratiev cycle has about 30 years time span with an S-shaped curve which is actually depicted by a logistic equation. In the course of upswing, the innovation market continues to increase for more than ten years and people believe that the market is still continuing to grow, and the stock market skyrockets. The market is, however, going

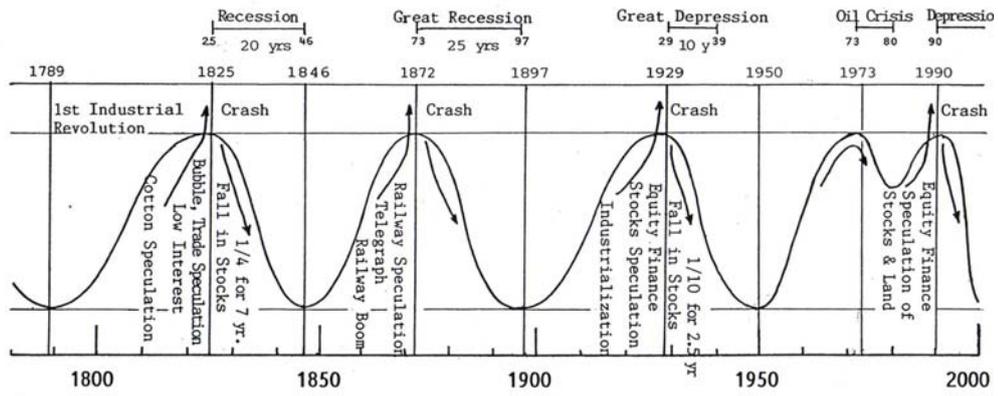


Figure 4 Kondratiev cycles and bubble/depression sequences saturate and the growth rate of market is sharply shrunk. When this gap between slowing

growth rate of the market and skyrocketing stock market is recognized, the bubble economy collapses towards a serious depression. Every Kondratiev cycle has this kind of phenomenon and thus every Kondratiev cycle makes a peak as shown in Figure 4.

4. Development of Innovation Paradigm in the 21st Century : Creating the 5th Kondratiev Upswing

The innovation paradigm consists of three trajectories and the distribution of these trajectories have a common interrelation in a sense of the time profile. So that, the next stage of innovations in which technology trajectories are ongoing can be estimated: that is, the timing of their development trajectories and then the diffusion trajectories. As we can trace the correlation between technology trajectories and diffusion trajectories of various modern high-technologies because such technologies of computer, engineering plastics, advanced composite materials, IC devices, fine ceramics, and biotechnologies have been already established and commercialized so far. The technology trajectory of multimedia has been already established and the commercialization is in progress. And the future diffusion trajectories of nano-catalysts, superconductive materials, genome technologies, regeneration technologies, precision polymerization, molecular devices, and quantum computers can be estimated on the basis of their technology

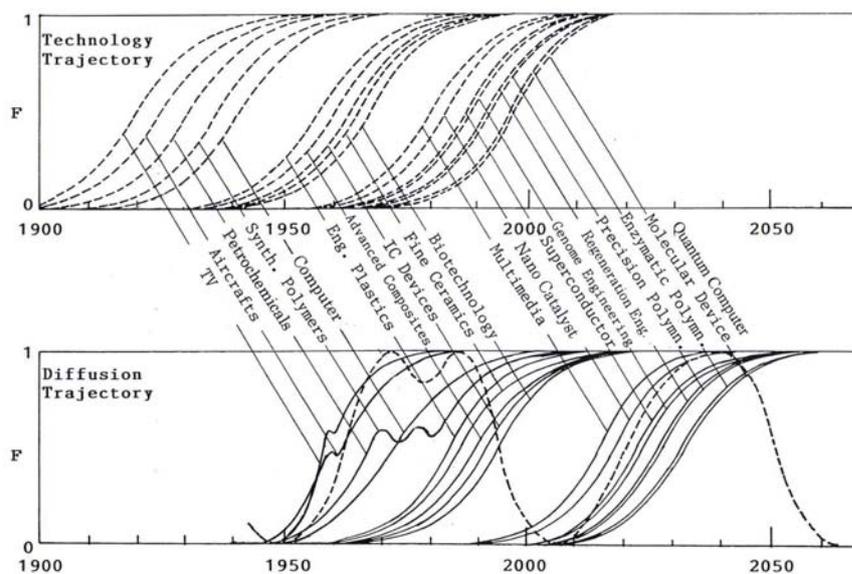


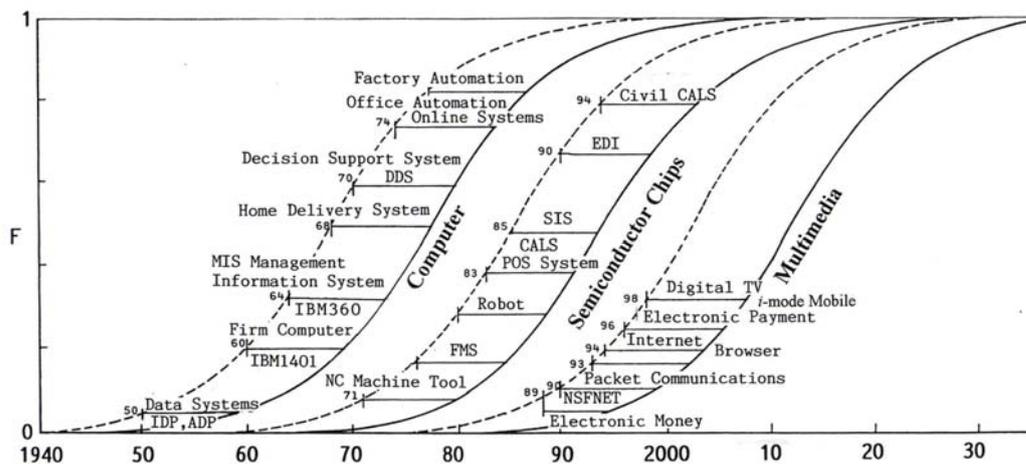
Figure 5

trajectories which are ongoing. Figure 5 shows the location of the innovations as the essential elements to create the 5th Kondratiev upswing in the first half of the 21st century.

5. Evolution of Information Technologies

The modern industrial society has been constructed on the basis of machines and Kondratiev cycles have been built up by spinning machines, steam engines, iron making, railways, automobiles, steel making, oil production, electric power generation, electric appliances, aircrafts, petrochemicals, computers and so on as shown in Figure 1. Now, we are on the way of a drastic change from the machine age to the age of information technologies. This drastic change started from the invention of computers. For the first time, the computers were used stand alone. The invention of internet, however, has drastically changed the situation. That is, the network of computers has begun to function as a media to build the information society. This evolution is critical to change from the age of machines into the information society.

The first stage of the evolution started by the computer technologies, and integrated circuits induced a drastic change of computers. The final evolution was the multimedia technologies which were created on the digitization of information processing. These three phases of innovations are depicted as shown in Figure 6. Each phase is expressed by the development trajectory (dotted line) and diffusion trajectory (real line). Each bar across the two S-curves indicates the timing of elemental technologies.



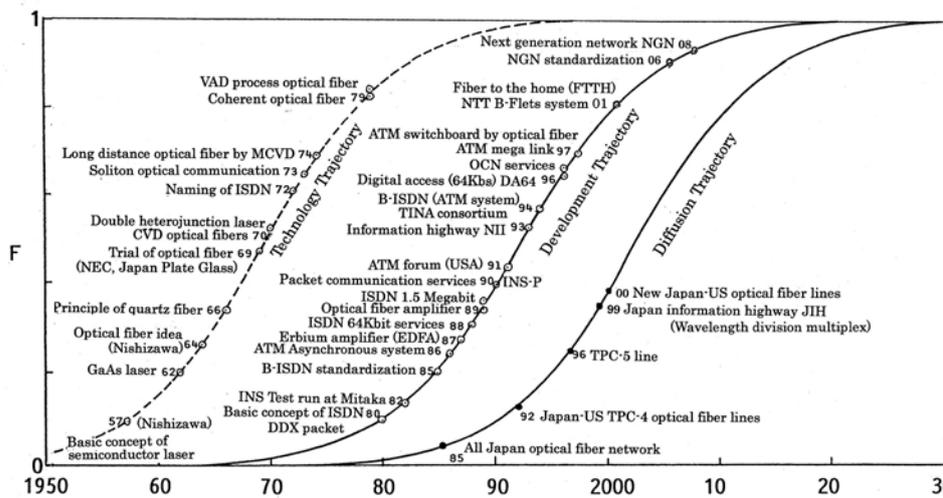
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Development of Information Systems to Multimedia Paradigm

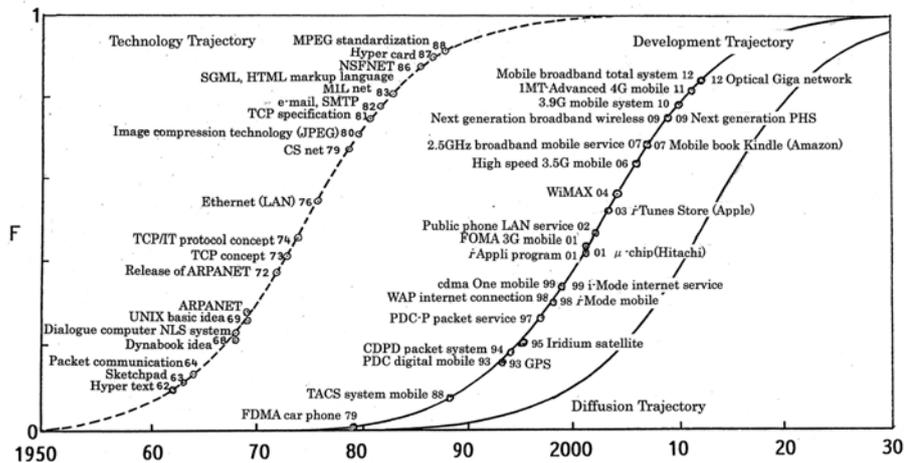
Information systems have been developed together with development of computers. Especially, when computers were networked, information and communication systems were drastically developed to construct information society. Digitization made possible to interact different media with multiple content forms such as texts, still images, animation, audio and video. Thus the multimedia paradigm has been constructed on the basis of digitization. This paradigm is substantially composed of internet paradigm and mobile communication paradigm, and ISDN system via optical fiber communication plays an important role.

ISDN System

The ISDN system (Integrated Services Digital Network) is defined as an information system in which digitized information is transmitted over an optical fiber network. Its technology trajectory starts from the idea of data transmission using optical fibers and semiconductor lasers as coherent light sources. The development trajectory is composed of a series of information network experiments, development of transmission processes, packet communication using asynchronous transfer mode (ATM) and broadband transmission. The diffusion trajectory is the locus extending optical fiber network. The ISDN paradigm is shown in Figure 7.



The technology trajectory of digital communication and internet paradigm is composed of a series of development of digitization, protocol, standardization, ATM



In the concrete, the technology trajectory started from the idea of hypertext by Ted Nelson in 1962, and packet communication process, development of Dynabook concept, NLS interactive computer system, and internet core technologies by ARPANET and NSFNET followed. The internet protocol was also developed based on TCP/IP, and HTML and SGML markup languages. During the initial stage of the development trajectory, several important inventions were achieved: www, Mosaic, JAVA, MPEG-4 and so on. Upon the establishment of www concept, commercialization of internet started in 1995 and we are now in the highest stage of development.

Development of NGN system

As the internet is inferior to the telephone network in terms of security and quality, a new internet system with as high quality as that of telephone was desired. This request was challenged from the side of telephone business and next generation network system NGN was constructed which is the fusion of the merits of telephone and IP network. Such unified communication system was proposed by Sisco Systems in 1999 and the standardization of NGN system was enforced in 2006. This was the unification of voice communication and data communication, and then further moved to the unification of e-mail, mobile phones, softphones (telephone software for personal computers), webconferences, internet messages. OCS 2007 was announced by Microsoft and IP phone was connected on the Microsoft Office Systems in 2007. And 'You Tube', which is a distribution site of mobile pictures to consumer participants, was set up in 2005.

ASP and SaaS

Enterprises usually have their own domestic information systems and operate by themselves. In these days, however, SaaS (Software as a Service) model has been getting popular. This is an information system in which they have no domestic information system and access outer application service providers (ASP) in case of need. In the United States, Salesforce.Com was set up as a vender of SaaS business in 1999 and then many venders have been built by using NGN effectively.

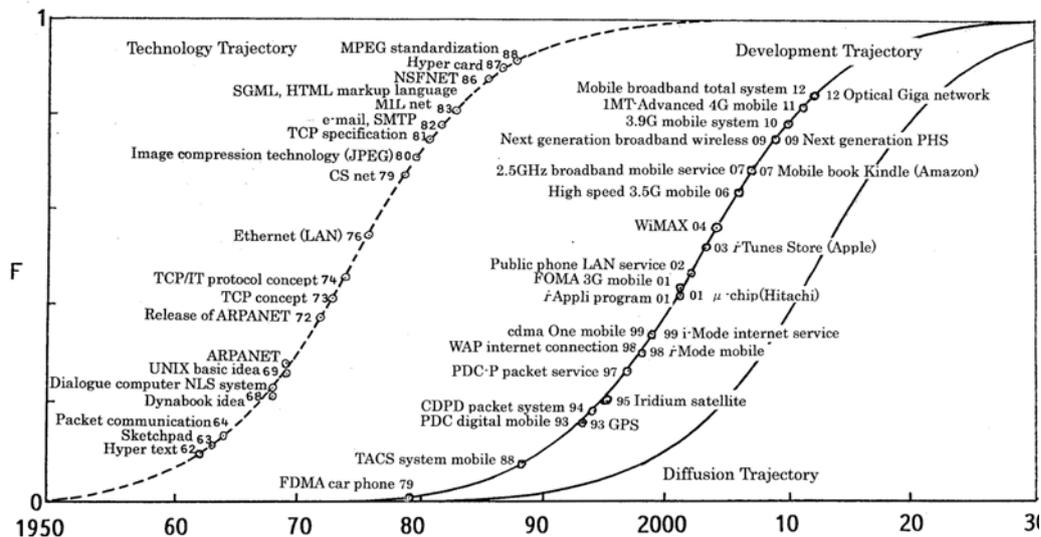
Semantic Web

The web page in the internet is described by HTML and it is a simple assemble of data. Thus, the information described in the internet pages cannot be automatically understood by computers, and the search and utilization of the information remain in a rather primitive level. If we could add a tag data indicating the meaning to the information, however, we can search in more sophisticated level and effectively utilize them for a specified collection of information. An idea for computers to collect data in more effectively has come into consideration when a kind of meta-data will add to the information according to a well-defined rule. This kind of data system is called 'semantic system' and the web which performs this system is called 'semantic web'. This means that it makes computers understood the meaning of web site and makes possible to collect information having more sophisticated quality. The semantic web is described by XML language with tag utilized RDF and OWL. This concept was first proposed by Tim Verner-Lee who was the inventor of www. This system will be expected to be commercialized around 2012.

Mobile Communication Paradigm and Formation of Ubiquitous Society

The mobile communication technologies started from the car telephone system in 1979 and mobile phones were developed by TACS system in 1988. The mobile phones were changed from analogue to digital ones (the 2nd generation). And then, PDC digital mobile phones in 1993, packet communication system, CDPD (the 2.5 generation) in 1994, and PDC-P packet communication services were practically utilized. The i-mode mobile phones which can be connected with internet services, was developed by NTT DoCoMo in 1998 and the i-mode data communication services were commercialized in the next year. Increasing the communication velocity, the images and online games using Java were able to be operated. Entering the era of 2000, the International Telecommunication Union (ITU) set up the standard of IMT-2000 (International Mobile Telecommunication) and the 3rd generation mobiles appeared. FOMA in Japan was the first commercialized products which put in practice in 2001. And, through the common frequency in the world-wide using UIM card, the international roaming has become available without changing number of phone and various services such as high speed data communications and TV phones using multimedia have been realized. Among the standard by IMT-2000, those based on the high speed data communication standard are called the 3.5 generation mobile phones (3.5 G). These include HSDPA(High Speed Downlink Packet Access) and HSUPA system. Along with the development of broadband wireless communication WiMAX, high speeding up has been realized and the 3.5G high speed mobile communication systems has been commercialized in Japan since 2006.

In 2007, Japanese Government allotted frequency for the next generation broadband wireless communication systems in 2.5GHz band and gave licenses to UQ Communications for WiMAX system and to Willcom for the next generation PHS system. These Services will be commercialized after 2009. Various terminal venders and service providers will take part in businesses utilizing WiMAX and the next generation PHS together with note PCs and mobile phones. In 2009, the next generation broadband communication system 3.9G (3.9 generation) using LTE (Long Term Evolution) communication system will start. And in 2011, 1MT-Advanced 4G will be expected. These trends indicate entering into the generation of the real wireless broadband by the comprehensive communication systems in which mobile phones will play the leading part. This also means that we are entering into the generation of real ubiquitous age. These trends are shown in Figure 9.



Since Darwin's evolutionary theory, the biology has been greatly advanced including recognition of microorganism by Pasteur, development of molecular biology and recognition of genome by Avery, and further development in biology will be highly expected in the 21st century. Two fields are now paid attention to grow: genome technology and regeneration technology. This section will be focused on these fields.

Genome technology paradigm

Since the DNA was recognized as the entity of the genetic trait by Avery in 1944, the technology trajectory of biotechnology has been developed through the discoveries of DNA having a double helix by Watson- Crick and recombinant DNA by Cohen- Boyer. A new paradigm of genome technology emerged through the decoding of genome started from development of sequencing method in 1975. Especially, the international human genome decoding project started in 1990 triggered by the proposal of the automatic high speed sequencing by Akiyosi Wada in 1983. Accelerated by Craig Vender's 'shotgun sequencing method', human genome decoding was finalized to analyze 3 billion pairs of genome in 2000 and the declaration of the completion was made in 2003. This story formulates the technology trajectory of the genome paradigm.

The development trajectory of the genome paradigm was raised through actual development of post genome products. That is, it is now the age to elucidate the function of genome and to regulate genome activities. This is the age of development of new genomic medicines and order-made medical treatment for individuals. Based on new technologies utilizing RNA interference, successful treatment has been realized to cure AIDS and C type hepatitis. And another success was made by preparation of comprehensive artificial cells or by repairing DNA by proteins. In the agricultural field, genetically modified organism and allergen-free crops have been developed. Further, a research field of epigenetics, which deals with problems giving change to cells and

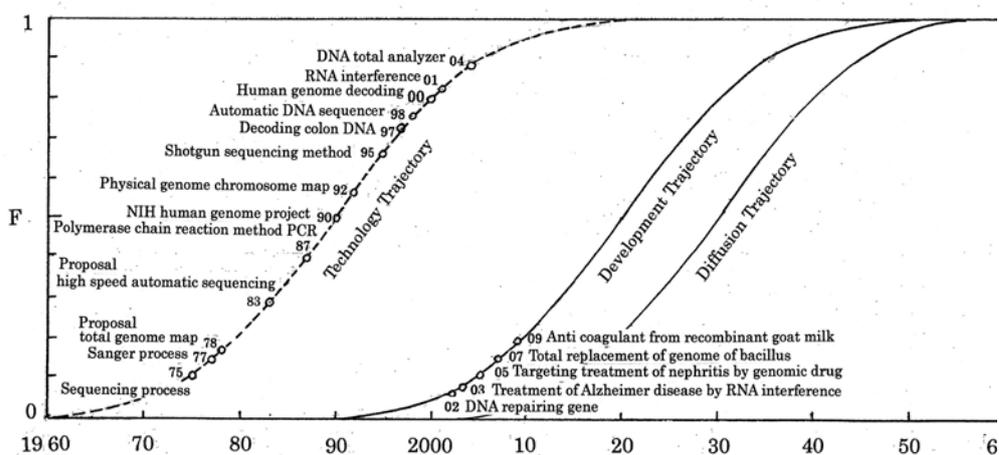


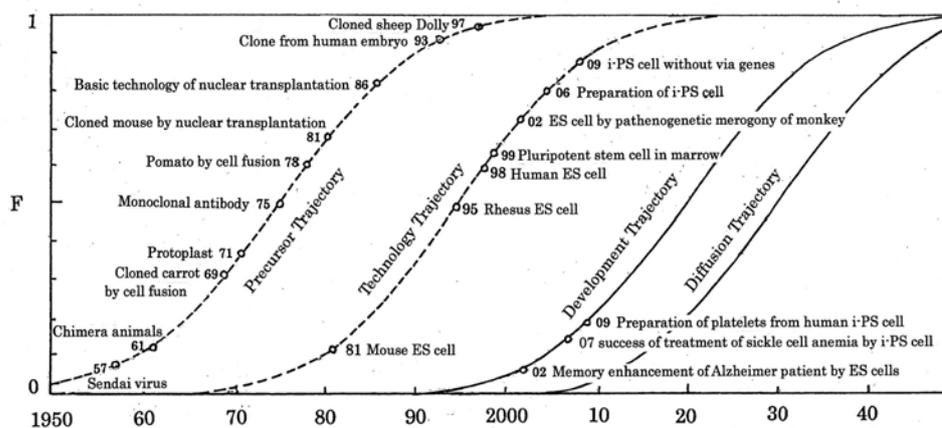
Figure 10 Genome technology paradigm

organism by controlling genomic emergence by a method without genomic deformation, has been paid attention.

The first half of the development trajectory of the genome paradigm lies for 15 years from 2005 and 2020. This term is the most promising timing for the venture business and higher probability of success is expected. The diffusion trajectory will start in around 2015. These relations are depicted in Figure 10.

Regeneration Technology Paradigm

Technology of cell fusion was first developed by Okada on Sendai virus in 1957. Since then a series of research has been carried out including monoclonal antibody and cloned sheep Dolly. These make a technology trajectory of cell fusion which situates as a precursor trajectory upon regeneration paradigm. The regeneration paradigm starts from an outstanding finding of ES (embryonic stem) cell in 1981 and developed through establishment of basic technology of nuclear transplantation. The knowledge of ES cell has developed stepwise from that of mouse in 1981 to of mink, pig, rhesus and finally of homosapiens in 1998. More important finding was made by Professor Shinya Yamanaka, Kyoto University. He first succeeded to induce a pluripotent stem cell: i-PS cell which was prepared from human skin but not from embryonic cell. This epoch-making finding is situated at the final stage of the technology trajectory of regeneration paradigm. The development trajectory is going to be built up with various applications of regeneration technologies such as success of recovery of memory of Alzheimer mouse, and treatment of sickle cell anemia. The fifteen years of the first half of the development trajectory is located between 2005 and 2020 and many outcomes can be expected in this term. The regeneration paradigm is shown in Figure 11.



Development of Nanotechnologies

The nano-level control in chemical materials has been paid attention and the age of nanotechnology comes into reality. The important thing is that nanotechnology is not only to develop nano-level materials but also to reveal a quantum effect which exhibits an extraordinary exaltation effect.

Mesoporous catalysts

One of nano-materials is high-performance catalyst with its structure controlled at the nanometer level. For example, a zeolite-type mesoporous catalyst having a regular pore size of 2–50 nm was recently developed. ‘Meso’, as defined by IUPAC, means a pore size of 2–50 nm; 2–10 nm is considered nano-size. Zeolite catalysts were first developed in the 1950s by Mobil Oil Company and then the pore size became artificially controllable since the ZSM-5 catalyst by intercalation with surface active agents like quaternary ammonium salts. This process was developed to achieve a regular pore size of 2–50 nm, especially within nano-size. Pores with a regular size can be used as meso-size reactors with specific catalytic activities. These pores exhibit specific quantum size effects, and various

physical properties are different from those in the normal condition. This results in enhanced catalytic activity and stereospecificity. Aida et al. synthesized extended chain structure polyethylene fibers in mesoporous silica including titanocene polymerization catalyst. This was the first direct production of extended chain structure polymer which was the result of a special performance of the mesoporous structure. The paradigm for nanoporous catalysts is now in the key timing of the development trajectory and various new products using them are in progress.

Approach towards precision polymerization

The polymer industry is now mature and a variety of polymers have been commercialized. The structure of polymer molecules, however, is not perfectly ordered, and they have many dislocations. If we could completely regulate the polymer structure, its performance would be greatly improved, and new functions could be revealed. Using a gel spinning process, Smith and Lemstra succeeded in 1980 in preparing a high-density polyethylene with an extended chain structure that was well crystallized. This extended-chain-structure polyethylene fiber without defects performs remarkably well: the specific strength was 35 g/denier, which is 200 times that of conventional polyethylene and higher than 4 g/denier of steel piano wire. While plastics are usually insulators, an electro-conductive polyacetylene developed by Naarmann in 1987 has the same level of electro-conductivity as copper, 10^5 S/cm, which was achieved by regulating the conjugation of double bond in the polymer. This is an example of revealing a new function by regulating the structure of polymers. These examples indicate that the perfect regulation of polymer structures is a very promising subject for future innovations.

Nano-electronics

Nano-electronics has been studied for more than 20 years and various trials have been carried out for post silicon devices.

Molecular devices have been under development since the tunneling microscope was invented in 1982, making molecular manipulation feasible. IBM succeeded in writing atomic letters on a solid surface in 1990. Single-electron devices have been discussed since Likharev first proposed single-electron devices in 1986. The success of the Coulomb blockade in 1988 made it possible to encapsulate an electron. A single-electron device operable at room temperature was developed in 1993, and single-electron logic gates and single-electron flash memories were developed in the 1990s. Room temperature single-electron transistors were realized within individual metallic single-wall carbon nanotube molecules in 2001. A single electron device has 1/100 in size compared with the conventional silicon devices and its electric power consumption will be expected to decrease one hundred thousandth. These trials form the technology trajectory, which has a time span of 25 years. The development trajectory would start around 2010, and commercialization could begin around 2020, if no fatal problems appear.

In June 2004, however, an international congress on semiconductor technology: Symposium on VLSI Technology was held in Hawaii and technology evaluation on the next generation devices was carried out by the international organization ITRS. And single electron devices and molecular memories would be not realized as the next generation devices and it was summarized that there would be no device technologically exceeded conventional CMOS FET. It seems to be now the turning point for single electron devices or molecular devices to be realized or not.

Quantum computer

The quantum computer has a completely different algorithm from conventional Neumann type computers. The basic concept of quantum Turing machine was proposed by Deutsch of University of Oxford in 1985. This is the starting point of the technology trajectory. Shor at AT&T demonstrated that high-speed factorization can be easily performed by quantum computers in 1994. This came as a big shock to people in charge of conventional computers because it meant that coded messages could be easily broken. Shor's discovery stimulated the study of quantum computing. Chuang at IBM demonstrated basic calculation using quantum computers in 1997, and a complex mathematical problem was solved using quantum computers at IBM's Almaden Research Center in 2000. In 1999, Takeuchi of Mitsubishi Electric Co. performed basic calculations using photons, and Fukushima of the Osaka Industrial Research Institute did it using atomic nuclear spins. Nakamura of NEC developed solid-state devices in 1999 and collaborated with Riken Institute in Japan on the development of basic and logic circuits using superconductors in 2003.

In order to materialize quantum computer, control of the state of quantum bit and coupling control technology making on-off of information communication between quantum bits are prerequisite. NEC, JST and Riken teams realized actual quantum bits using solid state devices, established control technology of quantum bits, and finally succeeded in coupling technology among bits in 2007. IBM constructed 7 qubit quantum computers and succeeded in factorization of 15. NIST developed laser driven quantum computers in 2002 and Riken developed super high speed quantum computers in 2006. These trends indicate that the development trajectory locates between 2002 and 2027 for 25 years and now about half of this trajectory has passed. The actual commercialization, however, has not been achieved yet.

8. Energy and Environmentals in the 21st Century

Overview of global issues

More than 30 years have passed since ‘The Limits to Growth□A Report for the Club of Rome’s Project on the Predicament of Mankind’ (Meadows et al., 1972) was published in 1972. The follow-up report, published 20 years later in 1992, was ‘Beyond the Limits□Confronting Global Collapse, Envisioning a Sustainable Future’ (Meadows, 1992), and the global situation has grown worse. According to their analysis, the population seems to decrease sooner in the latter book, reflecting the worsened global situation. The extrapolated world population of 10 billion in 2100 infers that the soft landing of the achievement will be almost impossible. Meadows et al. (1992) explained the reason for this by describing two traps from which we cannot escape. On the one hand, the advanced countries never stop their economic growth in order to keep the sound economy. On the other hand, the least developing countries have to increase their population in order to gain more subsistence. After the oil crises, there was a period when developed countries focused on developing renewable energy resources; however, this movement has now come to a halt, and the situation will be probably deteriorated in the future. In these decades, China, India and other developing countries have actively developed to increase the world consumption. These trends accelerate overshoot of the world economy to lead a catastrophe.

Prospects of energy resources

The main player in the development of modern industrial society has been innovation, and a key supporter has been energy. As shown in the report by the US government ‘The Global 2000 Report to the President: Entering the Twenty-First Century’ (U.S. Government, 1980)” indicted that the GNP in the United States increased 30 times over the past 100 years and energy consumption increased in parallel with the elasticity of unity. Energy consumption decreased slightly following the oil crises but then rose to even higher levels. The recent advance of developing countries has fueled the expansion of energy consumption.

Marchetti and Nakićenović (1979) analyzed the transition of energy resources in modern industrial society by Fisher Pry plot of the logistic curve. Energy resources were primarily charcoal before the Industrial Revolution, and then coal began to be used. Oil arose during the latter half of the 19th century and the oil and natural gas age has begun. Nuclear energy may be a bridge to renewable energy, which hopefully will be developed in the near future.

The long-term trend in primary energy consumption worldwide indicates that oil and natural gas resources will become tight around 2020 at least by 2040. Figure 12 shows the trend in ultimate oil reserves and the history of oil discoveries of big well. Major discoveries were made from the 1920s to the 1970s, and the steady increase in oil reserves forms an S-curve. Since around 1980, there have been no substantial discoveries. The trend in discoveries peaked around 1960 and has since decreased steadily, indicating that the world oil discovery is now in a maturity phase. The ultimate oil reserves seem to be 2.5 trillion barrels.

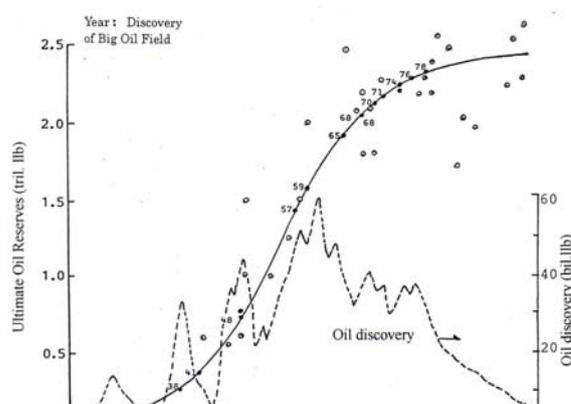


Figure 12 Oil discovery and ultimate reserves

According to Hatfield (1997) and Koyama (2001), the ultimate amount (a total of 2.35 trillion barrels, as estimated based on data for 1996) breaks down into cumulative production of 800 billion barrels, residual proved reserves of 1 trillion barrels, and estimated discoverable reserves of 550 billion. Thus, recoverable reserves could be 1.55 trillion barrels. If oil consumption worldwide increases 2% *per annum*, the available oil will be consumed within about 40 years.

Hubbert's peak of oil depletion

A more important perspective is Hubbert's analysis of oil depletion (Hubbert, 1957, 1969). He examined the history of oil discoveries in the United States and found that the trend in oil production tends to follow a bell-shaped curve and that production peaked when almost exactly half the total oil reserves had been extracted and some oil was still left in the ground. In 1956, he estimated that oil production would peak between 1966 and 1972; it actually peaked in 1970. He also forecasted the peak in global production and estimated that it would come between 1990 and 2000. This turned out to be too much pessimistic, partly because of inadequate data and partly because of minor flaws in his method. His method has since been refined and is now broadly accepted as a reliable prediction method.

Hubbert's method has been used by many petroleum geologists to predict the peak in world oil production. They have updated the data and their work figures prominently in the current discussion about petroleum depletion, as described by Heinberg (2003). Campbell has taken over Hubbert's method and refined the estimates. He set up the Association for the Study of Peak Oil (ASPO) and published extensively on the subject of petroleum depletion, e.g., Campbell (1997), Campbell and Laherrère (1998). Based on their analysis, Campbell and Laherrère (1998) predicted that the decline in world oil production would begin before 2010 and at the latest in 2015, as shown in Figure 13.

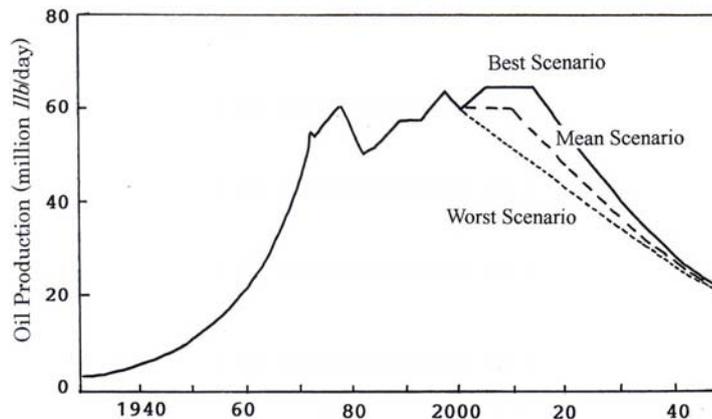


Figure 13 Hubbert scheme of world oil depletion

Using Hatfield's data of 1.55 trillion barrels, they also estimated that production would peak within 15 years, that is, by 2013; using the 2.036 trillion barrel estimate of

Edwards at the University of Toronto, they estimated that the peak would occur in 2020. Deffeyes (2001) estimated that world production would peak in 2003. Duncan (2000) at the Institute of Energy and Man compiled data on projected oil production peaks for 44 nations in seven regions in the world. The peaks furthest in the future were for Saudi Arabia in 2017, Kuwait in 2010, and the United Arab Emirates in 2009. The average for the Middle East was 2009. In short, the estimated peaks furthest in the future lie between 2003 and 2020, meaning that, in the very near future, oil depletion will become obvious.

Alternative energy resources

These estimates seem realistic and there are no countermeasures available. How can we switch to other energy resources under such a tight schedule so that we can eliminate the present deep dependence on oil? Since the development of renewable energy resources is not far enough to fulfill the prerequisite for replacing oil, will we have to depend on nuclear energy? While nuclear energy is primarily produced using light water reactors, other possibilities should be reconsidered. One previously discarded possibility is the thorium molten breeder reactor (Nishibori, 1979). Starting in 1965, the Oak Ridge National Research Laboratory of the U.S. Department of Energy tested one successfully for 3.5 years as the Molten-Salt Reactor Experiment. This homogeneous molten system is attractive because a meltdown cannot occur and weapons-grade material is not substantially produced. Moreover, thorium is widely available worldwide.

In these days, solar batteries have been greatly attracted and many countries are enthusiastic to build up solar energy supply stations. Solar batteries, however, could be difficult to replace the whole demand of oil in the world. Especially, the energy profit ratio, EPR (energy returned on energy invested) of solar batteries is not so high and moreover energy payback ratio (whole life EPR) is sometimes so small. There are some alternatives to oil: say, oil shale and tar sand are in plenty as the energy resources but it seems problematic to have EPR of sometimes less than one.

Another alternative is hydrogen. Since the decomposition of water is an energy consuming process, it is not so easy to obtain hydrogen economically from water. If it could become economically feasible, however, we can expect it as a future energy resource. There is, for example, catalytic photodecomposition by sunlight using a photosensitive catalyst, such as by Honda-Fujishima effect with an improved efficiency. Recent development of this kind process should be noted.

9. Situation and Characteristics of the 21st Century

We have discussed the 'near future' in the 21st century referring to events in the 20th century on the basis of Kondratiev business cycles so far. The modern industrialized society started at the Industrial Revolution in the 18th century and several Kondratiev cycles have been constructed by intermittent clusters of innovations as shown in the introductory presentation. The modern industrialized society in the 19th and 20th centuries was built up by various innovations of machines so that it can be called the machine civilization era. Since the end of the 20th century, we have been entering into the information society along the upswing of the 5th Kondratiev cycle towards the peak of 2035.

The modern civilization age has been developed for 300 years via five cycles of Kondratiev waves including the present cycle of the 5th Kondratiev. The solar activity has 10.5 years cycle of sunspot. Five of sunspot cycles having 50~60 years span formulate a Yoshimura cycle and five Yoshimura cycles could constitute a longer cycles having 300 years span. The economic fluctuation has the similar trend as that of solar cycles. Juglar cycle having 10 years span corresponds to the solar spot cycle and Kondratiev cycle having 55 to 60 years interval is for Yoshimura cycle. Jevons discussed that the economic fluctuation had been affected by such solar pulsation and named solar economics. The bottom of Yoshimura cycle well coincides with the peak of Kondratiev business cycle. These phenomena infer that the solar activities substantially affect the human economic behavior.

The modern civilization society has been developed together with several essential elements of transportation, logistics, urbanization, and modern life styles equipped with high-tech products and facilities through various trunk innovations which are defined to afford high value-added to the economy. And, the modern civilization era is now going into the final stage of 300 years time span. During this affluent age, however, we have induced many problems to be solved. The most fatal issue is the excessive activities of human being beyond the limits of sustainable earth. The population has been increased and living standard has been improved especially in the developing countries in these years. This trend enhances the consumption of energy resources to accelerate the energy depletion. Especially, oil resources may have passed 'Hubbert's peak' after which we cannot get enough amount of oil than before. Further, the food supply will become serious and already the half of the world population is in starvation. Environmental problem is getting worse and we do not have enough counter measure to depress the CO₂ contents in the air. In the near future, the first disaster will be realized by the shortage of oil but we have any concrete alternative energy resource at the moment. We have to manage such global problems within a rather short period. Another problem is the social turbulence of

the economy such as subprime lending issue. The upswings of Kondratiev cycles so far were built up mostly by trunk innovations giving high value-added to the economy but the coming upswing could be often disturbed by various social and economic turbulence together with a rather weaker impact of innovations. Almost all high impact innovations seem to have already run out. That is, innovations hereafter will be more sophisticated ones but with less impact to the economy. We have to concentrate our effort to solve such global issues as energy supply, food supply and environmental problems, and innovations should be focused on these area.

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Chapter 9. Modeling of Dynamics of Civilizations

9.1. PREDICTIVE CALCULATIONS OF CIVILIZATIONS DYNAMICS ON THE BASIS OF LOGISTICAL MODELS³

Methodology of Forecasting

We have mentioned earlier, that the specific feature of methodology of integrated macro forecasting is its orientation to civilizations approach, which stipulates application of a geocivilization reproduction cyclic model based on twelve local civilizations of the fifth generation. Construction of the long-term forecast is not possible without the application of the specific methods of a quantitative estimation of economic dynamics of local and global civilizations. Revealing of developed tendencies, critical situations and justification of scenarios of their development in long-term prospect can be made on the basis of the concrete analysis of occurring shifts and changes and the estimation of the prospects of their dynamics. As it will be shown further, for such quantitative estimation we use logistical models, which is essentially stipulated by the necessity of more authentic account of the cyclic fluctuations of the dynamics of individual national economies as well as local civilizations.

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Adapting a well-known method of situational analysis to the problem of civilizations dynamics research, we have developed a method of forecasting which includes:

- Revealing of critical situations in the dynamics of the previous retrospective period, when a special attention is given to the critical situations which have arisen on the phase of a decline of the industrial world civilization (the end of XX-XXI centuries);
- Examination of interactions between the civilizations and influence of the developing tendencies and critical situations in a single stream of movement of a global civilization;
- A selection of two options from the number of possible scenarios of civilization dynamics: inertial and innovative breakthrough;
- Determination of cyclic dynamics of each local civilization, of their groups and of the global civilization as a whole;
- Determination of the factors having key value for realization of the optimistic, innovatively - breakthrough scenario, institutes and mechanisms of its successful realization.

This method of forecasting can be extended if the basics of the theory of prediction of N.D. Kondratyev, complemented by researches of modern Russian and foreign scientists, will be taken in a more detailed account. The basics of the suggested model of forecasting and determination of the innovative - technological trajectory of development of local civilizations for the period up to 2050 include the following key principles:

The first. A nonlinear and cyclic character of the economic development: the existence of short and medium cycles with the duration of 3-4 years and 8-10 years respectively, and also long-term (Kondratyev) cycles of 50-60 years. We proceed from the assumption, that the fifth Kondratyev cycle will be completed in 2010-2015, with the subsequent generation and expansion of the coming sixth Kondratyev cycle.

The second. Innovative character of development. Only significant innovations and new technologies, industrial implementation of which coincides with the rising phase of the Kondratyev cycle, determine the character and rate of economic development at the essentially new technological level. In his theory of economic development J. Schumpeter has described five groups of innovations: 1) new products (goods); 2) new processes (industrial technologies); 3) new markets; 4) new sources of raw materials; 5) new organization. Such division of the character of innovations is essentially new: here we have an extremely important system element, a new organization, innovations result in radical changes of social, industrial and transport infrastructure, generating thus institutional changes in the society as well. According to Gerhard Mensch's classification, these are not the improving innovations facilitating the expansion of the prevailing technological system, but the trade innovations focused on the development of a new system.

The third. Taking into account of Hirooka's innovative paradigm. Prof. M. Hirooka has decomposed the innovative cycle «the invention - technology - a new product» into three logistical curves:

- The first logistical curve describes the development of the original innovation (the key invention) from the moment of the first article being published till the formation of the completed innovation (primary technology or group of technologies).
- The second logistical curve begins at the moment when a primary technology already exists and represents the trajectory of its development. The evolution of this trajectory results in industrial technology and the beginning of manufacturing of innovative products.
- The third logistical curve is the trajectory of diffusion (expansion) of a product. It begins only at the presence of industrial technology and represents a curve of penetration of a new product into the mass market.

The fourth. The existence of long-term (75-80 years) infratrajectories in the field of infrastructure formed by trunk innovations. Trunk innovation is an innovation which facilitates the formation of infrastructures and networks represented in the form of any kind of energy, driving forces, resources, kinds of transport and the communication facilities arising independently. At the beginning trunk innovations expand, as well as other innovations, creating the market, then their potential extends to form a new infrastructure in the economy. The diffusion of trunk innovations selectively forms cluster parallel to the rise of a Kondratyev cycle and becomes the main force determining the economic development.

The fifth. The presence of a cluster of basic technological innovations, interconnected and

following each other generations of technical equipment implementing the same technological principle, form technological system. There are several technological systems, simultaneously existing and interacting in the economy and its sectors: *prevailing*, determining the achieved level of competitiveness and efficiency of production and technology; *superseded*, but still keeping its influence in a number of sectors of the economy; *relic*, representing most primitive technical decisions of the last centuries; *originating*, expressing tendencies of the future technological development.

The change of technological ways is the contents and result of the waves of basic innovations which are expanded from the leading countries and industries, considerably changing the technological structure of the economy and forming the bases of the rising stages of Kondratyev cycles. Thus, technological systems change the world in the process of their development. So, due to the fifth technological way the advanced common markets with the domination of innovative and not resource intensive technologies were formed.

The sixth. The change of technological systems underlies the long waves of economic dynamics opened by N.D. Kondratyev and developed by Joseph Shumpeter, Gerhard Menshem, the modern school of Russian cyclism. During a deep economic crisis on the down wave of Kondratyev cycle and at the adequate technological system, the rates of the economic growth and labor productivity are decreased, the efficiency of innovations falls, economic, social and political contradictions grow. Such was the situation during the global crises of 1929 - 1933, in the 70s of XX century, the same tendencies are observed during the current crisis. It justifies the search of essentially new technologies which begin being implemented at the end of the phase of depression. As Gerhard Mensh said, «innovations overcome depression». After the stage of expansion (diffusion) these innovations begin to bring the growing amount of super profit (innovative quasirent), which is accompanied by acceleration of the tendency of the growth of gross domestic product (GDP) and productivity in the phase of maturity of Kondratyev cycle. Later the rates of growth slow down, but the profit does not decrease due to the amount of improving innovations. Then consistently the down wave of Kondratyev cycle begins, the preconditions of the next deep technological and economic crisis accumulate, until the time of the next long-term Kondratyev cycle comes.

Thus it is necessary to note, that according to the law of compression of historical time and acceleration of the rhythm of cyclic fluctuations, that the duration of Kondratyev cycles has the general tendency to reduction. If in XIX and in the first half of XX century the cycles were longer than 50-60 years, in the second part of XX and in the first part of XXI centuries their interval makes 40-45 years.

The seventh. A scenario-analog method. In some cases, the absence of a long-term and authentic statistical base complicates making of high quality forecasts of development. In this connection there is a necessity of determination of this or that analogue which technological level would be as much as possible close to the conditions and features of the researched country (the representative of this or that local civilization). The idea of this method is that the scenario (trajectory) of the development of a new object is determined by the scenario, which has already taken place, of another object, which structural identity by some parameters is proved to be true by economic or statistic data.

Based on the above methodological approach, the forecast of innovative - technological development for twelve local civilizations has been made: *West-European*⁴, *North American* (the USA, Canada), *Latin American*⁵, *Eurasian*⁶, *Eastern European*⁷, *Japanese*, *Indian*, *Chinese*, *Buddhist*⁸, *Muslim*⁹, *African*¹⁰, *Oceania* (Australia, New Zealand), which includes 143 countries, 96% of the

⁴ Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Great Britain, Austria, Greece

⁵ Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Trinidad and Tobago, Cuba, Mexico, Dominican Republic, Haiti, Jamaica, Puerto Rico

⁶ Russia, Ukraine, Byelorussia, Kazakhstan, Moldova, Estonia, Latvia, Lithuania, Armenia, Georgia

⁷ Hungary, Poland, Bulgaria, Romania, Albania, former Yugoslavia states, former Czechoslovakia,

⁸ Thailand, Vietnam, Burma, South Korea, North Korea, Sri Lanka, Cambodia, Laos, Mongolia

⁹ Turkey, Iran, Iraq, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Palestine, Yemen, Lebanon, Bahrain, Pakistan, Afghanistan, Indonesia, Malaysia, Bangladesh, Algeria, Egypt, Libya, Mauritania, Morocco, Sudan, Tunisia, Mali, Somalia

world population and 97% of the global GDP. For each local civilization trajectories of the development of the most and the least advanced countries have been considered in more details. A group of the vanguard countries (ten countries, included in four local civilizations) has been considered from the point of view of the industries and technological structure, taking into account the dynamics and character of the macroeconomic trajectory. Such research has been carried out for this small group of countries, based on the statistics of the Organization of Economic Cooperation and Development (OECD), in US dollars in the comparable prices of 2000. The statistics are taken from the data of the Center of Studying of Growth and Economic Development of Groningen University (the Netherlands)¹¹ where as currency of comparison the international dollar is used¹².

Initial Economic Situation of Local Civilizations

Making of a high quality forecast considerably depends on estimation of the initial level of development by the beginning of the predicted period, innovative - technological and economic components of local civilizations. In this connection the basic parameters (of statistical and expert nature in the tabulated form) are given below which characterize the place and the role of each individual local civilization in XX century and at the beginning of the third millennium.

Table 1

Dynamics of labor productivity (average annual growth rate for the previous period, %)

Civilization, country	1913	1929	1938	1950	1960	1970	1980	1990	2000
World	,4	,2	,4	,3	,0	,7	,8	1,6	1,1
West-European	,9	,1	,6	,4	,7	,0	,0	1,9	1,3
Eurasian									
Russia	,0	,2	,3	,5	,9	,6	,0	-0,5	-5,8
North American									
United States	,0	,1	,6	,6	,8	,5	,9	1,5	0,5
Latin American	,4	,1	,1	,2	,5	,9	,6	-0,3	0,4
Japanese	,8	,9	,6	1,9	,8	,9	,2	3,6	0,2
Chinese	,0	,6	,0	1,7	,9	,9	,7	9,1	8,5
Buddhist									
Thailand	,4	,3	,0	,9	,7	,8	,1	6,3	1,3

Source: World Economy. Global trends for 100 years. Institute of World economy and international relations. Moscow: The Economist, 2003, p. 539-540

Table 2

GDP growth rate for the previous period (%)

Civilization, country	1913	1929	1938	1950	1960	1970	1980	1990	2000
World	2,7	2,0	1,3	2,3	5,0	4,6	3,5	2,9	2,6
West-European	2,1	1,4	11,9	0,4	4,5	4,9	2,7	2,4	4,9
Eurasian									
USSR	3,7	0,8	2,9	4,3	7,8	3,6	2,3	0,5	-0,6
North American	4,6	3,1	-0,7	3,9	3,3	3,8	3,9	2,6	2,8

¹⁰ Ethiopia, Kenya, Tanzania, Uganda, Rwanda, Djibouti, Comoro Islands, Seychelles, Burundi, Central African Republic, Congo Democratic Republic, Republic of Congo, Chad, Benin, Cameroon, Gabon, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Liberia, Togo, Senegal, Gambia, Niger, Nigeria, Sierra Leone, Burkina Faso, Cote d'Ivoire, Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Republic of South Africa, Swaziland, Zambia, Zimbabwe, Cape Verde, Sao Tome and Principe

¹¹ <http://www.ggdc.net/databases/hna.htm>

¹² International dollar, or Geary-Khamis dollar is used for international comparisons of the parity of purchasing power at a certain period of time

USA									
Latin American	3,2	3,0	3,8	3,7	5,4	4,7	6,6	1,2	2,6
Japanese	2,4	3,9	3,6	-1,1	8,1	10,7	4,6	4,0	0,7
Chinese	1,0	1,2	0,4	-0,5	5,3	0,6	3,1	11,1	9,8
Buddhist									
Thailand	1,2	2,2	2,0	5,8	6,1	7,2	6,9	7,9	2,7
Korea	1,9	2,9	1,9	-0,9	4,3	8,9	8,5	9,1	6,0

Source: World Economy. Global trends for 100 years. Institute of World economy and international relations. Moscow: The Economist, 2003, p. 507

Unevenness of the economic development of local civilizations is best of all reflected by the ratio of variation of GDP per capita. As one can see from figure 1 and figure 2, the dynamics of differentiation of GDP per capita have been differing considerably during the last fifty years: for civilizations West-European, North American and Oceania the insignificant variation of this parameter (6-11%) is characteristic, while Muslim (68%) and especially African (95%) and Buddhist (92%) show the disturbing tendency of the extremely uneven level of incomes per capita between the countries of the same local civilization. A significant distinction in the economic development of local civilizations is proved also by a high level of intercivilization (within the group) variation of GDP per capita, for example, in 2006 when the value of this parameter was 93%.

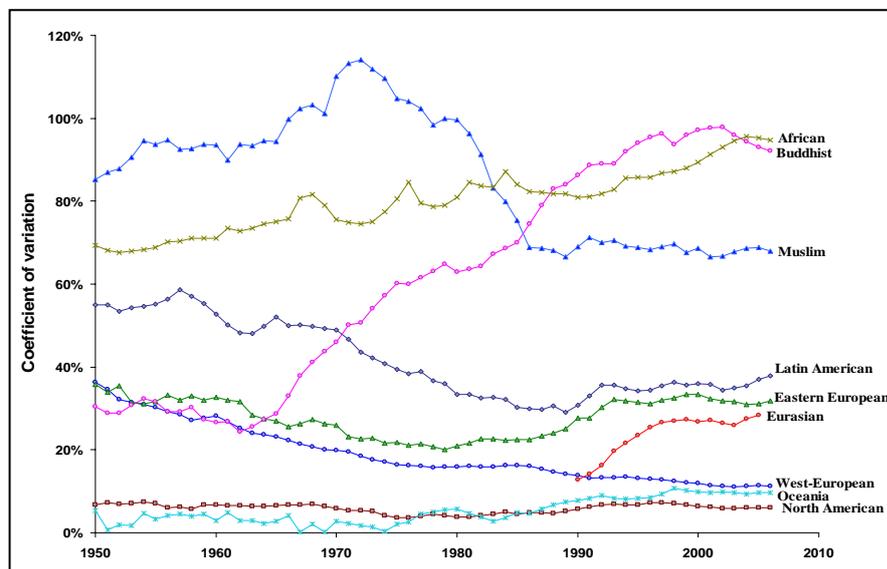


Figure 1. Dynamics of differentiation innercivilizations GDP per capita

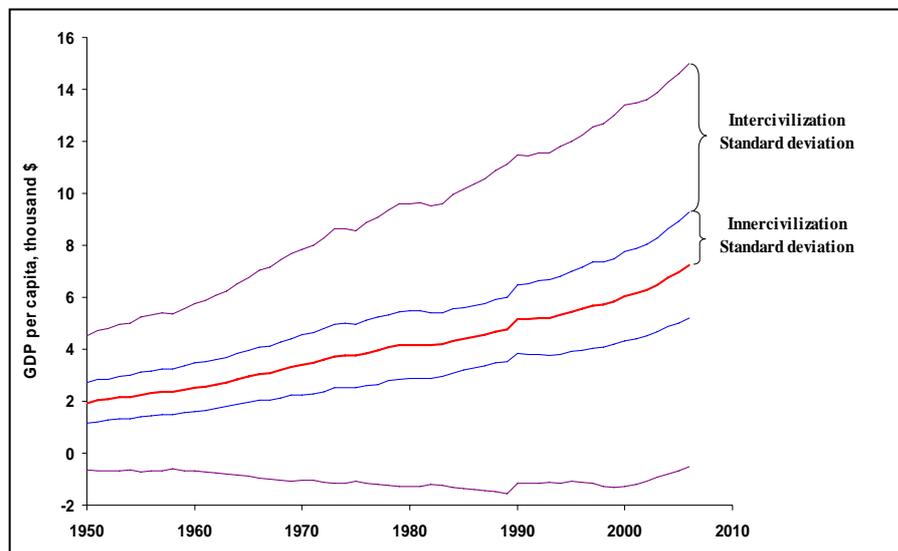


Figure 2. Dynamics of differentiation intercivilization GDP per capita

Table 3

The level of technological development

Civilization, country	Exports of HT (2005)		R&D (2003,2004)	Expenditures for IT (2005)	
	million \$	% of the world	% GDP	(%) GDP	per capita (\$)
West- European	358491	28,8	1,92	5,4	1226
Eurasian Russia	3690	0,3	1,7	3,6	190
North American United States	211233	17,0	2,68	8,8	3690
Latin American	40871	3,3	0,56	5,9	278
Japanese	122680	9,9	3,15	7,5	2678
Chinese	214246	17,7	1,44	5,3	90
Buddhist Thailand	1172	0,09	0,26	4,1	112
Korea	83527	6,7	2,64	6,9	1127

Source: 2007. World Development Indicators. Washington. The World Bank. 2007, p. 304-307

Table 4

Expert evaluation of the dynamics of technological level

Civilization	1950	1970	1990	2000
West- European	2,6	3,2	3,7	4,2
Eurasian North American United States	2,5	3,1	3,6	3,3
Latin American	3,0	3,5	4,0	4,4
Japanese	2,1	2,5	3,0	3,4
Chinese	2,4	3,3	3,9	4,2
Buddhist	1,8	2,2	2,9	3,3
	1,5	1,9	2,7	3,3

Source: Kuzyk B.N., Yakovets Y.V. Global outlook: The future of civilizations in 2050. Part 2. - Moscow: International institute of Sorokin-Kondratyev, 2008, p. 131-132

The expert estimation of the dynamics of the technological level of civilizations is based on the system of criteria where the parameter of the average technological level - the average share of various technological systems by civilizations is taken as the basic one. Thus technological systems 3-7 receive markings according to their numbers, and 1-2 industrial and all the preindustrial ones-

Branch and Technological Structure of the Economies of the Vanguard Countries

Structural characteristics of the economies of the vanguard countries included in these or those local civilizations, show clear tendencies which have stipulated their role as a kind of locomotive of technological and economic development during XX century. First of all, it concerns two local civilizations: West-European and North American. The most advanced economies of the Asian continent - Japanese and Korean, show similar tendencies.

For estimation of structural changes, the dynamics of the structure of GDP of the core countries for each local civilization for the period from 1970 to 2003 have been studied and evaluated. First of all, GDP was examined from the point of its basic branches: (01) agriculture, hunting, forestry and fishery; (02) mining; (03) electricity, gas and water supply; (04) construction; (05) wholesale and retail trade, hotels and restaurants; (06) transport, warehouses and communications; (07) finance, insurance, the real estate and business services; (08) services - individual, social, public; (09) manufacturing industry. Figure 3 shows the dynamics of the change of average values of shares of each of the listed branches in the period under examination.

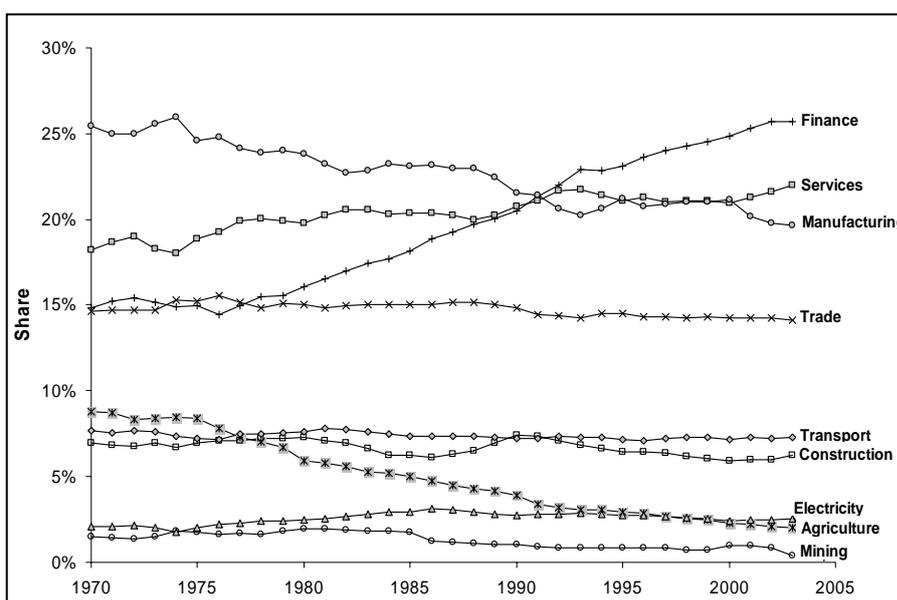


Figure 3. Dynamics of average values of the shares of branches in GDP.

As one can see in figure 3, two branches had a steady tendency to growth, namely finance and services. The declining trend is observed for two sectors - agriculture and manufacturing industry. These two opposite tendencies are corroborated also by the data given in Table 5, where average values of shares of branches in GDP and their variation by local civilizations for the beginning (1970) and the end (2003) of the researched period are given.

Table 5

The average level and variation of the branch structure of GDP

Branch	Average share, %		Variation	
	1970	2003	1970	2003
Agriculture, hunting, forestry and fishery	9,7	2,2	8,4	1,0

¹³ Kuzyk B.N., Yakovets Y.V. Global forecast “Future of Civilizations” for the period of up to 2050. Part 2. – Moscow: International institute of Sorokin-Kondratyev, 2008, p. 121-153

Mining	1,5	0,4	1,2	0,3
Electricity, gas and water supply	2,1	2,5	0,4	0,5
Construction	7,2	6,3	1,6	2,0
Wholesale and retail trade, hotels and restaurants	14,5	14,1	2,0	2,9
Transport, warehouses and communications	7,6	7,6	1,1	1,4
Finance, insurance, real estate and business services	14,3	25,3	3,5	4,0
Services: individual, social and public	17,8	21,6	3,2	2,3
Manufacturing	25,4	20,0	4,5	3,4

It is necessary to note, that from the same Table 5 one can make an essentially important conclusion about the presence of branches which densities in GDP remain practically constant for a long period of time. These are the mining industry, electricity, gas, water supply, construction, trade, transport and communications. We have conditionally named these branches as "settled".

Thus, the structure of economy of the vanguard countries is subject to one common tendency: sectors of non-material production (financial and service) have played a key role in the growth of GDP for the last 20-25 years. Another tendency which, most likely, has to be considered as negative, is a consecutive decrease of the share of processing sectors in the formation of GDP. As a matter of fact, there is "washing out" of sectors of material production, and accompanied by a decrease in manufacture of direct material goods. A very low share of agriculture in GDP (1-2,5 percent) creates the extremely disturbing situation for the global civilization: the growth of gross output of agricultural products significantly lags behind their ecological and consumer properties, social and economic degradation of the vital sector of the economy actually takes place. All these tendencies show the increase of elements of structural instability in the dynamics of industrial economic system, which became particularly clear during the global economic crisis of 2008-2009.

We have carried out an estimation of dynamics of GDP and individual branches for a group of the vanguard countries of four local civilizations. For example, in figure 4 and figure 5 the trajectories of economic development of two economies - the USA (North American) and Republic Korea (Buddhist) are given.

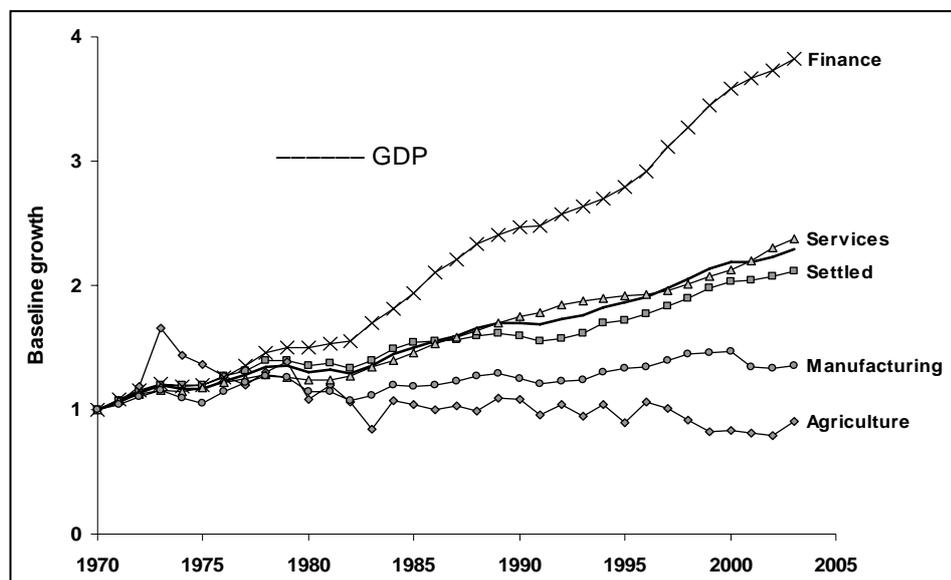


Figure 4. Real GDP and branches growth of the North American civilization (USA)

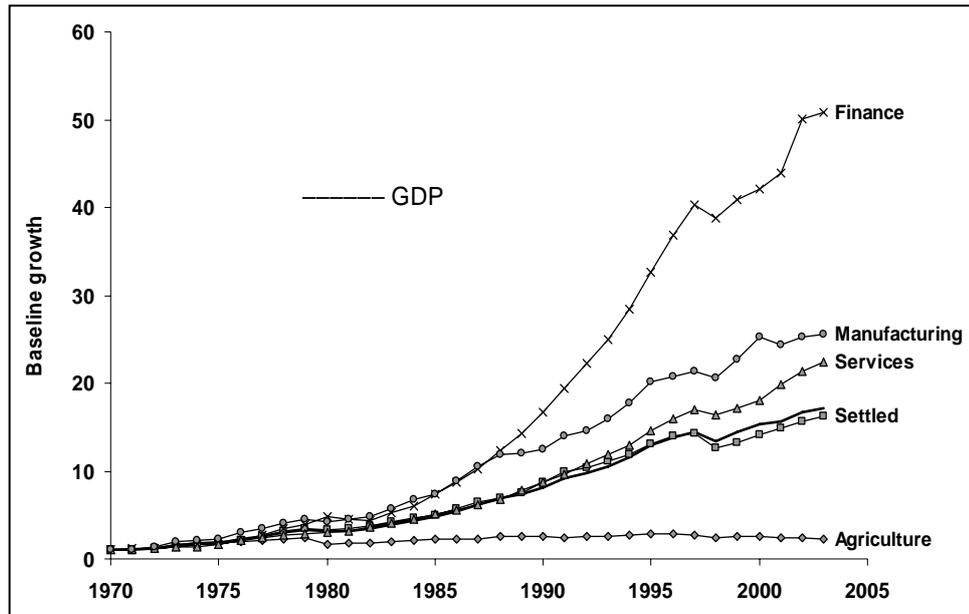


Figure 5. Real GDP and branches growth of the Buddhist civilization (Republic of Korea)

As one can see from figure 4 and figure 5, for these civilizations a sharp growth of the finance sector and a slower growth of the service sector were characteristic. As for other branches, the rates of their growth were lower than the rates of the growth of GDP. In the case of a Buddhist civilization (figure 5), only the group of the "settled" branches and agriculture had the rate of growth lower than GDP. The distinctive feature of a Buddhist civilization was also the higher rates of growth of a manufacturing industry against the rates of growth of GDP. In our opinion, it shows a qualitatively new character of economic development of the vanguard countries of the Buddhist civilization. The data of table 6, where the branch structure of GDP of ten out of twenty four countries, included in the researched civilizations as of 2003, can be considered as a result of the specific trajectory of their economic development for the last 30 years.

Table 6

Branch structure of GDP
in the context of local civilizations, % (2003)

	West-European						Japanese	Buddhist	North American	
	Austria	Germany	Finland	Sweden	Spain	Italy	Japan	Korea	USA	Canada
0										
1	2,0	1,1	3,4	1,8	3,2	2,5	1,2	3,8	1,0	2,2
2	0,5	0,3	0,3	0,2	0,4	0,4	0,1	0,3	1,2	5,0
3	2,5	2,0	2,3	2,8	2,1	2,3	3,6	2,7	2,0	2,7
4	7,7	4,2	5,3	4,4	9,7	5,0	6,5	9,6	4,6	5,4
5	17,6	11,8	11,9	11,8	18,9	16,4	12,7	10,3	15,5	13,8
0	7,6	6,2	10,8	8,1	8,8	7,2	6,1	7,5	6,1	6,9

6										
7	22,4	30,5	21,4	24,8	20,1	27,3	27,7	21,6	32,0	25,8
8	20,0	21,7	22,1	26,1	20,7	20,0	22,0	17,8	23,8	20,1
9	19,9	22,2	22,6	19,9	16,2	18,9	20,0	26,4	13,8	18,1

It has been already marked above, that the share of manufacturing industry tended to decrease in the majority of these countries, however a qualitative appraisal of this process can represent a special interest, if we look at the classification of industrial branches, rather recently adopted by the European Union regarding the level of technological development¹⁴.

Table 7 gives the evaluation of the level of technological development of manufacturing industry of the countries included in the West-European, North American, Japanese and Buddhist civilizations, according to the above mentioned classification of the European Union. It is necessary to note, that the dynamics of a technological level have a steady tendency to improvement, first of all due to the growth of densities of hi-tech sectors and reduction of a low-tech sector.

Table 7

The level of technological development
manufacturing industry in the context of local civilizations, % (2003)

	West-European						Japanes e	Buddhis t	North American	
	Austri a	Japan	Spain	Italy	Swede n	Finlan d	Japan	Korea	US A	Canad a
HT	9,4	12,4	6,2	9,5	17,5	24,6	16,8	23,5	18,6	8,1
MH T	27,7	44,0	26,5	24,4	32,2	19,2	31,3	28,7	24,2	26,9
ML T	29,1	22,6	31,6	26,6	19,9	21,4	23,1	29,3	20,4	23,0
LT	33,7	21,0	35,6	39,4	30,4	34,8	28,8	18,4	36,8	42,0

Illustrations in figure 6 and figure 7 prove the tendency of technological development of the local civilizations marked above.

¹⁴ High-tech (HT): office machinery and computers, radio, television and communication equipment and apparatus, medical, precision and optical instruments, watches and clocks, aircraft and spacecraft, pharmaceuticals, medicinal chemicals and botanical products

Medium-high-tech (MHT): machinery and equipment, electrical machinery' and apparatus, motor vehicles, trailers and semi-trailers, other transport equipment, chemicals and chemical products excluding pharmaceuticals, medicinal chemicals and botanical products

Medium-low-tech (MLT): coke, refined petroleum products and nuclear fuel, rubber and plastic products, non-metallic mineral products, basic metals, fabricated metal products except machinery and equipment, building and repairing of ships and boats

Low-tech (LT): food products and beverages, tobacco products textiles, wearing apparel; dressing and dyeing of for, tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness, wood and products of wood and cork, except furniture, pulp, paper and paper products, publishing, printing and reproduction of recorded media, furniture and other manufacturing, recycling

(European Commission: Towards a European Research Area Science, Technology and Innovation – Key Figures 2007, p. 106)

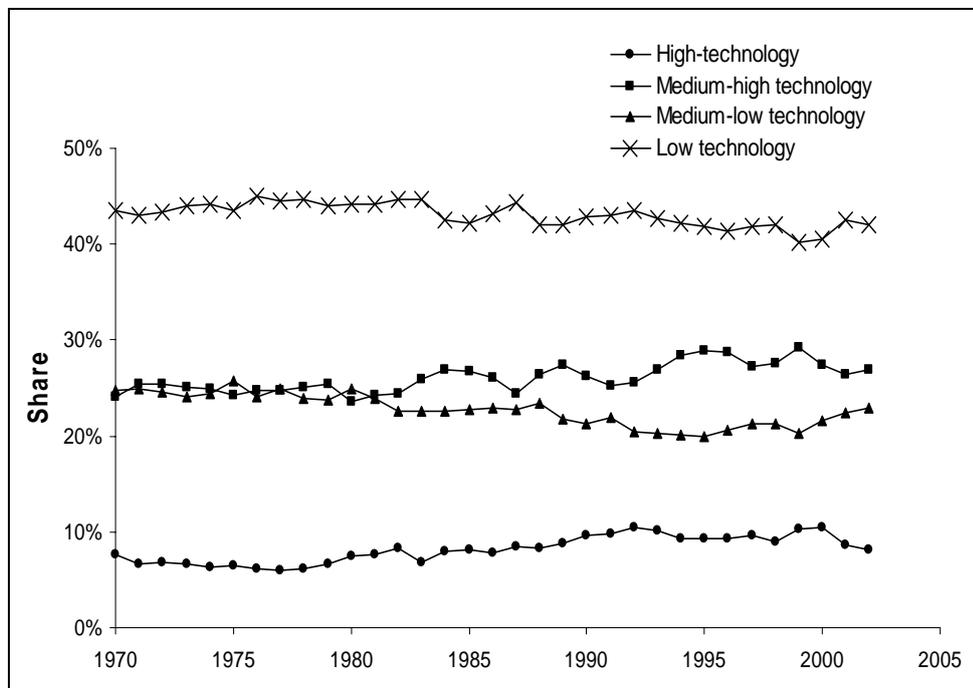


Figure 6. The dynamics of the technological structure of manufacturing North American civilization (Canada)

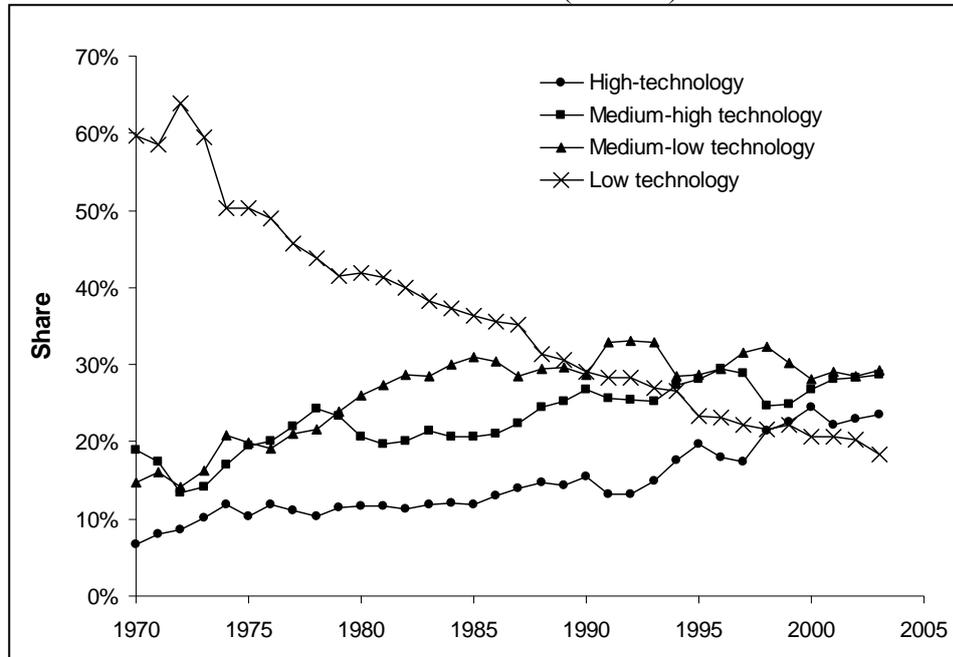


Figure 7. Dynamics of the technological structure of manufacturing Industry Buddhist civilization (Republic of Korea)

Model of Macroeconomic Forecast

It has already been noted above, that for all local civilizations the analysis of dynamics of the volume of GDP for the period from 1950 to 2006 has been carried out. To eliminate inflationary processes, all calculations have been made in international dollars and the prices of 1990.

With the help of approximation, using the method of the least squares, there have been received parameters of the following function:

$$\tilde{y} = \frac{A}{1 + b \cdot e^{-c \cdot t}} + d' + e' \cdot \sin(f' + t^{\circ}) + d'' + e'' \cdot \sin(f'' + t^{\circ})$$

where: $\frac{A}{1 + b \cdot e^{-c \cdot t}}$ – logistical function,

$d' + e' \cdot \sin(f' + t^0)$ – the first cycle,

$d'' + e'' \cdot \sin(f'' + t^0)$ – the second cycle.

The influence of cyclic dynamics on the rates of economic development of local civilizations turned out to be unequal. The data of Table 8, where the basic dynamic characteristics of the constructed forecast models are given, show it.

Table 8

Dynamic characteristics of models of development of civilizations

Civilization	Logist	Duration, years		The amplitude	
	Parameter c	Cycle 1	Cycle 2	Cycle 1	Cycle 2
West-European	0,035	54,0	36,2	0,061	0,011
Eastern European	0,027	51,6	27,3	0,168	0,070
Eurasian	0,054	64,3	35,8	0,326	0,188
Buddhist	0,061	45,2	14,3	0,018	0,013
Chinese	0,061	54,8	26,8	0,091	0,042
Japanese	0,057	80,0	34,1	0,227	0,072
Indian	0,049	50,0	26,1	0,074	0,035
Muslim	0,051	54,7	19,4	0,037	0,020
African	0,035	46,8	28,0	0,055	0,025
Latin American	0,040	57,6	34,8	0,085	0,036
North American	0,034	52,6	11,3	0,017	0,012
Oceania	0,039	54,6	23,5	0,023	0,011
World	0,040	48,1	23,6	0,035	0,003

In case of the advanced civilizations, the duration of the first cycle turned out to be uneven: the longest it was for Japanese (80 years), and for North American (52,6 years) and West-European (54 years), and has practically coincided with the Kondratyev cycle. Approximately the same duration of a cycle is characteristic for all other civilizations, which gives the average duration of the first cycle of 48,1 years for the global civilization. As for the duration of the second cycle, it varies from 36,2 years (West-European) to 14,3 years (Buddhist) and 11,3 years (North American), at its average duration of 23,6 years, practically coinciding with the cycle of Kuznets. The existence of long cycles (from 80 to 45 years), cycles of Kuznets (from 23 to 36 years), short cycles with the duration of 11 and 14 years (it is very close to cycles of Zhuglyar) show the unevenness of economic development between local civilizations and prove the thesis of Prof. Y.V. Yakovets about the dissimilarity of the cycles themselves within various local civilizations and the common tendency to compression of duration of the cycles.

As for the key parameter of logistical function c , its values characterize indirectly *the rate of development* of each local civilization and by that predetermine a possible trajectory of the future economic growth: a higher value of this parameter means higher rates of development. According to our calculations, the highest rates of development are demonstrated by the Buddhist and Chinese civilizations (0,061), Japanese (0,057) and Eurasian (0,054). The lowest rates of development are characteristic for Eastern European civilizations (0,027). The average index of rates of the global development makes 0,040. The forecasted trajectory of dynamics of GDP for twelve local civilizations is given in figure 8.

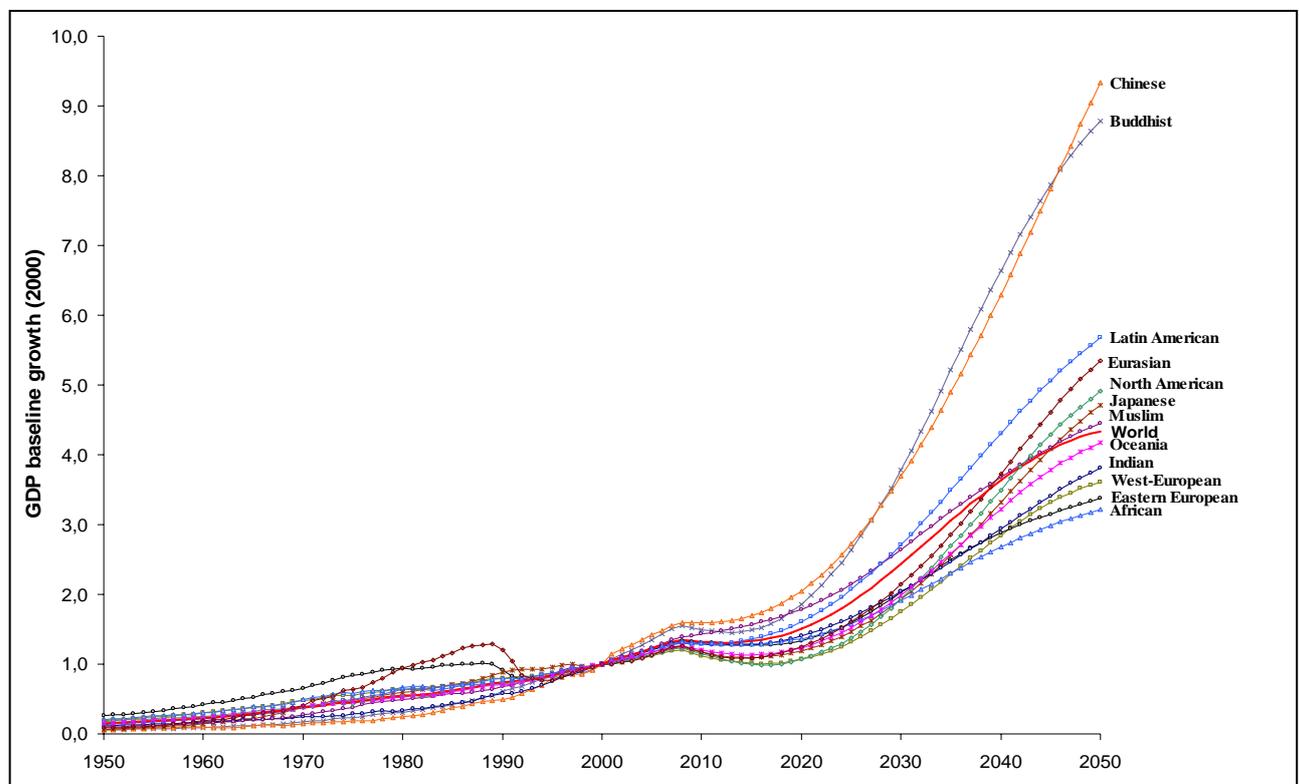


Figure 8. Forecast GDP dynamics of local civilizations

The important dynamic characteristic of forecast model is the amplitude of fluctuations reflecting stability of economic development. Within the first cycle the greatest stability is demonstrated by the North American (0,017), Buddhist (0,018), Oceania (0,023) and Muslim (0,037) civilizations. The least stable was the development of the Eurasian (0,326), Japanese (0,227) and Eastern European (0,168) civilizations. Unevenness of economic development of the Japanese civilization should not confuse us, as duration of its first cycle makes 80 years and practically covers the prewar, war and post-war regenerative time of the Japanese economy. Within the framework of the second cycle the most stable rates of development are demonstrated by civilizations: West-European and Oceania (0,011), and also North American (0,012). The least stable characteristics are inherent to the Eurasian civilization (0,188), and also to Eastern European (0,070) and Japanese (0,072). Instability of the development of the Japanese civilization can be generally explained by the fact that for the last twenty years it has had typical processes of technological and economic stagnation. Most likely, the factor of instability has in its basis transformations of the structural character: within the limits of the first cycle it is directly related to the change of branch structure of the economy, and within the limits of the second cycle to innovative - technological changes both within the branch and at the level of large companies and firms - manufacturers.

The forecast of economic dynamics of local civilizations would not be complete without the forecast trajectories of individual countries. With this aim within each local civilization there have been selected least and most economically advanced countries for which different levels and rates of economic development are characteristic. In total 27 countries of 12 civilizations have been selected, and in table 9 the basic characteristics of forecast models for these countries for the period till 2050 are given.

It is interesting to note, that the highest rates of development are generally demonstrated by representatives of the Buddhist civilization (South Korea - 0,079, Thailand - 0,069, Vietnam - 0,044). Representatives of the Latin American civilization lag behind them a little as for the rates of development (Brazil - 0,050, Mexico - 0,048, Cuba - 0,043). As for representatives of the Muslim civilization, here very high rates of development are demonstrated by the United Arab Emirates (0,075), and extremely low by Afghanistan (0,021), which is a little outstripping the "outsider" of the African civilization - Angola (0,019). High rates of development are characteristic for China (0,061) and Japan (0,057). As for stability of the economic development, within the limits of the first cycle the highest stability is shown by the vanguard countries: the USA (0,016), United Kingdom (0,018). The

least stable development is typical of representatives of the Eurasian civilization (Russia - 0,312, Kazakhstan - 0,301), African (Angola - 0,298), Muslim (United Arab Emirates - 0,176, Afghanistan - 0,126), Greece and Brazil (0,126), representing West-European and Latin American civilizations. Within the framework of the second cycle parameters of stability practically coincide with the parameters of the first cycle, but in some cases there are some differences. So, for example, Iran has more stable development than United Arab Emirates, the republic of South Africa has more stable development than Kenya, Portugal has more stable development than Norway, and Russia has more stable development than Kazakhstan.

As the duration of business cycles for each of the selected countries has been calculated for the construction of the model, it is necessary to note a significant disorder of duration of the first cycle: 80 years for Japan and 37,7 for South Korea. The average duration of this cycle is approximately 50 years, which coincides with a Kondratyev cycle. As for the second cycle, its duration changes from 36,9 years for Norway to 15,3 years for Cuba. The average duration is 22 years and coincides with a Kuznets cycle.

Table 9

The dynamic characteristics of models of development of individual countries

Countries	Logist	Duration, years		The amplitude	
	Parameter <i>c</i>	Cycle 1	Cycle 2	Cycle 1	Cycle 2
<i>West-European civilization</i>					
United Kingdom	0,025	39,5	29,6	0,018	0,003
Norway	0,039	52,0	36,9	0,024	0,019
Portugal	0,043	52,0	27,6	0,064	0,013
Greece	0,044	59,8	31,3	0,126	0,045
<i>Eastern European civilization</i>					
Poland	0,029	47,2	26,2	0,104	0,049
Albania	0,045	47,0	26,8	0,106	0,066
<i>Eurasian civilization</i>					
Russia	0,053	55,7	22,1	0,312	0,071
Kazakhstan	0,031	54,7	23,6	0,301	0,127
<i>Buddhist Civilization</i>					
South Korea	0,079	37,7	29,4	0,042	0,034
Thailand	0,069	42,0	21,4	0,046	0,056
Vietnam	0,044	43,3	27,0	0,115	0,068
<i>Chinese civilization</i>					
China	0,061	54,8	26,8	0,091	0,042
<i>Japanese Civilization</i>					
Japan	0,057	80,0	34,1	0,227	0,072
<i>Indian civilization</i>					
India	0,049	50,0	26,1	0,074	0,035
<i>Muslim civilization</i>					
UAE	0,075	60,0	27,6	0,176	0,107

Iran	0,053	50,0	21,0	0,142	0,067
Afghanistan	0,021	40,0	25,0	0,126	0,135
<i>African civilization</i>					
RSA	0,035	51,9	30,0	0,091	0,027
Kenya	0,047	59,4	34,3	0,059	0,049
Angola	0,019	42,5	18,3	0,298	0,151
<i>Latin American Civilization</i>					
Brazil	0,050	57,0	28,0	0,126	0,058
Mexico	0,048	56,0	27,6	0,095	0,037
Cuba	0,043	31,7	15,3	0,132	0,045
<i>North American civilization</i>					
United States	0,034	59,9	22,7	0,016	0,006
Canada	0,040	66,2	31,4	0,055	0,019
<i>Civilization Oceania</i>					
Australia	0,040	49,9	23,2	0,024	0,010
New Zealand	0,030	43,8	26,1	0,051	0,011

Forecast calculations of the dynamics of GDP and GDP per capita on the basis of the constructed logistical models are given in tables 10 and 11 for all local civilizations, and in tables 12 and 13 for individual countries - representatives of local civilizations.

Table 10

Forecast intensity of economic development of civilizations
in I-st half of the XXI-st century

Civilization	Base GDP growth		Average annual growth rate of GDP,%				
	Actual 2000 to 1950	Forecast 2050 to 2000	2001-2010	2011-2020	2021-2030	2031-2040	2041-2050
West-European	5,4	3,6	1,2	-0,5	5,1	5,0	2,4
Eastern European	3,9	3,4	2,7	0,2	4,2	3,6	1,6
Eurasian	12,3	5,5	0,9	5,5	2,7	4,3	4,0
Buddhist	17,5	8,8	4,1	2,2	7,4	5,8	2,8
Chinese	17,6	9,3	4,7	2,6	6,1	5,5	4,0
Japanese	16,3	4,7	1,6	0,1	5,0	5,6	3,6
Indian	8,5	3,8	2,5	0,9	3,8	3,7	2,7
Muslim	10,1	4,4	3,6	2,3	4,0	3,4	1,9
African	4,9	3,2	2,7	0,5	3,4	3,4	1,9
Latin American	7,4	5,7	2,6	2,2	5,4	4,7	2,8
North American	5,6	4,9	1,4	-0,7	6,1	6,1	3,5
Oceania	6,1	4,2	1,8	0,3	4,9	5,0	2,6
World	6,9	4,3	2,8	1,3	4,9	4,1	1,8

Table 11

Forecast growth of GDP per capita of civilizations
in I-st half of the XXI-st century

Civilization	Base rate of growth of GDP per capita		Annual growth rate of per capita GDP,%				
	Actual 2000 to 1950	Forecast 2050 to 2000	2001-2010	2011-2020	2021-2030	2031-2040	2041-2050
West-European	4,2	3,4	1,1	-0,8	5,1	4,9	2,4
Eastern European	2,8	3,2	2,8	-0,2	3,3	3,9	2,0
Eurasian	8,5	5,8	2,1	1,0	5,7	5,7	3,5
Buddhist	6,5	6,8	3,1	1,5	6,9	5,2	2,8
Chinese	7,6	7,7	3,9	2,3	5,4	5,0	4,3
Japanese	10,8	4,4	1,1	0,1	5,3	5,2	3,3
Indian	3,1	2,0	0,8	-0,7	2,5	2,7	1,6

Muslim	3,1	2,4	1,9	0,8	2,9	2,3	1,1
African	1,3	1,2	0,4	-1,7	1,3	1,5	0,2
Latin American	2,3	3,8	1,4	1,1	4,4	4,2	2,4
North American	3,0	3,3	-0,1	-1,4	5,2	5,7	3,0
Oceania	2,7	2,8	0,4	-1,3	4,7	4,7	2,2
World	2,9	2,7	1,4	-0,1	3,7	3,7	1,4

Table 12

Forecast intensity of economic development of individual countries
in I-st half of the XXI-st century

Countries	Base GDP growth		Average annual growth rate of GDP,%				
	Actual 2000 to 1950	Forecast 2050 to 2000	2001- 2010	2011- 2020	2021- 2030	2031- 2040	2041- 2050
<i>West-European civilization</i>							
United Kingdom	3,5	3,5	0,8	-0,2	4,8	4,9	2,4
Norway	6,4	4,1	1,5	1,3	4,8	4,3	2,3
Portugal	8,1	4,8	2,6	1,5	4,7	4,5	2,5
Greece	8,8	5,1	3,5	1,7	4,8	4,5	2,1
<i>Eastern European civilization</i>							
Poland	4,7	3,5	2,5	1,0	3,7	3,0	2,5
Albania	7,8	2,7	3,5	0,6	2,7	2,2	1,1
<i>Eurasian civilization</i>							
Russia	12,3	5,9	3,1	-1,3	6,7	6,1	3,9
Kazakhstan	4,3	3,9	2,9	-0,1	5,3	2,5	3,1
<i>Buddhist Civilization</i>							
South Korea	37,8	9,2	4,3	2,9	7,4	5,5	2,8
Thailand	24,2	7,7	4,9	1,9	6,4	5,2	2,4
Vietnam	8,6	4,5	2,5	0,5	4,4	4,1	3,6
<i>Chinese civilization</i>							
China	17,6	9,3	4,7	2,6	6,1	5,5	4,0
<i>Japanese Civilization</i>							
Japan	16,3	4,7	1,6	0,1	5,0	5,6	3,6
<i>Indian civilization</i>							
India	8,5	3,8	2,5	0,9	3,8	3,7	2,7
<i>Muslim civilization</i>							
UAE	36,8	7,7	6,4	2,5	5,5	4,3	2,2
Iran	10,9	4,2	2,5	0,3	4,5	5,3	2,0
Afghanistan	2,6	2,3	3,3	-1,4	3,2	1,5	2,1
<i>African civilization</i>							
RSA	5,1	3,4	2,8	1,3	3,1	3,3	2,0
Kenya	7,8	4,1	2,8	2,4	4,3	3,3	1,4
Angola	1,8	1,7	4,4	-2,5	-2,7	3,7	2,5
<i>Latin American Civilization</i>							
Brazil	10,9	6,0	3,7	1,6	5,4	5,1	2,5
Mexico	10,8	5,0	2,7	0,7	5,5	5,1	2,5
Cuba	2,3	1,5	1,8	-1,0	-2,1	3,2	2,5
<i>North American civilization</i>							
United States	5,5	5,2	1,0	-1,2	6,6	6,8	3,9
Canada	6,8	4,2	1,9	0,5	4,6	4,9	2,7
<i>Civilization Oceania</i>							
Australia	6,8	4,8	1,9	0,3	6,3	5,4	2,2
New Zealand	3,8	3,1	1,9	-0,6	3,6	4,3	2,5

Table 13

Forecast growth of GDP per capita for selected countries
in I-st half of the XXI-st century

Civilization	Base rate of growth of GDP per capita		Annual growth rate of per capita GDP,%				
	Actual 2000 to 1950	Forecast 2050 to 2000	2001- 2010	2011- 2020	2021- 2030	2031- 2040	2041- 2050

<i>West-European civilization</i>							
United Kingdom	2,9	3,1	0,4	-0,4	4,7	4,7	2,2
Norway	4,6	3,6	1,2	1,1	4,4	4,2	2,0
Portugal	6,6	4,1	2,1	1,4	4,1	4,6	2,2
Greece	6,3	4,4	2,8	1,9	4,5	4,0	1,9
<i>Eastern European civilization</i>							
Poland	3,0	3,3	2,3	0,8	3,6	3,0	2,5
Albania	2,7	2,3	2,7	0,0	2,6	1,9	1,0
<i>Eurasian civilization</i>							
Russia	8,5	6,9	3,6	-0,9	7,0	6,3	4,0
Kazakhstan	1,9	3,5	2,1	-0,2	5,2	2,5	3,1
<i>Buddhist Civilization</i>							
South Korea	16,8	8,1	3,5	2,7	6,8	5,6	2,9
Thailand	7,8	6,4	3,8	1,6	6,4	4,6	2,5
Vietnam	2,7	3,0	1,3	-0,4	3,6	3,6	3,3
<i>Chinese civilization</i>							
China	7,6	7,7	3,9	2,3	5,4	5,0	4,3
<i>Japanese Civilization</i>							
Japan	10,8	4,4	1,1	0,1	5,3	5,2	3,3
<i>Indian civilization</i>							
India	3,1	2,0	0,8	-0,7	2,5	2,7	1,6
<i>Muslim civilization</i>							
UAE	0,8	3,8	2,2	0,6	4,7	4,0	2,0
Iran	2,8	3,0	1,3	-0,6	3,9	4,9	1,8
Afghanistan	0,9	1,0	1,7	-3,3	1,3	-0,2	0,5
<i>African civilization</i>							
RSA	1,5	2,6	1,7	0,5	2,5	3,0	1,7
Kenya	1,6	1,7	-0,0	0,4	2,3	2,2	0,5
Angola	0,7	0,7	2,6	-4,3	-4,4	1,9	0,8
<i>Latin American Civilization</i>							
Brazil	3,3	4,2	1,4	0,9	5,2	4,8	2,2
Mexico	3,1	3,6	1,5	-0,1	4,9	4,7	2,2
Cuba	1,2	1,4	1,5	-1,2	-2,2	3,1	2,4
<i>North American civilization</i>							
United States	3,0	3,5	0,3	-2,5	5,7	6,0	3,3
Canada	3,1	3,3	1,2	-0,4	4,3	4,7	2,4
<i>Civilization Oceania</i>							
Australia	2,9	3,2	0,7	-0,9	5,4	4,8	1,9
New Zealand	1,9	2,2	0,8	-1,4	2,8	3,8	1,9

Prospects of dynamics of local civilizations

The forecast for local civilizations takes into consideration the current economic crisis which has touched all countries. The scale of the crisis, its depth and consequences which it will have for the development of the global economy are still difficult to estimate exactly. However, there are tentative estimations of the current losses which are taken into account in our forecast.

1. The West-European civilization

For the West-European civilization XX century has been marked by inconsistent tendencies in economic and technological development. In the first half of the century two devastating wars took place, and as the consequence, during this period the civilization had rates of a gain of GDP per capita below the world average. During the post-war period the Western Europe was already in world leaders, being surpassed only by Japan as for the rates of growth of GDP per capita (4,05 % against 8,06 % at Japan). The last third of XX century is characterized by unidirectional trajectories of development within this local civilization: Austria, Germany and United Kingdom had stable dynamics of economic growth. The same positive dynamics, but with elements of structural instability, was demonstrated by Finland and Sweden, and also by the countries of Southern Europe - Spain and Italy. Figure 9 gives the projected trajectories of dynamics of GDP and GDP per capita for the West-European civilization and individual countries - representatives for the period till 2050. It is necessary to note, that if the tendency of structural instability will be kept for the first half of XXI century (our

forecasts show a reality of such scenario of development), the West-European civilization will concede the leading positions as for the rates of economic growth to the Chinese and Buddhist civilizations.

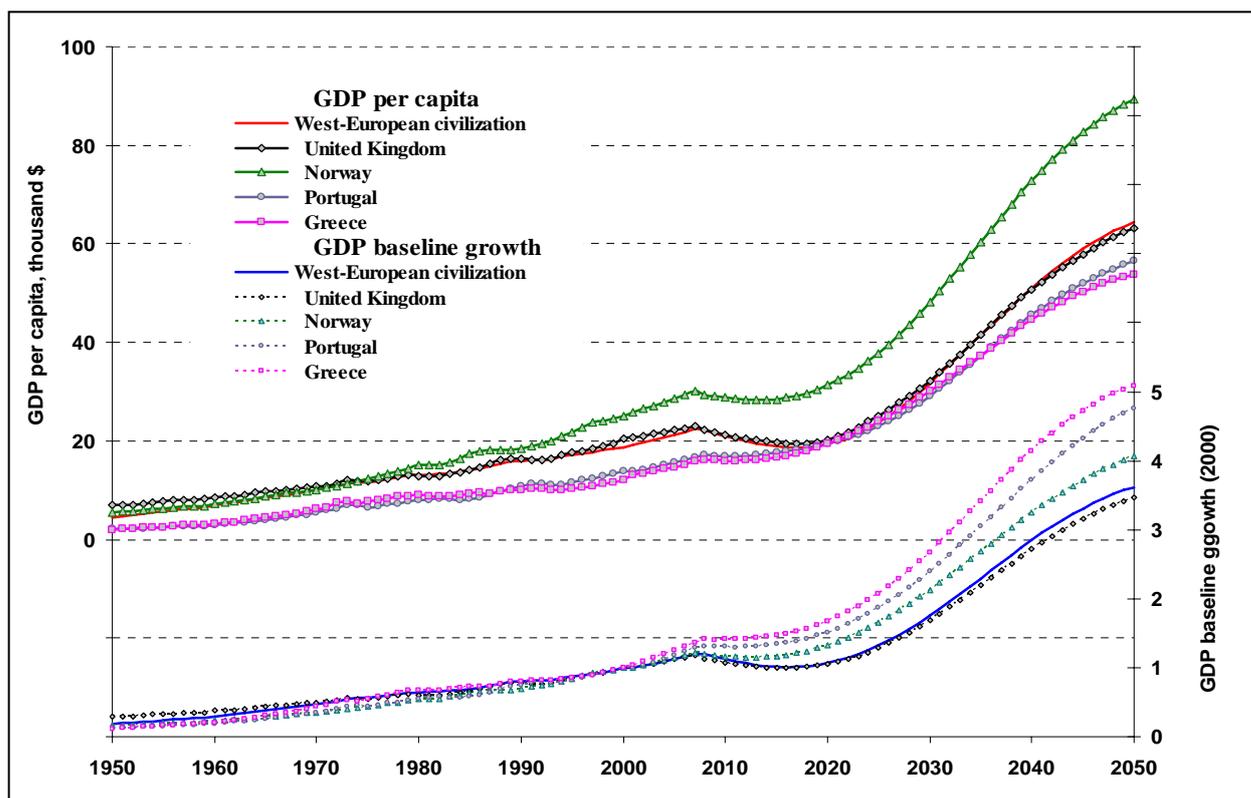


Figure 9. Evolutionary dynamics of GDP and GDP per capita West-European civilization

2. North American civilization

This civilization is quite naturally considered to be affiliated from the West-European civilization and from the end of XIX century it has occupied leading positions in the world for GDP per capita (4,5 times higher than the average world level). It was this civilization that demonstrated the highest and steady rates of innovative - technological and economic development in the XX century. As a consequence of such dynamical development it has a leading role in the global civilization on the boundary of the second and third millennia. At the same time this civilization has gone through a number of serious economic crises (1929-1933, second half of 1950s and the middle of 1970s). Now America experiences the heaviest financial and economic crisis that should be reflected in the dynamic characteristics of the system as a whole. The forecasts made by us show that the North American civilization, having overcome crisis, will show steady rates of growth in the first half of XXI century and will manage to keep leading positions in the world, first of all due to the huge accumulated intellectual, technological, economic and military potentials. Most likely this civilization also will not avoid the certain structural instability that will cause decrease in the rates of economic development. The density of the USA in the world economy in the long term most likely will decrease in connection with the eminence of Chinese, Indian and maybe Latin American civilizations. The increased charges of the huge internal and external debt as a payment for exit from the crisis sooner or later will have its effect. Figure 10 gives the trajectory of economic development of the North American civilization for the period up to 2050.

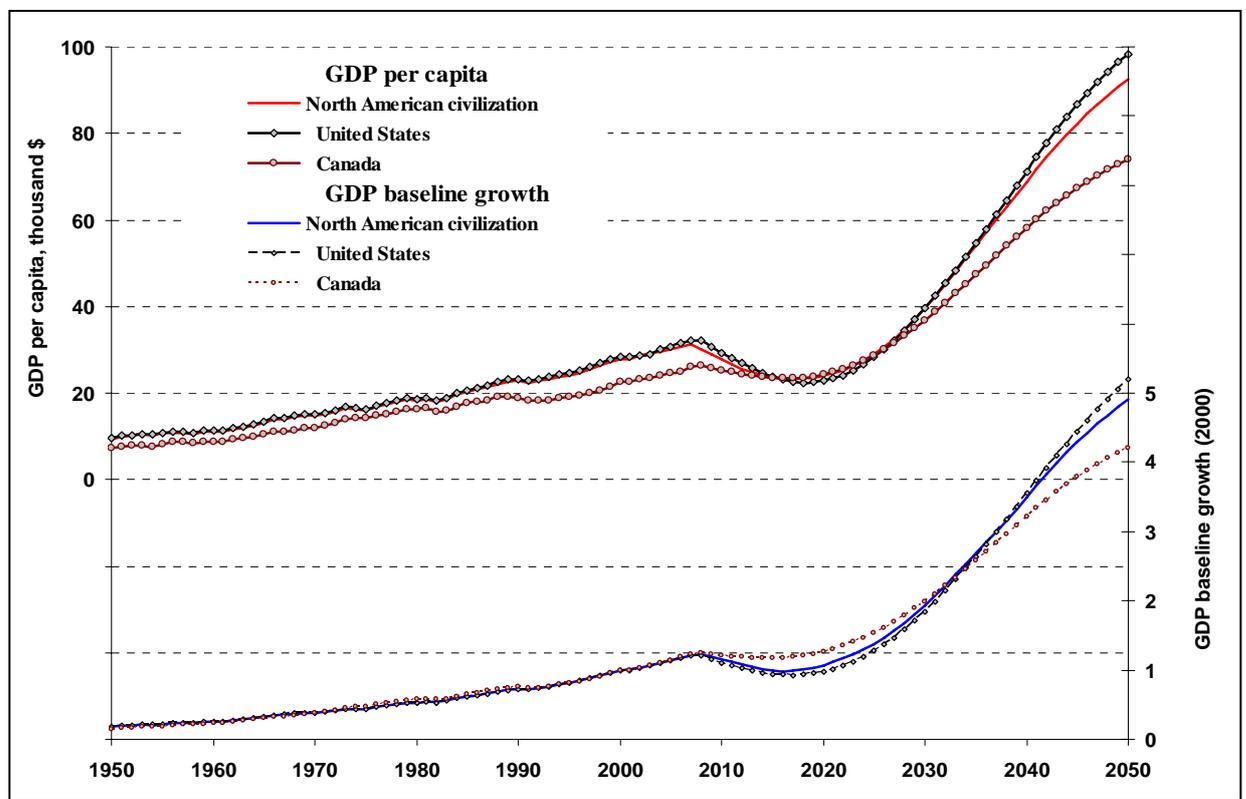


Figure 10. Evolutionary dynamics of GDP and GDP per capita North American civilization

3. Latin American civilization

For a long time this civilization remained politically shattered, and as for its economy, it was a source of raw materials and manpower for the West-European and North American civilizations. The second half of XIX century, at the background of the struggle for national independence, became a period of economic revival for the countries of Latin America and has provided them with a stable economic development. Favorable conditions of formation and development of this civilization were presented by natural, ecological and demographic factors. In the second half of XX century the organizations of regional economic and financial cooperation, which have played an important part in coordination and development of joint economic policy, were created. Such cooperation has led to a big openness of the markets and structural reforms of branch and over branch nature. The countries of Latin America were characterized by certain asynchrony and instability of the economic development: a rapid development of energy sources branches was not accompanied with a proper technological modernization of processing sectors of the industry. The openness of financial markets and close attachment to the markets of North America have caused intensive involvement of the Latin American civilization in globalization processes. Nevertheless, as our calculations show, this civilization will keep rather high rates of growth, but some structural instability (see figure 11) will be inherent to it.

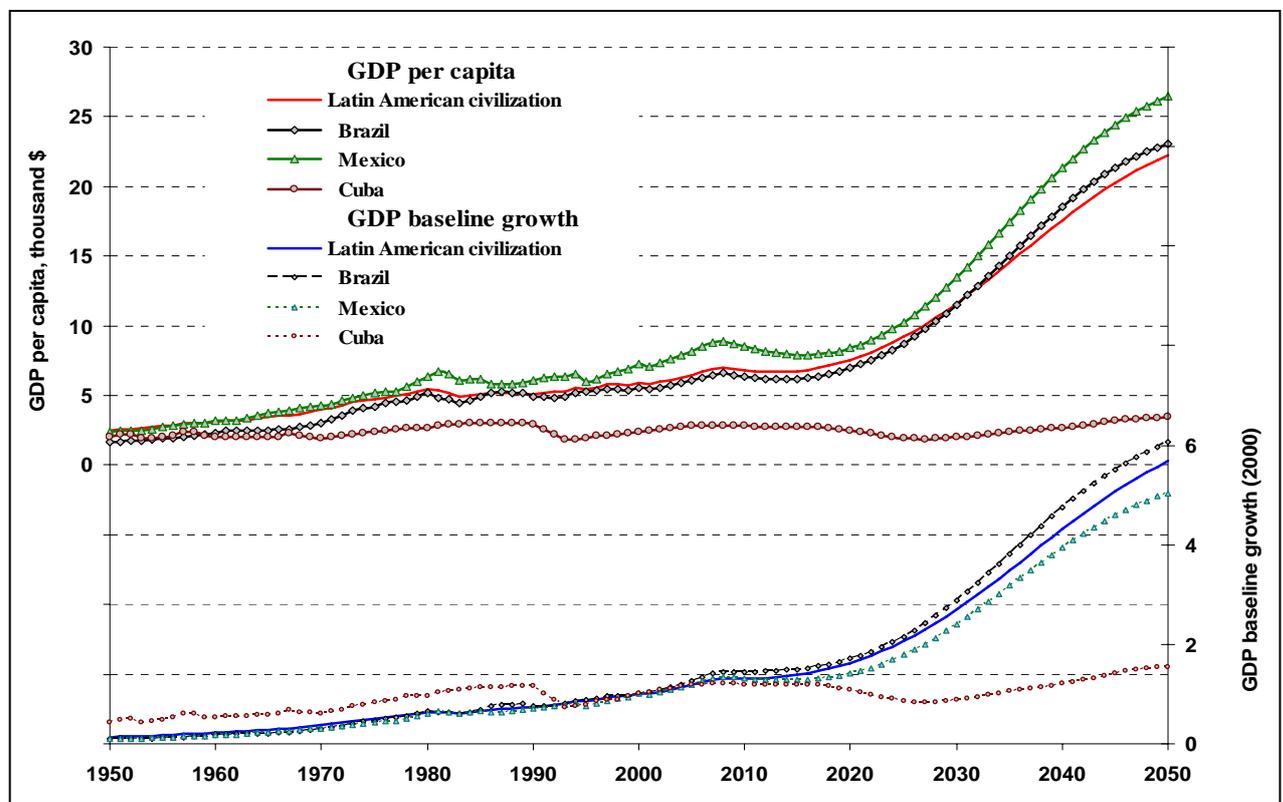


Figure 11. Evolutionary dynamics of GDP and GDP per capita Latin American civilization

4. Eurasian civilization

The Eurasian civilization has been existing for many centuries, the core of it is Russia. In the 50s of the last century the Eurasian civilization had the rates of development considerably outstripping the average world ones. Its share in the world GDP had grown from 11,1% in 1950 up to 14,5% in 1960, and the level of GDP per capita had doubled the average world one. However, in the 70s - 80s the first signs of stagnation appeared, the share of the USSR in the world GDP decreased, and in the 90s it was 2,4 times less, the prompt collapse of manufacturing of GDP per capita took place. With disintegration of the USSR, the Eurasian civilization experienced significant socio-cultural and economic shocks. If in the 60s-70s the USSR occupied a large sector of the world technological market and supplied production of the fourth technological mode, now Russia acts mainly as an importer of the equipment and technologies of the fifth mode, and only with defensive products keeps its positions as a large player in the world market. As for the structure, the basic system making sector of the economy is traditionally energy raw materials and export of hydrocarbons. Such raw orientation of the economy represents a real threat for the future development as the general well-being directly depends on the conjuncture in the world market and the situation in the energy sector. Therefore, sharp fall of the world prices for energy carriers has led to the fall of manufacture and export, growth of unemployment, deterioration of positions of the country in the world market. Structural crisis is intensified by a demographic crisis: increasing rates of depopulation, aggravation of the age structure of the population and sharp growth of migratory processes. Similar tendencies are characteristic also for the economy of Kazakhstan as in the past it was a component of the Soviet economy.

On the background of such extremely adverse structural and demographic estimation there is a question about the place and role of the Eurasian civilization in XXI century. Making the forecast we recognized that the retrospective analysis of the economy of the Eurasian civilization during the newest time has not so big sample. To eliminate this factor, the dynamics of GDP of the USSR have been studied, and the prognostic function is constructed with the account of the listed above factors. The trajectory of the economic development of the Eurasian civilization received thus testifies to the presence of essential potential of growth, and under the favorable external and internal circumstances and realization of a strategy of innovative breakthrough the prospect of steady economic

growth in the first half of XXI century remains. At the same time, by virtue of the involvement of the Russian economy in globalization processes, technological lag and the raw orientation of the economy, it cannot avoid those negative consequences which the current financial crisis has for the economic development. In this connection the trajectory of dynamics of the Russian economy is constructed so that these negative consequences are taken into account as much as possible (see figure 12). But one cannot exclude also a worse condition if the inertial scenario will be realized and after exhaustion of the accumulated reserve funds Russia will not be able to enter the world and domestic markets with competitive production of the sixth technological mode.

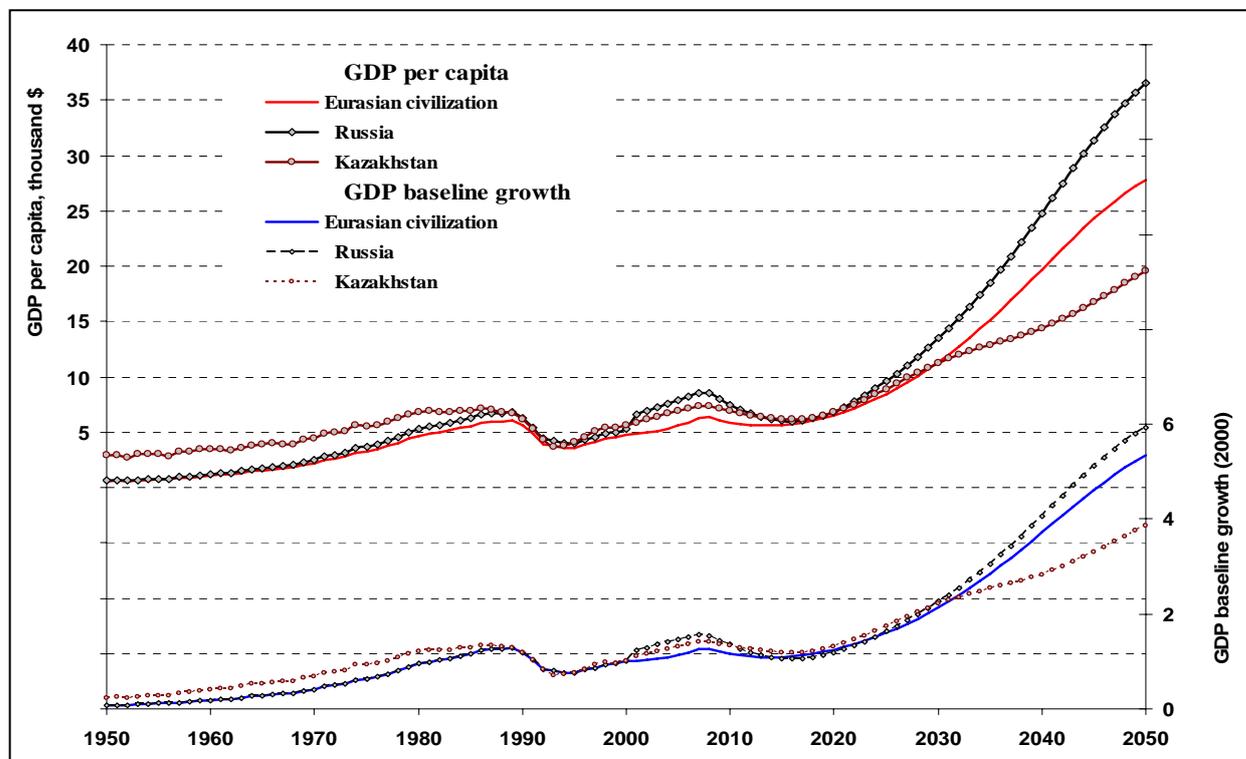


Figure12. Evolutionary dynamics of GDP and GDP per capita Eurasian civilization

5. Eastern European Civilization

The Eastern European civilization is inextricably related to West-European. It was quickly developing during the Middle Ages. After the all-European crisis of XIV century Eastern Europe began to revive again. Constant involvement in intercivilization conflicts - the Napoleonic wars, the First and Second World wars and smaller confrontations weakened its economic potential of development.

During the post-war period the Eastern European civilization, coming to be in the sphere of influence of Eurasian (USSR), quickly restored the lost positions. In the last quarter of XX century this civilization went through the crisis caused by stagnation and transformation of all post Soviet space.

As our calculations show, the Eastern European civilization will have stable development, due to the close integration with West-European. However, its development will be restricted by such factors as demographic and natural-ecological. At the same time the danger of decrease of competitiveness of local production remains in case of overdue development of the sixth and seventh technological modes. As for the internal civilization distinctions between the countries, the key factors providing steady development will be the population and the size of the territory.

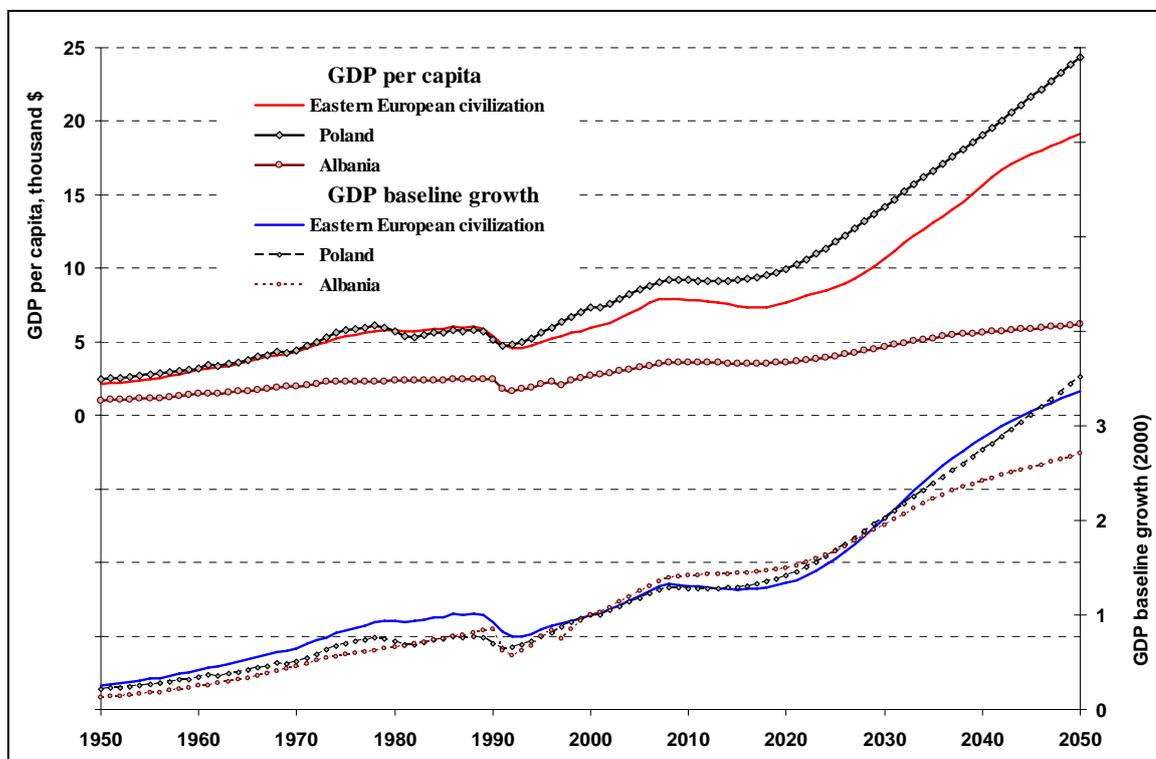


Figure13. Evolutionary dynamics of GDP and GDP per capita of the Eastern European civilization

6. Japanese, Indian, Chinese Civilizations

For a long time Japan was on the outskirts of the civilized world and till the beginning of XX century did not play any considerable role on the world stage. The modest place of Japan in the global civilization was aggravated by the policy of self-isolation and denial of a dialogue and mutual exchange of achievements with other local civilizations. Reforms of Meidzi epoch (1868) woke the country and gave an impulse to the fast rise of the economy. Japan showed especially high rates in the post-war years: the rates of gain of the GDP in 1951-1978 reached 9,29%, and in 1981-1990 - 10,7%. The share in the world GDP increased from 3 % to 7,8 %. However, since the 1990s the potential of innovative breakthrough of the Japanese economy has been practically exhausted and the economy entered the period of stagnation and recession. It also was aggravated by practically full absence of its own natural resources and sharply increased average age of the population. However, accumulated during the years of rapid economic growth technological potential keeps good prospects of development of this civilization in the first half of XXI century, which is proved also by our forecast.

In the first one and a half millennium of our era the Indian civilization was leading in the global civilizations space by its share of population, development of the economy, welfare, a variety and intensity of the spiritual life on the background of a deep crisis which was experienced by civilizations of the Mediterranean, Middle East and the north of Eurasia. However, the trajectory of civilizations dynamics of India during the next centuries began decreasing. Overpopulation of the country and in this connection deterioration of ecological conditions, overdue transition to manufactory and machine technological base of manufacture, feudal dissociation, invasions of overseas aggressors had its effect. The establishment of colonial domination and expansion of industrial production of United Kingdom led to the ruin of thousands of Indian craftsmen, first of all weavers, whose production was superseded not only from the world, but also from the domestic market. The ancient civilization came into the longest and deepest crisis in its history. Only after the Second World war, when India became independent, it began a difficult and long way of its revival. A part of the population of the country after a series of bloody collisions separated and became part of a Muslim civilization. The high mobility of the population, first of all connected to the intensive economic relations with the mother country, allowed it to approach the advanced achievements of Anglo-Saxon culture. As the long colonial domination of United Kingdom has turned English into the language of

not only cultural, but also technological communication, India could provide access to the advanced scientific and technical achievements of the West. Flexible enough policy of the Indian authorities after the gain of independence allowed the country to get familiar also with the achievements of science and technology of Eurasian civilizations (USSR). Such diversified approach to its own technological policy allowed the Indian civilization, despite the big demographical problems, to become a leading one on the Asian subcontinent. Our forecast shows, that stability of the development of this civilization will be substantially predetermined by a demographic situation in the country. At the present rates of growth of the population it will not be among the leaders, as it is shown in figure 14.

In pre-industrial epoch China had the world superiority in the volume of GDP and population. These positions were completely lost in XIX and first half of XX century: the country suffered from West-European and Japanese aggressions, long-term civil war and revolution. Record rates of the gain of GDP fall to the end of the 70s of XX century - about 10 % of average annual, the rates of growth in the last quarter of the century were a little slower. One should recognize, that in this period China provided sociopolitical stability within the country, became an example of steady development and sharply increased competitiveness of its goods in the world markets. At the same time the Chinese civilization in XXI century can face a number of objective restrictions, able to affect the rate of development. First of all, these are demographic and natural-ecological factors. According to the forecast of the United Nations, by 2030-2040 the country will enter a period of depopulation, ageing of the most part of the population and decrease of the share of citizens of innovative - active age. Even the stronger restriction will be presented by a natural-ecological factor, a fast exhaustion of own power resources and environmental contamination. As a consequence it all can lead to a possible deterioration of qualitative characteristics of growth. Our calculations show that, despite of a number of restrictions of objective character, the Chinese civilization will manage to overcome the economic crisis rather quickly and will have the highest rates of development and become one of leaders in the global civilization.

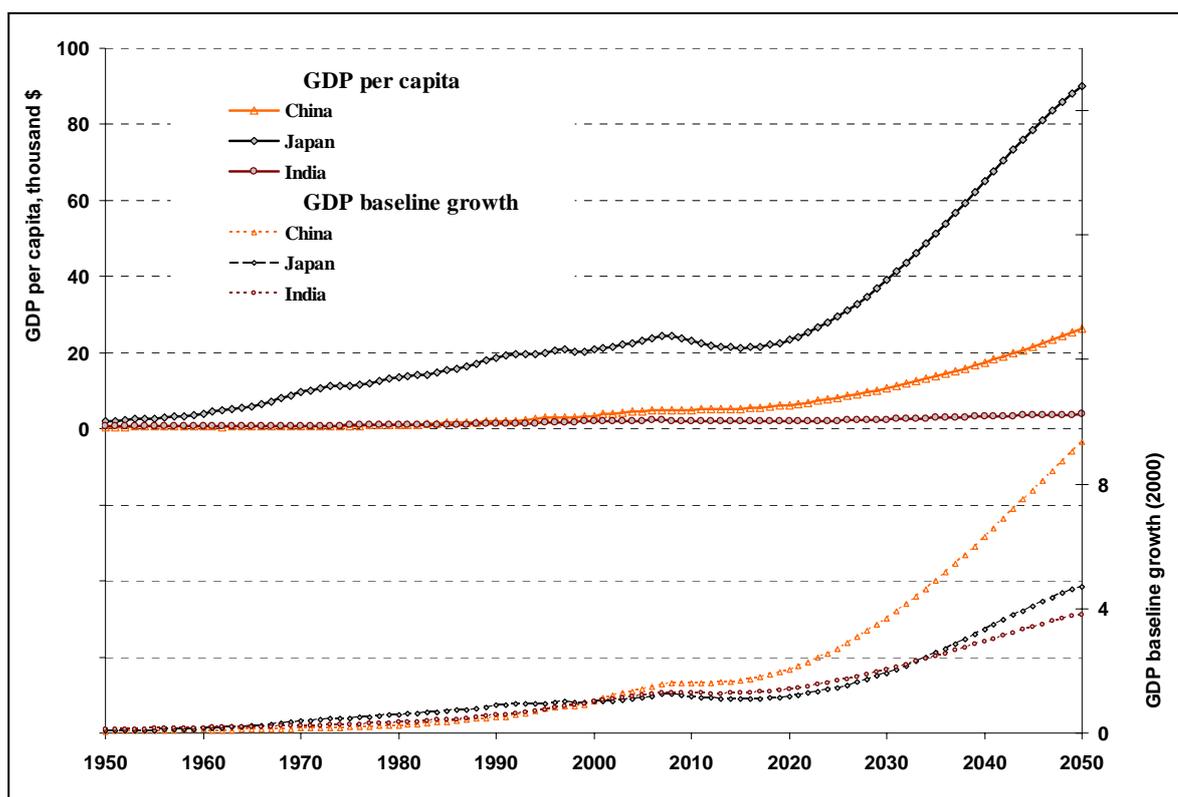


Figure14. Evolutionary dynamics of GDP and GDP per capita Japanese, Indian and Chinese civilizations

7. Buddhist civilization

In the first one and a half millennium A.C. the Buddhist civilization had rather high level of development of technologies, economy and culture. During the colonial expansion of the

Western European states the general level of development of this civilization sharply decreased. From the second half of XX century, when they gained independence, the countries of Southeast Asia had high rates of development. However, within the Buddhist civilization there is a certain unevenness of social and economic development. If in the beginning of the 60s Thailand had the highest level of development, since the second half of the 70s the palm is kept strongly by South Korea, and since the beginning of the 90s Vietnam and Laos have joined them. In the last quarter of XX century the Buddhist civilization has shown a high ability to perceive new technologies and innovations, to reform the system and make deep economic transformations. The high dynamic potential of this civilization is proved by our calculations: by the rates of growth of GDP by 2050 it will outstrip Japanese considerably.

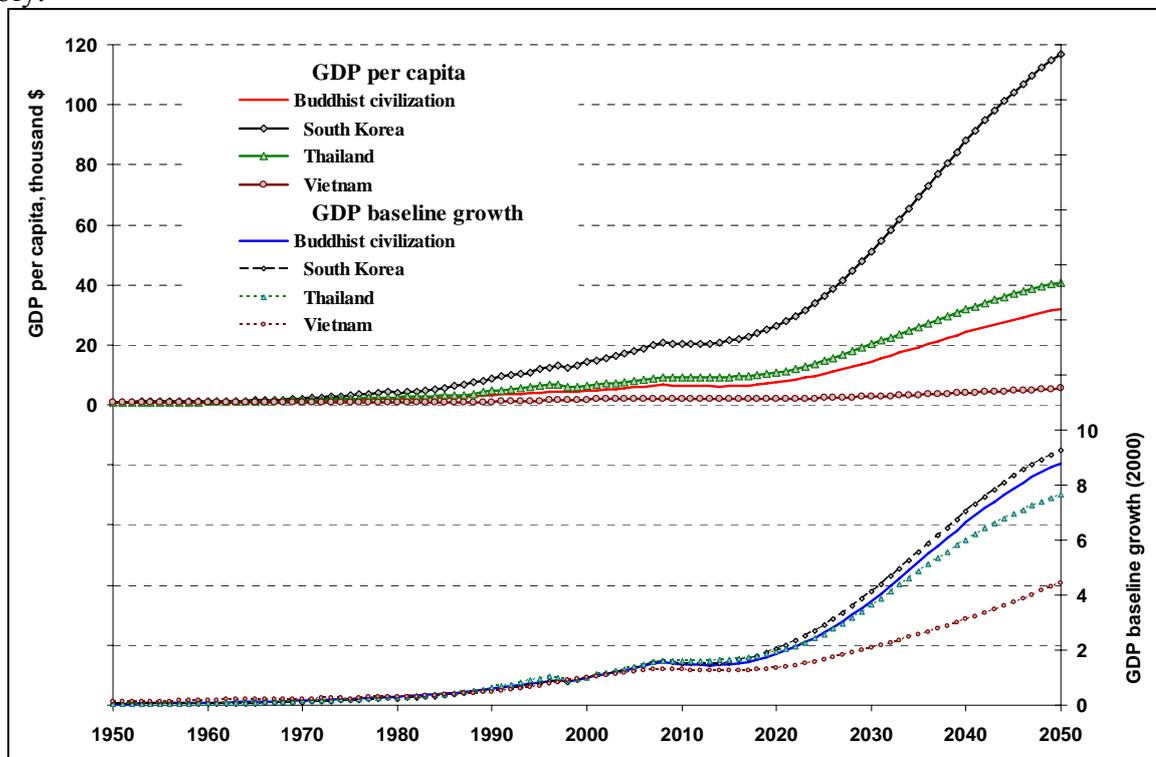


Figure 15. Evolutionary dynamics of GDP and GDP per capita Buddhist civilization

8. Muslim and African Civilizations

The Muslim civilization is comparatively young and hence besides the features of passionarity it also has readiness for changes. This civilization includes the states of the African and Eurasian continents.

The share of the Muslim civilization in the world GDP in the first half of XX century was rather small, the rates of gain almost in all countries were lower than the world average. In the 50s - 70s the rates of gain of GDP intensified considerably, which was caused mainly by the high prices for oil and other natural resources. According to the United Nations, in 1999 this civilization included 40 countries with the population of 982 million people, and on the background of the slowdown in economic development in the 80s - 90s of XX century it led not only to the internal social tension, but also to the external one. In such circumstances the development of the Muslim civilization has got elements of multipolarity: some countries (Turkey) have chosen a secular way of development, other countries (Iran) have chosen another way. At the same time it should be noted, that globalization processes form an objective basis of economic development of these countries, first of all, taking into account their big supplies of power resources such as oil and gas (figure 16).

The African civilization gained socio-cultural integrity only in the second half of XX century when the African states gained independence, strengthened relationships with each other, understood the similarity of economic and geopolitical interests. At the same time the evolutionary process has absorbed many elements of other civilizations, which gives to the African civilization a

certain variety political as well as economic. It should be noted, that both African and Muslim civilizations have met the same challenge of XXI century: innovative development, political consolidation and common aims of development. As it is shown in figure 17, the development of these civilizations will be steady, with certain fluctuations under the conditions of internal political instability.

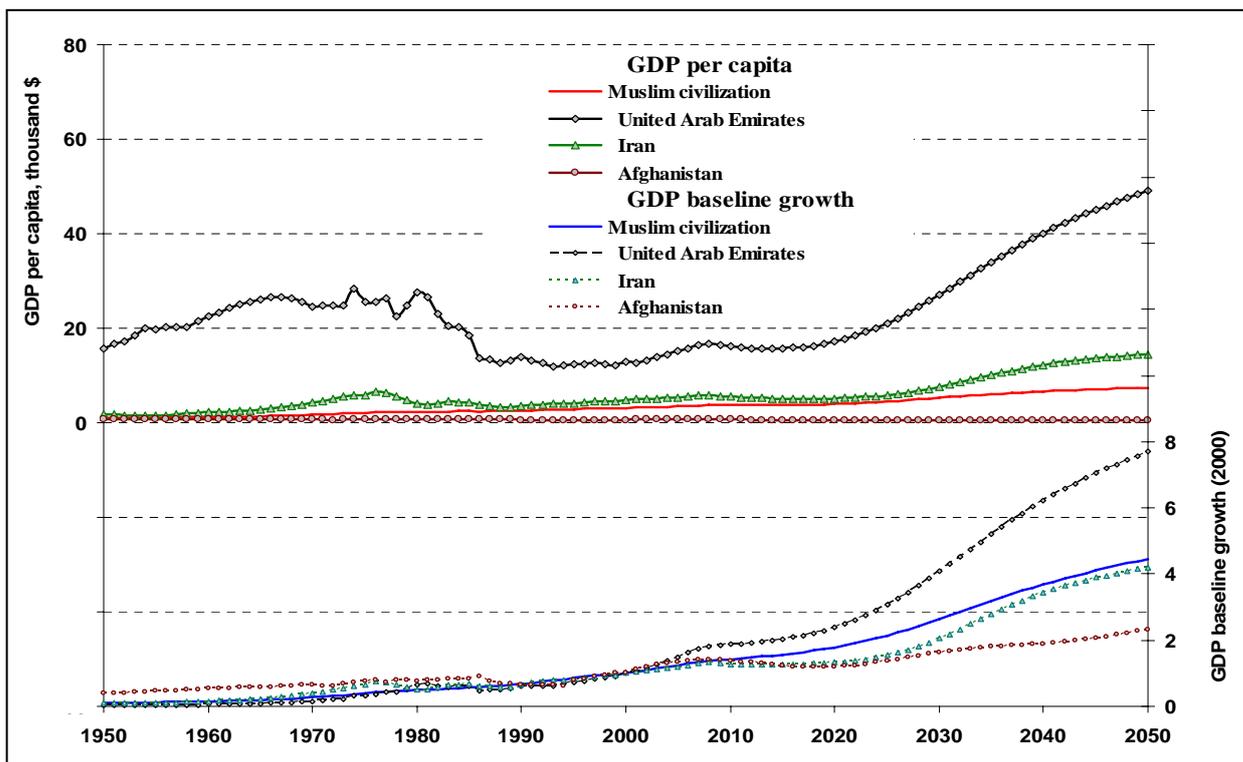


Figure 16. Evolutionary dynamics of GDP and GDP per capita
Muslim civilization

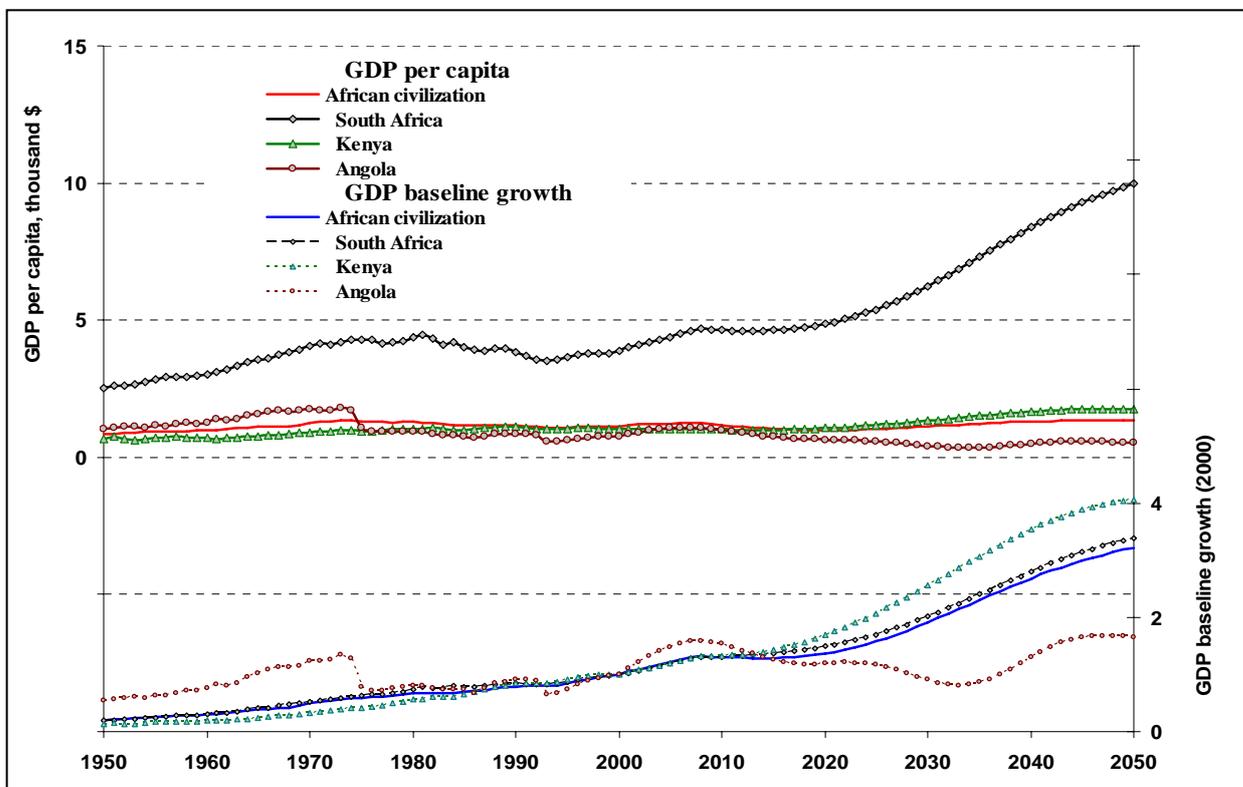


Figure 17. Evolutionary dynamics of GDP and GDP per capita
African civilization

9. Civilization of Oceania

Colonization of Australia, New Zealand and islands adjoining the continent began from the end of XVIII century. After the Second World war on the islands of Polynesia, Melanesia and Micronesia there was a set of small states, however, speaking in terms of the economy, technology and politics, the vanguard countries are Australia and New Zealand. The share of these two countries in 2002 was 1,41% of the world GDP. XX century became a period of fast industrial development of Australia and New Zealand. Availability of rich natural resources, fast economic and technological rise have provided these two countries with leading positions in the dynamics of the local civilization. According to our forecasts (figure 18), in the first half of XXI century these two countries will keep the vanguard role in the innovative - technological and socio- economic development of the civilization of Oceania.

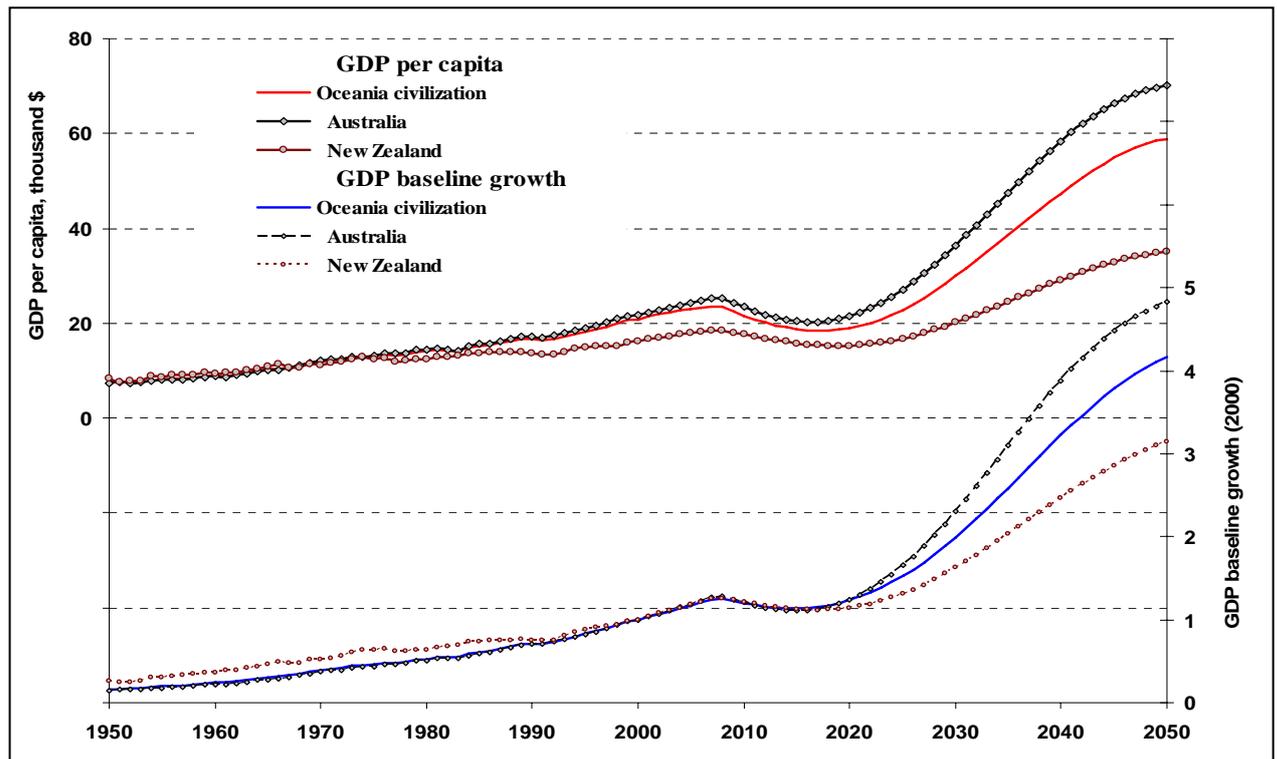


Figure 18. Evolutionary dynamics of GDP and GDP per capita civilization Oceania

Prognostic calculations prove the thesis of unevenness of the economic and technological dynamics of civilizations. As for the rates of growth, the leaders here will be the Chinese and Buddhist civilizations. By this parameter the West-European and African civilizations will have the lowest rates of growth in the first half of XXI century. Another important factor of development will be instability, most likely of structural nature, which will significantly affect the economic trajectories.

It should be taken into account, that the first half of XXI century will be a transition period of deep transformation at first in the vanguard, and then in lagging countries. It is connected to a considerable slowdown in the rates of economic growth. But also in the second half of the century, after the consolidation of a postindustrial technological way of production and formation of integrated economic sphere, the record parameters of the third quarter of XX century connected to the post-war rise of the economy, scientific and technical revolution, race of arms and intensive exploitation of new natural productive forces will be hardly achieved (Table 14). One should also take into account the falling rate of growth of human resources and population in most of the countries and civilizations in

Forecast growth of GDP per capita of civilizations
in I-st half of the XXI-st century

Civilization	Base rate of growth of GDP per capita		Annual growth rate of per capita GDP,%				
	Actual 2000 to 1950	Forecast 2050 to 2000	2001-2010	2011-2020	2021-2030	2031-2040	2041-2050
West-European	4,2	3,4	1,1	- 0,8	5,1	4,9	2,4
Eastern European	2,8	3,2	2,8	- 0,2	3,3	3,9	2,0
Eurasian	8,5	5,8	2,1	1,0	5,7	5,7	3,5
Buddhist	6,5	6,8	3,1	1,5	6,9	5,2	2,8
Chinese	7,6	7,7	3,9	2,3	5,4	5,0	4,3
Japanese	10,8	4,4	1,1	0,1	5,3	5,2	3,3
Indian	3,1	2,0	0,8	- 0,7	2,5	2,7	1,6
Muslim	3,1	2,4	1,9	0,8	2,9	2,3	1,1
African	1,3	1,2	0,4	- 1,7	1,3	1,5	0,2
Latin American	2,3	3,8	1,4	1,1	4,4	4,2	2,4
North American	3,0	3,3	- 0,1	- 1,4	5,2	5,7	3,0
Oceania	2,7	2,8	0,4	- 1,3	4,7	4,7	2,2
World	2,9	2,7	1,4	- 0,1	3,7	3,7	1,4

We believe it should be noted, that the world leadership in the rates of development does not mean leadership absolute: economic, technological and social. The trajectory of development of local civilizations is characterized by significant starting disorder in absolute parameters of the level of GDP. It is thanks to their huge accumulated economic and technological potential that the West-European and North American civilizations will keep their strong positions in the first half of XXI century (Table 15, figure 19).

Table 15

¹⁵ The forecast model doesn't take into account this serious factor of the growth restriction. According to the latest research, the changes of the demographic structure of the population can strongly affect the rates of economic growth. For example, in the next 50 years the share of the working age population of Korea will have a 30% decrease, whereas the share of the retirement age population will increase from 15% to 65%. The same tendency will be characteristic for the Big Seven countries, where this rate will grow from 25% to 45%. The expected social expenses regarding these demographical changes will make 11% of GNP in Korea and 4,5% of GNP in the Big Seven. – Republic of Korea: Selected issues. October 2007. IMF Country Report #07/345/ - p.4-5.

Forecast level of GDP per capita of civilizations
in I-st half of the XXI-st century

Civilization	GDP per capita, thousand \$					
	Fact	Forecast				
	2000	2010	2020	2030	2040	2050
West-European	19,2	21,0	19,3	31,7	51,0	64,3
Eastern European	6,0	7,8	7,7	10,7	15,7	19,2
Eurasian	6,7	5,9	6,5	11,3	19,7	27,8
Buddhist	4,7	6,4	7,5	14,6	24,2	32,1
Chinese	3,4	5,0	6,3	10,7	17,4	26,5
Japanese	20,7	23,0	23,3	39,1	65,0	90,2
Indian	1,9	2,1	1,9	2,5	3,2	3,8
Muslim	3,1	3,7	4,0	5,3	6,7	7,4
African	1,1	1,2	1,0	1,1	1,3	1,3
Latin American	5,9	6,8	7,5	11,6	17,6	22,2
North American	27,9	27,7	23,9	39,6	68,9	92,4
Oceania	20,8	21,6	18,9	30,0	47,3	58,9
World	6,0	6,9	6,8	9,8	14,1	16,2

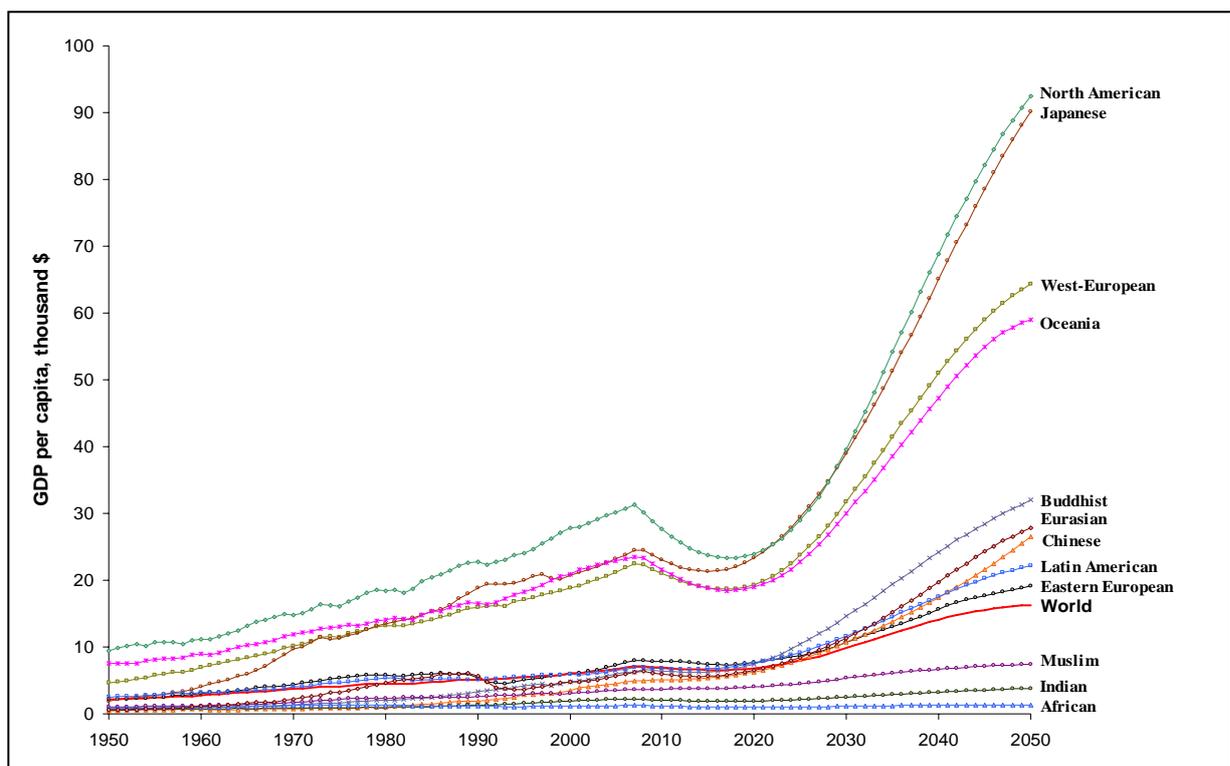


Figure 19. Evolutionary dynamics of GDP per capita
in the context of local civilizations

At the same time, the significant potential of consumption in the domestic markets of civilizations of Asia (first of all, Chinese, Japanese and Buddhist civilizations) is able to change considerably the tendencies of global development: the high capacity of domestic markets will also cause a radical technological modernization of their economy, will lead to a considerable growth of GDP per capita. Table 16 gives forecast values of GDP per capita for some countries, which show that the tendency of the uneven development of countries as well as local civilizations will be kept during the first half of XXI century. If the world GDP per capita will make 16,2 thousand dollars in 2050, in

some countries it will be much lower: in Afghanistan - 0,6 thousand dollars, in Kenya - 1,7 thousand dollars, in India - 3,8 thousand dollars and in Albania - 5,5 thousand dollars.

Table 16

Forecast level of GDP per capita for selected countries
in I-st half of the XXI-st century

Civilization	GDP per capita, thousand \$					
	Fact	Forecast				
	2000	2010	2020	2030	2040	2050
<i>West-European civilization</i>						
United Kingdom	20,4	21,2	20,3	32,2	50,8	63,1
Norway	25,1	28,2	31,4	48,4	73,2	89,2
Portugal	13,8	16,9	19,5	29,1	45,5	56,5
Greece	12,1	16,0	19,3	30,1	44,6	53,8
<i>Eastern European civilization</i>						
Poland	7,3	9,2	10,0	14,2	19,1	24,4
Albania	2,7	3,6	3,6	4,7	5,6	6,2
<i>Eurasian civilization</i>						
Russia	5,3	7,5	6,8	13,5	24,8	36,5
Kazakhstan	5,6	6,9	6,8	11,3	14,4	19,6
<i>Buddhist Civilization</i>						
South Korea	14,4	20,2	26,4	51,1	87,9	116,9
Thailand	6,4	9,3	10,8	20,2	31,8	40,8
Vietnam	1,8	2,1	2,0	2,8	4,0	5,5
<i>Chinese civilization</i>						
China	3,4	5,0	6,3	10,7	17,4	26,5
<i>Japanese Civilization</i>						
Japan	20,7	23,0	23,3	39,1	65,0	90,2
<i>Indian civilization</i>						
India	1,9	2,1	1,9	2,5	3,2	3,8
<i>Muslim civilization</i>						
UAE	12,9	16,1	17,2	27,1	40,1	49,1
Iran	4,8	5,5	5,2	7,6	12,2	14,5
Afghanistan	0,6	0,7	0,5	0,5	0,5	0,6
<i>African civilization</i>						
RSA	3,9	4,6	4,9	6,2	8,4	10,0
Kenya	1,0	1,0	1,1	1,3	1,7	1,7
Angola	0,8	1,0	0,6	0,4	0,5	0,5
<i>Latin American Civilization</i>						
Brazil	5,5	6,3	6,9	11,5	18,5	23,1
Mexico	7,3	8,5	8,4	13,5	21,3	26,5
Cuba	2,4	2,8	2,5	2,0	2,7	3,4
<i>North American civilization</i>						
United States	28,5	29,4	22,8	39,6	71,2	98,3

Canada	22,5	25,2	24,2	36,8	58,2	74,0
<i>Civilization Oceania</i>						
Australia	21,7	23,4	21,4	36,4	58,4	70,1
New Zealand	16,2	17,6	15,3	20,1	29,1	35,1

The General Conclusions

1. For all local civilizations the processes of cyclic development, unevenness and instability are characteristic.

2. During the postindustrial period the processes of cyclic dynamics will keep their influence on the processes of economic development, moreover, the following features will be characteristic for them:

- reduction of the duration of the big cycles of conjuncture in the process of acceleration of the rate of change of technological modes;

- asynchronization of processes of the cyclic dynamics will tend to decrease and to become smoother;

- cycles of average duration will be synchronized with phases of innovative - technological upgrading of manufacture.

3. The macroeconomic structure will be changing towards the increase of densities of sectors of material production:

- there will be a decrease of the share of financial sector and services;

- the share of manufacturing industry will increase;

- production in the agrarian sector, first of all regarding improvement of consumer properties of production and increase of its science intensiveness will change qualitatively; development of production to overcome famine on the planet;

4. High rates of development of individual local civilizations cannot completely solve the problem of closing the gap between different levels of their development because of the huge gap in the resource potential of individual civilizations.

5. Nonlinear trajectories of development will be equally characteristic for all local civilizations, irrespective of the level of their initial positions.

6. It should be expected, that after the deep, global financial and economic crisis and the subsequent economic crisis of the second half of the 2010s, on the decrease of a wave of the fifth Kondratiev cycle, a rather long period of higher rates of economic growth of the upward wave of the sixth Kondratiev cycle will begin, when crisis phases of medium term cycles will be less deep and long. However, by the middle of XXI century the potential of the upward wave of the sixth mode will be essentially exhausted and a wave with gradual decrease of the rates of growth and a deepening of crises of medium term cycles will begin.

9.3. Development of Global Civilization System: The Main Principles, Basis Equation and Modelling.¹⁶

Abstract. The development of the world economy shows systematic complication of the construction with periodicity in 70 years. The work offers a verbal description of the development of the world economy as a complex social system and non-linear dynamic model that is based on the population growth on the earth and two fundamental laws: the law of conservation of the economic potential of a system and the principle of minimum dissipation of resources that are implemented by system ability to self-organization. The main principles of conducting numerical experiment and the analysis of the findings are studied together with the model.

Key words: System sustainable development, System self-organization, sustainable development of the global system,

1) Introduction

Scientists' interest in problem of economic development increased in the second part of the XX century when there arose a sharp contrast between developed countries of "the golden milliards" and the third world countries which were defined as developing countries or countries with developing economy. The contrast in the level of income among countries of the world community determined scientists' interest in analyzing conditions for nation welfare as well as in maintaining these conditions for highest possible period of time. The necessity of such analysis predetermined using the mathematic modeling of the economic growth. The first significant result was the combined model of Harrod-Domar based on changes of the main economic parameter which influences economic growth – the rate of investments. With increase in understanding influence of human capital, technologies and population upsurge on economic growth, the task of optimal economic growth was developed in the form of Solow and Solow-Swan's model with the function of Cobb-Douglas to be used. The growth of technologies and the population upsurge are also introduced into the model. These factors influence the main parameter of economic growth – fixed capital per worker, which defines efficiency of labor that is the economy growth rate.

Later there appeared models of economic growth by Ramsey, Braun, P. Romer, the models of technological changes, the model of Uzawa-Lucas with two sectors, Schumpeter models of endogenous growth. With the help of these models scientists studied factors that influenced economic growth, among these factors were human and physical capital, technological changes, diffusion of technologies, migration and population upsurge, environmental pollution. Besides, an American economist W. Rostow studied conditions for sustainable growth of long duration. The works by S. Kuznets became the base for further development in understanding sustainable economic growth. According to Simon Kuznets, sustainable economic growth is a process of increase in productivity of national economy which has to exceed the population upsurge for the highest possible period of time. Thus, efforts of economic theory in the XXth century were directed at analyzing conditions that provide long-run economic growth. Then the concept claiming that economic growth lies in necessity of maintaining equilibrium state of economy with economic methods during the highest possible period of time was formed.

Almost all these approaches being expressed by mathematic models of economic growth did not find their qualitative application in economies of developing countries and later in the second part of 80-90es of the XXth century they did not find an application in analysis of economic behavior of countries with transitive economies.

There were approaches towards forming models of economic development including those which take into account structural changes in economy. For example, Arthur Lewis's model with two sectors; later this model was expanded and formalized by J. Fti and G. Ranis, the model of H. Chenery and others.

Being based on the experience of countries with developed economies, these models and theories connected with them turned to analysis into developing economies of the third world countries.

Further the elaboration of sustainable development theory reached the basic formal assertion widely accepted in the world as a category that is follow: “Sustainable development is the development that serves needs of today’s generations and does not place possibilities for their usage by future generations under the threat” (WCED, 1987).

Correspondingly, the basic category of sustainability has the following formulation: “Sustainability is putting technical, scientific, ecological and economic social resources in order so that the resulting system can be maintained in an equilibrium state for some time and in space” (WCED, 1987).

The work of G. Brundland’s committee resulted in categories stated above.

Thus, “sustainable economic development” and “sustainability” categories came from the environment of analysis into conditions for optimal economic growth basing on the postulate which necessitates exceeding the growth of national production against population upsurge. However, today there is no well-founded answer to the question: **“Why have these models not given the practical result in countries with developing and transitive economy?”** **What do the existing models of economic growth not take into account?”** **Why are the existing models of development inadequate for changes occurring in many kinds of economies in the world?**

2) The system of approach to the theory of sustainable economic development

It is obvious that the reason why existing models of economic development are inadequate for actual changes in economic life consists in approach towards understanding the concept of the following categories: “development”, “sustainability” and “sustainable development”. There is a need for accurate understanding the content of these categories; understanding should be based on adequate mathematic apparatus from natural sciences.

The analysis shows that models of economic growth as well as development models based on this approach do not function during long periods of time in economies of countries with an unstable (transitive) political system. Institutions of implementation of economic policy strategies that are based on applying existing models of economic growth are missing. This fact causes all attempts to create qualitative economic changes in society during all periods of time to fail.

In accordance with N. Konradiev and Schumpeter’s approaches contemporary scientific theory has a great number of works on models of cyclic economic growth. Owing to these works we can clearly see time limit of classic and neoclassic models of economic growth; these models describe only one stage in a cyclic development – equilibrium or the stage of economic growth.

Models of cyclic development are not a substantial instrument for analyzing the process of economic development either.

The general theory of systems and the information theory provide other approach to qualitative understanding of the phenomenon of economic development.

Development is considered as the process of accumulating structural information that increases the level of system organization.

The general system theory holds development as the change of system states during a long period of time. Every state of a system is characterized by structural and quantitative characteristic.

Thus, in the process of system development there is a change of structural and quantitative characteristic. It shows the evolution of the system structure that adapts the latter to environmental impact. In economic system environmental pressure lies in population growth and in limit of natural resources. The adaptation of the system takes place due to accumulating structural information, which raises sustainability on the basis of increase in the quantity of system organization.

Materials covered above testify the following conclusion: the model of economic development should contain the parameter that would characterize the structure of economic system in the sense of conditions and interaction regulations of economic agents among themselves. Numerical solutions of

this model should show the evolution of this structure, which provides sustainability of a social system during a long period of time in the sense of its integrity. The political structure and the monetary system serve as a structure for a social system.

Thus, the category of “sustainability” takes a new content. The theory on sustainability which originates from works by Puankare and Lyapunova has a rule to answer two key questions:

- What exactly do we investigate for sustainability?
- Sustainability concerning what or in a sense of what do we investigate?

From all abovementioned information in the context of system-information understanding of sustainable development of social system we can claim that:

1. We investigate the process of social system development for sustainability; this system consists of political and social subsystems where the political system is the structural characteristic whereas the economic system gives the quantitative indicators of its states.
2. We investigate sustainability in the sense of maintaining integrity of the social system during a long period of time with regard to population growth in the condition of limited resources.
3. The sustainable development of a social system is the consecutive, periodical change of its states during a long period of time, directed at increase in system sustainability (in a sense of maintaining its integrity) on the basis of restructuring its relations – evolution of a system structure. In a mathematical sense we can give more strict definition as to sustainability of social development that is based on availability of undetermined behavior in a social system.
4. The sustainable development of a social system is a consecutive change of states where all possible trajectories of its development are attracted to the area of sustainable positions in a phase space. The area is defined by the set of attractors characterizing the treatment of system functioning for a given period of time.
 - 4.1 The set and the structure of attractors are defined by the quality and the type of a political structure.
 - 4.2. The sustainable development of a social system is the movement of economic environment where solution to the system non-linear differential equation, describing it in the form of equation of economic environment movement, is sustainable against impact of managing parameter.

3) Self-organization of social systems

As we know the concept self-organization came to social sciences from physics, after the phenomenon chaos was discovered through the works by G. Haken, I. Prigogin and other scientists.

In natural sciences self-organization independently complicates the structure in conditions of strong instability of environment with the aim to maintain its sustainability against impact of environmental factors. Self-organization is peculiar to objects of inanimate and animate nature.

In case of social systems self-organization has a few levels:

The first level is a microlevel – the level where economic agents compete among themselves for limited resources and wealth; it results in optimizing their market distribution.

The second level is a macrolevel – the level where rules of economic game among agents concerning resource allocation and wealth distribution based on political subsystems as an optimal macroeconomic policy are formed independently. It maintains optimal resource allocation and wealth distribution among economic agents during a long period of time.

The third level is a metalevel – the level where the political structure and institutions of a social system are restructuring independently; we can witness it in the countries with transitive economy and we call it the process of transportation.

Correspondingly first two mechanisms of self-organization are implemented within sustainable functioning of a system. The third mechanism appears when the integrity of a system is under threat that is sustainability exceeded its boundary values.

Thus, the constant optimization of resource allocation and wealth distribution among system agents is the base to maintain its integrity for a long period of time. It is implemented through independent actions of economic system agents; actions are based on regulations laid down in a political structure that is through developing and implementing macroeconomic policy.

4) Correlation between self-organization and social system development

The process of forming and implementing optimal macroeconomic policy as well as its flexible correction in case of inaccuracy is the process of accumulating structural information for a long period of time. It connects with the fact that system being based on feedback laid down in a political structure receives the information about its current state. This forms the managerial decision by way of macroeconomic policy.

We can witness the evident fact about interrelation between self-organization and social system development as well as connection between level of self-organization and sustainability of system in the sense of its capacity to optimize macroeconomic policy and to react to economic and social destructive changes.

Self-organization is the mechanism of social system development where the quality of political structure defines possibilities of social system concerning sustainable development in the sense of transfer from crisis to economic growth without conflicts.

5) Principles of self-organization and sustainable development

There are two laws playing a defining role for sustainable development aimed at maintaining integrity of a system in conditions of population surge:

1. Principles of minimum dissipation of system resources are formulated as follows: “Every subsequent state of a system dissipates less resource than the previous one. In economic sense in every subsequent state resources are allocated in more optimal way than in the previous state; it expends economic effect, compensating increase in environmental impact.” The principle of minimization of dissipation or scattering minimization that is optimization of resource allocation for production and distribution of goods for consumption naturally decreases resource dissipation. In other words the process of optimizing or implementing the principle of minimization of dissipation has a reverse direction concerning resource dissipation – production output Y . The counteracting force F as for dissipating of system resources called as the principle of minimization of resource dissipation opposes to economic growth or rate of production output Y' with the coefficient K_S that reflects structural qualities of the system – its institutions (political system) to produce useful work concerning optimization of resource allocation for producing goods to be consumed as well as reaction rate of the political system towards unfavorable economic changes in the form of structure adjustments in the current macroeconomic policy and changes of its direction in case of fallacy by non-conflict way through changing party in power to opposition. Putting it in other words, it is force that reflects the value of self-organization of the social system S . It can be recorded as:

$$S \quad Y'K_S \quad (1)$$

the sign «-» means opposition of effect of force that compensates dissipation where S – the quantity of self-organization;

Y' - economic growth;

K_S – structural coefficient reflecting usefulness of the system structure as for producing economic effect when optimizing resource allocation for production and goods for consumption.

2. The law of conservation of system economic potential.

2.1. Economic potential – system ability to produce economic effect.

2.2. Social system transferring from one state of the system into another in the process of social development maintains economic potential unchangeable.

It means the following:

When in the process of development social system transfers from one state into another one it maintains the ability to produce economic effect and to create economic effect necessary and sufficient in order to maintain system sustainable in terms of preserving its integrity.

Economic potential of the social system is the ability to execute the work as for producing economic effect; this ability is produced by the system transferring from one state into others, which provides system integrity or sustainability of development process.

Economic potential is the potential ability of the economic system to execute the work as for producing economic effect when transferring from one state into another one in the process of system development necessary and sufficient in order to guarantee system integrity or sustainable development in conditions of increasing population and scarcity of limited resources.

$$P_{(E1)} = P_{(E2)} = const \quad (2)$$

Interrelation between sustainable development and self-organization can be seen in the figure 1.

6) Mathematical formalization of sustainable development

From information stated above it follows that the model of economic development should show:

- the evolution of social system structure during some time
- boundary conditions of sustainability of system development
- replacement for treatments of system functioning

This is extremely important! Being based on economic growth models, economic development models show only one treatment of functioning - adaptation, that corresponds to economic growth state – equilibrium state. At the same time we know that restructure of economic relations that forms a new structure and maintains sustainability occurs at times of crises laid in nature of economic cycle through bifurcation treatment of functioning.

Economic effect indicates efficiency or sustainability of development and can be formulated in the following way: $Y''/L'' \geq I$.

Potential of creating economic effect consists in ability to maintain productivity (efficiency) of a system at which the condition $Y''/L'' \geq I = const$ is to be implemented. This condition also characterizes the sustainable development.

Economic efficiency as a dynamic characteristic of development is the sustainable (constant) excess of growth rates of GDP over growth rate of population in a social system. Accordingly, to maintain system sustainability means maintaining its potential of creating economic effect $Y''/L'' \geq I = const$.

7) The model of development and self-organization of the world economy (Global system)

The example of self-organization and development of a complex system can be seen while studying changes in the states of the world economy during the period from 1825 to 2035.

In the context of growing conflict tendencies of the XXIst century it is getting evident that existent institutions of the global system – supranational organizations and the system of international exchange of resources – do not provide development of the global system without conflicts. Therefore the most urgent task of nowadays is to make a forecast as to forming such social institutions that can guarantee coexistence of local civilizations without conflicts as well as sustainable development of the global system of the XXIst century.

The system of rules about interaction between countries as a political structure of the global system of the XXIst century on the basis of the common planetary constitution can be referred to these institutions. The system of international monetary and financial relations that is the basis for exchange of resources among nations should be stated in the common planetary constitution as well.

The global system is aimed at maintaining its homeostasis or keeping humankind safe. Sustainable development of humankind lies in maintaining the global system integral for a long period of time. The necessary condition for this sustainable development is institutions which provide compromise base for interaction between nations and its group consolidation - local civilizations within the global system. To solve this task we need to define conditions which form both stability of a social system “the global system” and boundary limits of stability ensured by rules of interaction and in the context of which sustainable development occurs.

Thus, the forecast concerning sustainable development of the global system is the task of forecasting and forming institutions of the global system which can provide sustainable development of humankind.

The solution of the task about defining conditions of sustainable development of the global system helps us to make the following conclusions:

- general approach allowing us to describe the main properties of the global system in a simplified form and its development with indicating feature parameters.
- mathematical formalization of the global system and its development basing on outlined characteristics as a non-linear dynamic system.
- making simulation modeling on the basis of laid down system of differential equations describing development of the global system.
- analysis of experiment results that can help to realize the following items:
 - about the character of the global system behavior in the process of development.
 - about the main system properties that form the process of development and its stability.
 - about conditions for system functioning; the conditions have to be implemented to provide stability of development.

8) Sustainable development of the World Economy: system approach

The author of the monograph “Self-organization of the World Economy: Eurasian aspect” formulated the concept of development and self-organization of a social system the world economy (the global system) and made the corresponding model. The model represents the main characteristics of the system itself and its development. The model is represented in the figure 1.

The system development is regarded as the process of changes in system states. Every system state has a structural and quantitative characteristic and specific time interval during which the structure keeps its integrity.

The model of the world economy development describes the system behavior within the period 1825-2035.

The idea about development process lies in the base. The process is considered as accumulating structural information on the basis of mechanism of self-organization as the result of struggle between two contrary tendencies: organization and disorganization. Definite structural and quantitative characteristics allow us to define three states of the world economy system in the process of its development. The first two states are real whereas the third one is predicted. The structural characteristic for every state is the system of international monetary and financial relations that function during specific time interval. Political structure of the global system– availability or absence of supranational institutions of regulating interactions among ordinary system agents as to exchange of resources on the basis of international labor division – can also be referred to structural characteristics.

The rate of GDP growth for countries that participate in international exchange of resources can be called the quantitative characteristic. Countries making up the so-called “triad”: Europe – the USA – Japan are taken as the base as more than 60% of world goods turnover during specific time interval falls on these countries.

Every state of the global system corresponds to a 70-year cycle of development. Every cycle combines conflict as well as non-conflict phase of development. A conflict phase is implemented through the bifurcation mechanism of development and low rates of GDP growth. Non-conflict phase is implemented through the adaptation mechanism of development and uneven increase in GDP. Every phase of a cycle corresponds to a definite period of development that changes each other like mechanisms of development.

We consider sustainable development as a change in system states that keep its integrity and maintain it within boundary limits of stability for a long period of time. It happens on the basis of forming a new structure of a system with adaptation to environmental pressure: population growth and limited resources. The stated above conflict trends are external demonstration of the pressure.

Thus, we have the following description of the global (the world economy) system development.

9) Development and Self-Organization of the Global 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. [table 1]

These time limits 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.

1. 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 is functioning;
- the rate of the world economy growth corresponds to 1.5%.

2. 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 is functioning;
- the rate of the world economy growth corresponds to 2.6%.

The second state.

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

1. 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 is functioning;
- the rate of the world economy growth corresponds to 1.8%.

2. The fourth period in the second cycle of development:

- the period from 1945 till 1965. Active functioning of the Bretton Woods system;
- the period when the adaptation mechanism of development is functioning;
- the rate of the world economy growth corresponds to 5%.

The third state

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

1. 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 period when the bifurcation mechanism of development is functioning;
 - the rate of the world economy growth corresponds to 3.4%.
2. 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 from 2015 – 2035 (predicted);
 - the period when the adaptation mechanism of development is functioning;
 - the rate of the world economy growth corresponds to 8 – 9% (predicted).

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

10) Sustainable development of the global system – non-linear dynamic system

Above-stated model of development and self-organization of the global system (the world economy) allows us to make the following conclusions about properties of the model under research.

There are two oppositely directed processes lying in the basis of system development; originally they are its natural quality: dissipation – resource dissipation and the principle of minimum dissipation – scattering, expressed by optimizing resource allocation for production and goods for consumption on the basis of current stipulated rules of cooperation – institutions.

The factor that produces dynamics is population growth for a long period of time.

The natural property of the system – dissipation of resources – is expressed by unlimited consumption of goods in conditions of limited resources for their consumption; it also predetermines the necessity of independent forming the system structure in order to provide efficient resource allocation for production and goods for consumption, i.e. self-organization. The natural property of the system – non-equilibrium – is also caused by two contrary trends.

All hierarchic types of the social system have the property of dissipation and min dissipation of resources, for example, a nation, a regional system and a global system. We can see the fractal symmetry of the main properties of the social system “the Global system”.

Old system relations are being restructured and new relations are being formed at the stage when the bifurcation mechanism of development works. This process is followed by decreasing quantitative indicator of development.

Table 1.

States of the world economy system	Time intervals	Periods of functioning	Structural characteristic of the state	Mechanisms of implementation	Quantitative characteristic. Development rates in percentage
The first state	1825-1895	the Ist 1825-1875	Functioning of the Gold Standard system of international monetary relations	Bifurcation	1,5
		the IInd 1875-1895		Adaptation	2,6-3
The second state	1895-1965	the IIIrd 1895-1945	Functioning of the Bretton Woods system of international monetary relations	Bifurcation	1,8
		the IVth 1945-1965		Adaptation	5
The third state	1965-2035	the Vth 1965-2015	Functioning of the Jamaican system of international monetary relations	Bifurcation	3,4
		the VIth 2015-2035		Adaptation	forecast 8-9

Whereas at the stage of the adaptation mechanism the development occurs without conflicts and is followed by uneven growth of quantitative indicator. Every cycle of development corresponds to one

system state. Every consecutive state of the system possesses more complex structure and from the economic viewpoint it is more effective than the previous one: it provides the system integrity in conditions of the environmental pressure. Stability has its borders within which sustainable development occurs. When the system leaves the limits of stability it stimulates states of extremely non-equilibrium kind. It also leads to further indefinite behavior of the system where the global conflict can happen or self-destruction of the humankind can be one of the possible versions of development.

Therefore the main condition for keeping the system integral consists in maintaining stability of the system “the global civilization”. **The main objective of studying non-linear dynamic system behavior – development of the global civilization on the basis of modeling and conducting numerical experiments – is to calculate the stability limit as well as the conditions for maintaining the system within the estimated borders**

We can also see the complication of the system structure: self-organization in the form of the mechanism that implements sustainable development on the basis of spontaneous complication of the system structure.

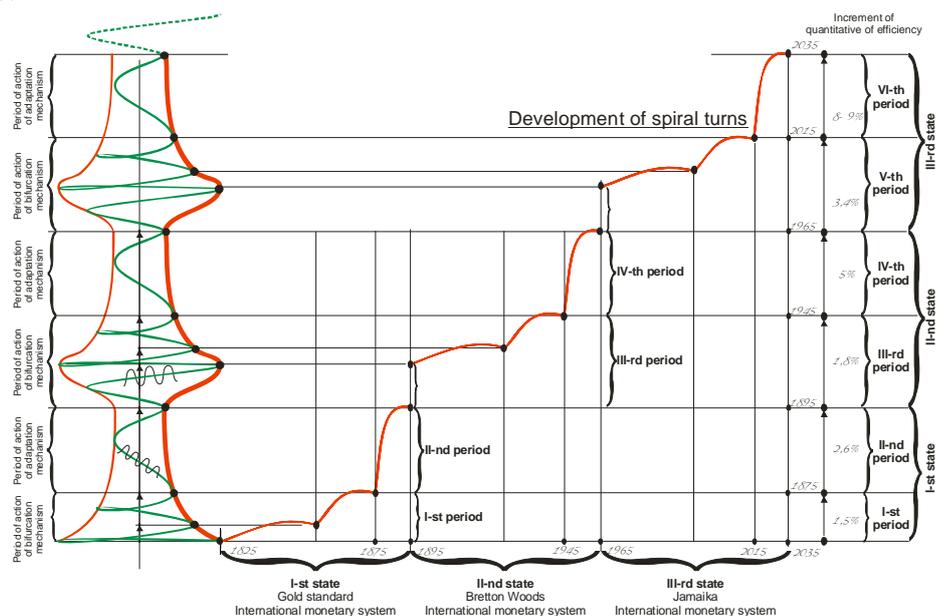


Fig. 1. The model of development and self-organization of World Economy (Global system) for interval of time 1825-2035 years

We can make the conclusion that “the global civilization” system has properties peculiar to non-linear dynamics. The system can function in two different modes – bifurcation and adaptation converting from one functioning mode to another one in the developmental process. The system has the property of self-organization as well. The main function of the system lies in the development through which its aim (to maintain the integrity) is implemented.

The processes of production and consumption are regarded as the main properties of the system that generates development.

The fact that the system is maintained in limits of sustainable development through the process of development helps to keep the system integrity.

11) Formalization of the global system development

The global system is regarded as global economic environment where countries and their group organizations are ordinary agents. Every agent has the same properties as the system: they can be open, non-equilibrium, dissipative, self-organizing; they can also have the aim – to maintain integrity through the main function (development). Development is caused by contrary processes – the process of

production and the process of consumption and is implemented through two types of the development mechanism: the bifurcation mechanism and the adaptation mechanism.

We can watch the fractal symmetry of all general properties ranging from the global system to its ordinary agent.

Development, the main function of the system, is viewed as the movement of economic environment. Basing on the assumption about maintaining boundary limits of system stability we solve the task of stable movement of environment and sustainable development of the global civilization in the context of fixed main properties and system characteristics.

At the first stage we study behavior and properties of an abstract non-linear dynamic system on the basis of reduction and fractal symmetry of the main properties. At the second stage we model and examine the behavior of specific the global system.

12) Modeling of the global system development.

On the basis of outlined properties we make a mathematical model of non-linear dynamic system – development of the global system, where:

- phase variables – ordinary agents of a country that has a property to dissipate resources in the form of production and consumption expressed by production output Y and property of optimizing resources for production and goods for consumption expressed by value of self-organization S and its index K_s – structural coefficient of self-organization;
- space they belong to is the phase space or global economic environment;
- the main function is the development expressed by global economic environment traffic. Thus, ordinary agents of the system can be described by two phase variables (Y, K_s) , correspondingly phase economic space they belong to is recorded as $F = F(Y, K_s, t)$

where Y – **qualitative characteristics** of development, parameter that characterizes system capacity – ability to produce economic efficiency and dissipativity;

K_s – coefficient of self-organization – **structural characteristics**, parameter that reflects economic usefulness of system structure and characterizes minimization of dissipation or ability to optimize resource allocation for production and goods for consumption;

t – time

Development of the global system is recorded in the form of environment traffic equation like Burgers

$$\frac{dY'}{dt} + Y' \frac{dY'}{dL_Q} = K_s \frac{d^2Y'}{dL_Q^2} \quad (3)$$

where: t – time interval during which system is investigated

Y – production output during time interval under analysis (estimated in GDP)

$Y' = \frac{dY}{dt}$ - rate of production output or economic growth during time interval under analysis

$Y'' = \frac{d^2Y}{dt^2}$ - rates of economic growth of a system during time interval under analysis.

$L_Q = LK_N$ – skilled labor or population growth during time interval under analysis taking into account qualification, where

L – population during time interval under analysis

L' - speed of population growth

L'' - rate of population growth during time interval under analysis

N – population with higher education during time interval under analysis

K_N – coefficient of qualification of work in a social system. The coefficient characterizes the growth of structural information expressed by new knowledge. Creation of new knowledge is an

intellectual work of population with higher education expressed by increase in population with higher education N . Thus,

$$K_N = \frac{dN}{dt} = N'$$

The quality of dissipation of resources is expressed by production function

$Y = F(K, L)$, where k – capital, L – labor resource. During long time intervals $t \rightarrow \infty$ $k \rightarrow 0$. We will write the function $Y = F(L, t)$ for long time interval. The property of optimizing resource allocation for production is expressed by the function of self-organization $S = F(I, t)$, where I – created information $I = F(N)$, t – time of creation and its introduction into the system. Information is the function of intellectual work of people with higher education defined by N . Thus, $S = F(N, t)$ is described with the equation $S = Y'K_s$.

Quantity of self-organization $S = Y'K_s$ – counteracting force F as for dissipating of system resources called as the principle of minimization of resource dissipation opposes to economic growth or rate of production output Y' with the coefficient $K_s = S/Y'$ that reflects structural qualities of the system – its institutions (political system) to produce useful work concerning optimization of resource allocation for producing goods to be consumed as well as reaction rate of the political system towards unfavorable economic changes in the form of structure adjustments in the current macroeconomic policy and changes of its direction in case of fallacy by non-conflict way. In other words, it is force that reflects the value of self-organization of the social system S .

13) The analysis of equation shows that

1. The basis of equation consists in N . Kondratiev's hypothesis which says that cumulative accumulation of three components of a social system underlies the process of development (trend):
 - population growth L
 - capital accumulation k , together they make up the production function

$$Y = F(k, L)$$

- scientific-and-technological advance.

In our case for a long time interval $k \rightarrow 0$, and scientific-and-technological advance is described with accumulation of new values (of information) or the function of accumulating people with higher education $I = F(N, t)$. Thus, the equation shows the convective transport of the main properties of the environment in space on the basis of the population growth taking into account the accumulation of new knowledge (information) influencing increase in productivity or dissipation of system resources.

It is recorded as $\frac{dY'}{dt} + \frac{dL_Q}{dt} \frac{dY'}{dL_Q}$ or the total derivative from - $\frac{dY'}{dt}$

2. Equation contains nonlinear term $Y' \frac{dY'}{dL_Q}$ since qualification of ordinary agent's work is the factor

that originates nonlinearity proceeding from the simple consideration $Y' = Y'(L_Q)$. Nonlinear term shows the system property – dissipation, and reflects the accumulation of structural information in time and also dependence between rate of production output and change of population qualification along with change in its number. This term reflects the influence of structural information accumulation over the rate of production output.

3. Equation contains adhesive term $K_S \frac{d^2 Y'}{dL_Q^2}$, which reflects the system ability to resist resources

dissipation or implement the principle of minimum dissipation of system resources that is to optimize their distribution on the basis of current structure.

4. Thus, the left part of the equation shows the dissipative process – the rates of dissipating resources in time taking into account the growth of work qualification K_N , the right part shows the compensatory process – optimization of resources for production and goods for consumption K_S . The equation expresses the law of conserving the potential of the production of the economic effect which is formulated in the following way:

- rates of dissipating nonrenewable system resources during long period of time are compensated by their optimization on the basis of implementing the principle of minimum dissipation. It provides its integrity and implementation of the target function – maintaining homeostasis. Decrease in creating economic effect in the left part of the equation on the basis of decrease in the ratio of production output to population growth rate is compensated by creating economic effect on the basis of increase in the level of system organization in the right part of the equation.

4.1. This position is explaining the cyclical (periodic) restricting of the system on the longtime interval and the wave nature of the economic cycles.

5. The equation shows the evolution of structure. The accumulation of information $K_N = \frac{dN}{dt}$ which

increases the rates of resource dissipation is compensated by its introducing into the system – structuring. In the right part of the equation we can see how the information becomes structural by changing K_S and increases the level of system organization. Basing on the action of the political system the information becomes structural in the form of laws put into force. The change of K_S from 0 to 1 shows accumulation of the structural information, complication or evolution of the system structure during long time interval.

6. Equation shows the evolution of structure, which enables us to make forecast of the future state of the system.

7. Sustainable decision of this equation will be a shock wave owing to competition between two opposite tendencies: dissipation and attenuation – minimum dissipation.

7.1. Equation formally describes the wave nature of economic cycles.

14) The model of global civilization system development

The model is recorded in the following way:

$$\frac{dY'}{dt} + \frac{dL_Q}{dt} \frac{dY'}{dL_Q} = K_S \frac{d^2 Y'}{dL_Q^2} \quad (4)$$

The condition of sustainability $Y''/L'' \geq 1$.

The managing system parameter – economic efficiency E_Y . Equation is examined by stability of decisions depending on value of managing parameter. It is necessary to determine what value of the managing parameter should have so that solution of equation could be stable. It is also necessary to designate what geometrical image of obtained solutions of equations will be equal to stable states. To get a numerical result we create the algorithm, program and carry out numerical experiment.

15) Objectives of simulation modeling

1. To get some idea as to qualities and properties of attractors in the given system of both modes of functioning which the system forms in the development process. Attractors are mathematical images of determined modes of functioning. Change of modes – switch of functioning from an ordinary to a chaotic (bifurcation) mode shows the change of quantity and character of attractors. In “the global system” attractors are supranational institutions that determine rules of behavior for system agents. These attractors also decrease indefinite trajectory of development which helps to maintain system stability in a mathematical sense of description. Thus, we receive a mathematical concept of institutions necessary for maintaining sustainable development of the global system.
2. To make a numerical calculation of borders of stable environmental movement within which the global system develops.
3. To get some idea about the character of change in number and in properties of system attractors for maintaining boundary limits of sustainable development of the global system.
4. To show interaction of sustainable development, self-organization and available boundary value of the stability of the system under study.
5. To show evolution of the structure of an abstract social system under research.
6. To show evolution and to make a forecast as for the structure of international monetary relations of the global system.
7. To show evolution of the structure and to make a forecast of forming the main political institutions of the global system in the XXIst century.

16) Tasks of modeling

The coefficient of self-organization of the global system K_S is the main object of numerical calculation in our case.

This coefficient reflects economic efficiency of the world economy structure – its main regulating institutions. The system of international monetary relations and the political structure can be referred to such institutions. Accordingly, we will examine the evolution of these institutions from 1835 to 2035 and make numerical calculation of the coefficient K_S for every assigned stage of functioning the global system. Besides, we will make a forecast up to 2035.

The actual evolution of the coefficient K_S for the period 1825-2009 looks in the following way:

The minimal coefficient K_S corresponds to the period 1825-1895 where the system of international monetary relations “Gold standard” and the political structure being based on direct diplomatic relations were being developed and functioned. The population increased insignificantly for this period and made up approximately one billion people.

The world monetary system and the political structure were being restructured during the period 1895-1965. The Breton Woods system of international monetary relations had been formed by 1945 and a new structure of the world economy began its sustainable function. Both elements of the structure became complicated. The supranational institutions of regulating both monetary and political relations were formed: the IMF, the IBRD and the IFC in the monetary system, the GATT and the UNO in the political system. On the whole, consisting of two levels the structure of the world economy became more complicated and it functioned up to 1965-1967, providing the highest growth rates throughout all its history. It should be noted that the population of a planet has increased more than in 2 times for the short period 1895-1945-1965. We can presume that the coefficient K_S for this period has increased towards the coefficient of the previous period. The structure of the world economy became more effective in an economic way and ensured stable development of humankind in a way of maintaining its integrity.

During the period 1965-2009 the population of a planet has increased almost in 3 times towards the previous period and almost in 6 times towards the period 1825-1895. Accordingly, since 1965 we

witness consecutive financial and energetic crises of the economy. In 1975 they have resulted in a new monetary system called the Jamaican system. There also were crises in 80-90-s of the XXth century. The crisis of the world economy broke out in 2007-2009. By its indices this crisis corresponds to the Great Depression of 1930-s of the previous large cycle. Basing on the concept of the sustainable development and the empirical cycles of the world economy development which were chosen above we can assume that the period of forming a new structure finishes by approximately 2015. The existent crisis serves as an instrument and environment for forming this structure.

A logical assumption can be made as for the coefficient K_S of the third cycle under research. During the period 1965-2015-2035 this coefficient will increase comparing to that one of the previous period. The structure of the global system corresponding to the probable coefficient will be more complicated – it will include three levels.

Two factors predetermine the structure consisting of three levels. The factors are as follows: the process of regionalizing and the fact that the world economy has three groups of countries with different coefficient K_S : developed countries, countries with the emerging market economy and developing countries.

Thus, the main object of a numerical experiment and forecast lies in calculating a mathematical image of institutions of a new generation which regulate the relations between the countries at a regional level within the limits of acting one K_S and at a global level of regulation which is directed at maintaining interaction of regions with different K_S without conflicts in conditions of high rates of population development and scarcity of nonrenewable resources.

17) Preliminary summary

The first step of an experiment – a numerical calculation of behavior of the parameter K_S during the time interval showed interesting results.

Out of specified states of the system the world economy we consider the time interval 1965-2035. This time interval has been chosen due to availability of statistical data beginning with 1950. Statistical data on the GDP and population size were taken from “The World Economy” by A.Maddison. Statistical data on population with higher education were obtained from W. Lutz, A. Goujon, W. Sanderson “Reconstruction of population by age, sex and level of educational attainment of 120 countries for 1970-2000”. Vienna Yearbook of Population Research, 2007. Since the recent data include only 119 countries (Hong-Kong was viewed separately from China), numerical calculations are limited by this number of countries. At the beginning of calculation the population size of chosen countries made up 93.7% from the general population on the planet. The volume of their GDP – 95.2% from the general volume of the planet’s GDP. Thus, we consider the given number of countries enough in order to describe the tendency of the world economy development.

For introduction into the model as well as for further analysis we combine countries mentioned above into three groups according to one feature – the level of political system development or the dimension K_S .

The first group: all countries of the Organization for Economic Cooperation and Development, countries of Central and Western Europe and the Baltic countries (formerly Soviet Republics) that are the members of the EU. There are 38 countries in all.

To the second group we can refer the countries with the emerging market economy: countries of the former USSR (excluding the Baltic countries), China, India, Brazil, Argentina, Hong-Kong, Iran, the Republic of Korea, Malaysia, the United Arab Emirates, Singapore, Turkey, Uruguay, Chile and the South African Republic. There are 27 countries in all. The rest countries were included in the third group. Data on 119 countries were used for the experiment. All of these countries breaks on 12 groups. Every group is the Civilization, that based on criteria of Yakovets-Kuzyk research. They are : North-

American; West-European; Est-European; Eurasian; Latin-American; Japanese; African; Chinese; Indian; Oceanic; Buddhistic; Mussulmunic.

The calculation is shown in the form of charts given below.

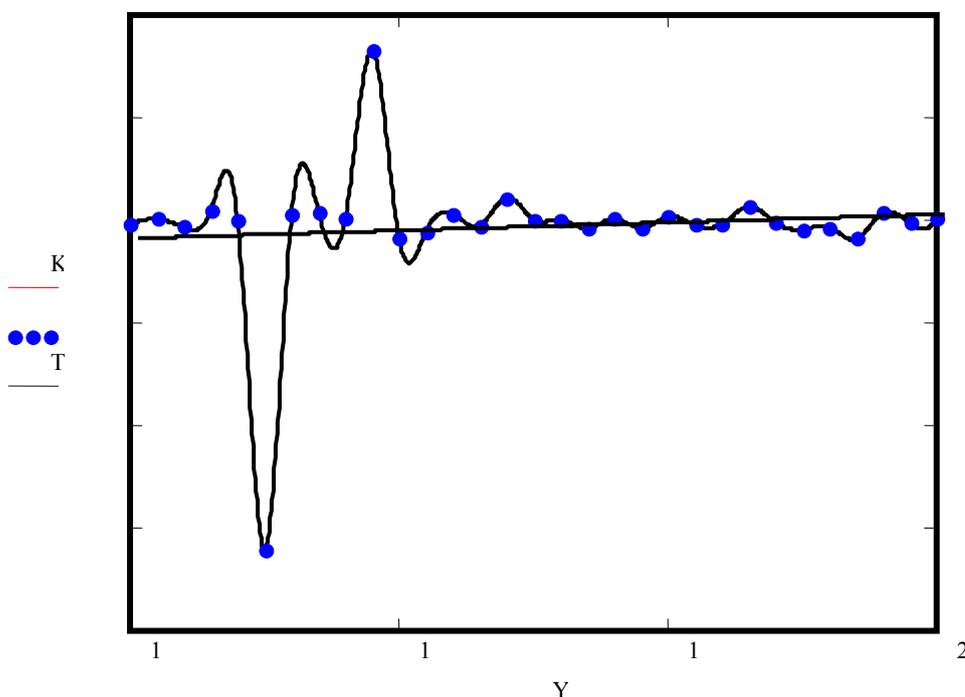
The charts which show changes K_s of the world economy in general and some countries representing three indicated groups show that:

1. The world economy reacted to the world crises of 1973-1975, 1980-1982, 1990-1992, 1997-1998 by high amplitude of speed drop in production output which shows not best value of the coefficient K_s of the world economy for the period 1965-2015 where it evolves towards its increase.

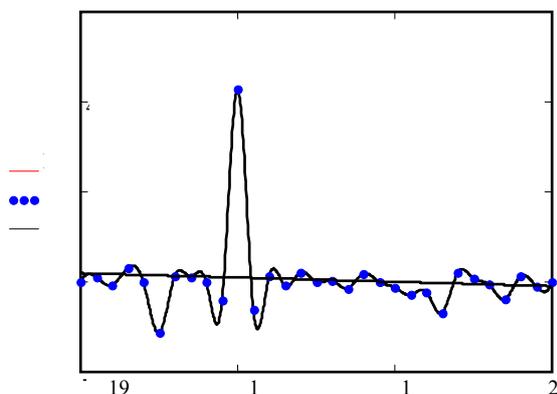
2. The character of behavior of the parameter K_s shows that the structure of the system the world economy is to be complicated, it also needs to form new maxims between countries which decreases the amplitude of oscillation i.e. it would increase sustainability.

3. The charts K_s shows that the behavior of the world economy and the USA is closely interrelated, that is the behavior of countries from the second and the third group greatly depends on macroeconomic policy pursued by the USA.

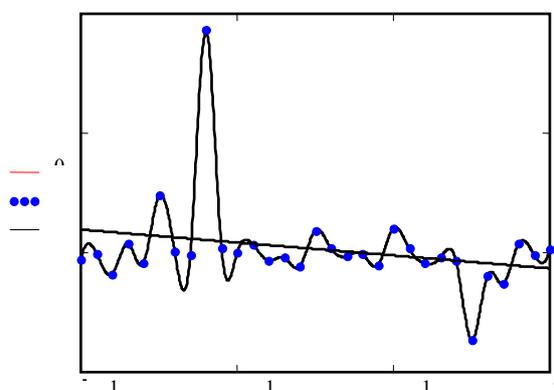
World Economy



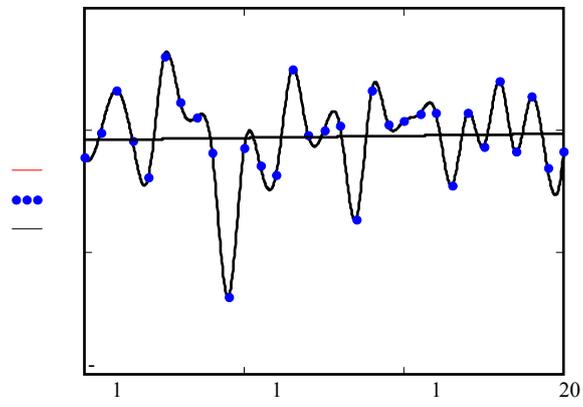
The developed countries



Countries with emerging market economy



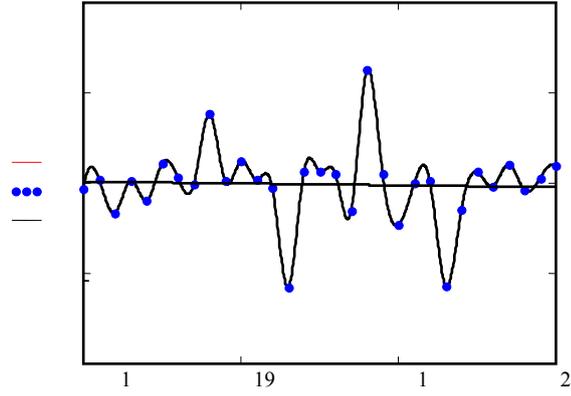
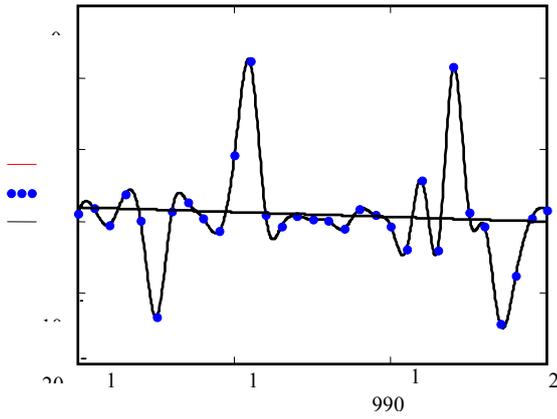
Developing countries



12 civilization

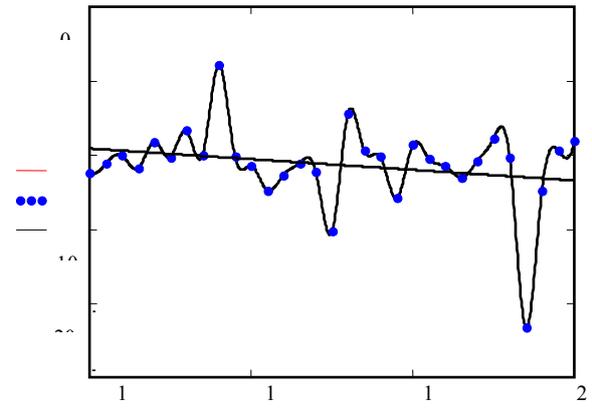
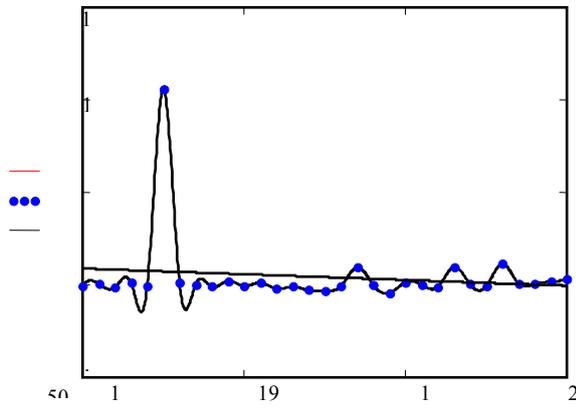
North-American

Latin-American



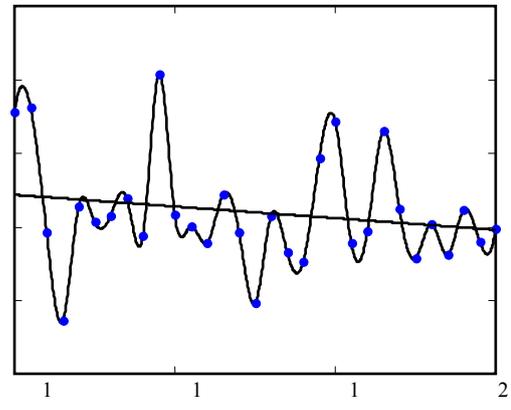
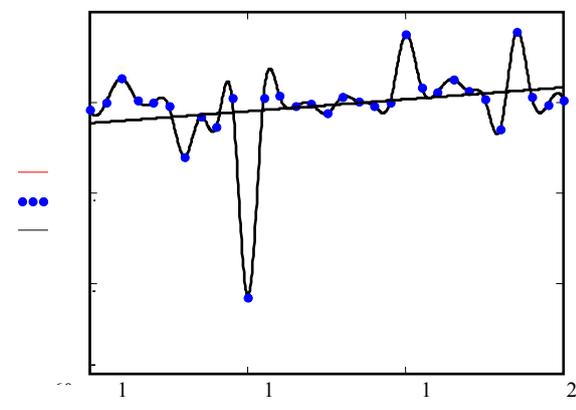
West-European

East-European



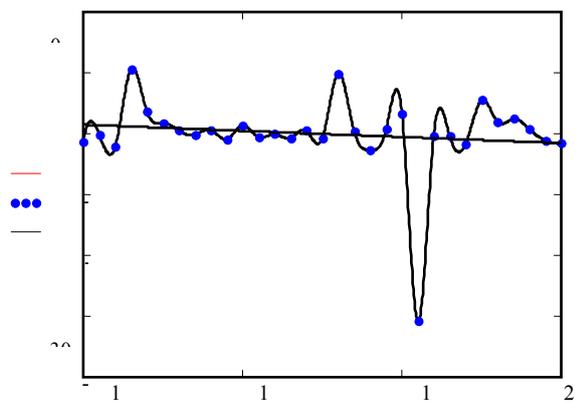
Eurasian

Japanese

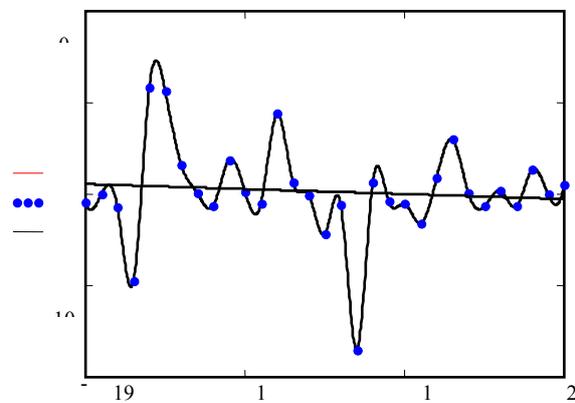


Chines

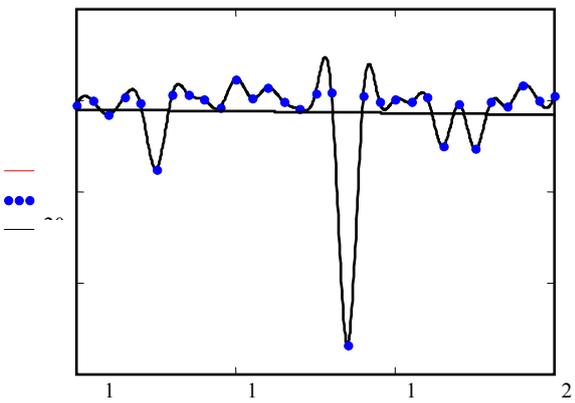
Indian



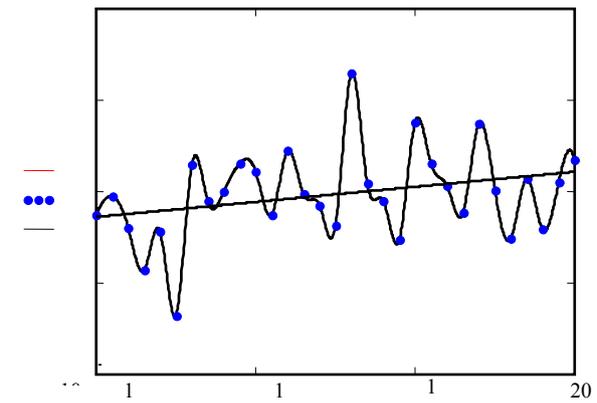
Buddhistic



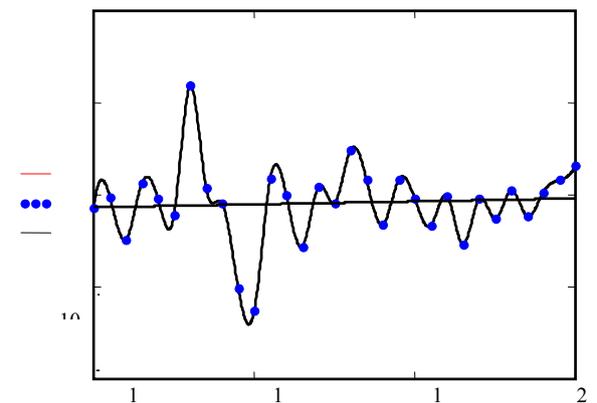
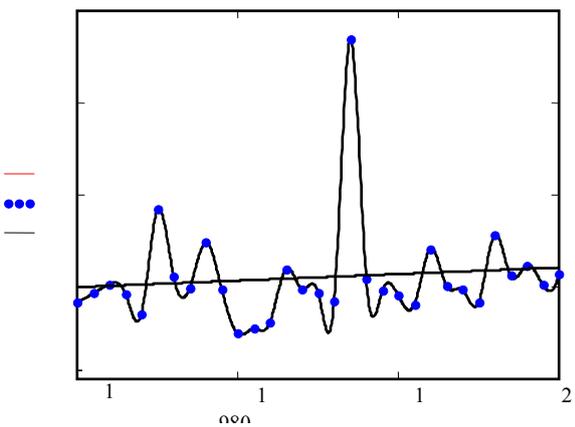
Mussulmanic



African



Oceanic



4. If we compare the charts K_S of Civilizations and 3 Groups of countries we can see that countries react to imbalance which occurs in the world economy in a different way. It depends on economic efficiency of the political system K_S and the degree of country's integration into the world economy.

5. Macroeconomic policy implemented by the USA and the global institutions for the world economy is not optimal and therefore it is inefficient from the viewpoint of inadequate reaction to the world crises. The reason lies in the financial sphere – the targets of the monetary policy implemented by the World Bank and the USA are directed towards regulating processes in the first groups (developed countries). They do not take into account conditions and macroeconomic targets of other two groups. In the sphere of the international trade the reason is the same.

6. All three groups have a different level of the coefficients K_S and K_N , different level of economic efficiency of the political system and availability of information.

7. The world economy has at least three spheres with different development speed, every sphere stays on a different stage of development and has a different degree of dependence on macroeconomic policy implemented by the USA and the global institutions in the World Economy.

7.1. These spheres need different group targets of macroeconomic policy.

The first group. The developed countries

- need low interest rates and allocating surplus funds, firstly, the financial capital in other groups as they have a high index K_S and K_N .

The second group. Countries with emerging market economy

- experience the stage of forming the national capital and new institutions of a political system. They need high interest rates as they constantly experience the pressure of inflation and have “overtaking” economic growth. Countries of this group possess a high value K_N and a medium K_S which experiences the stage of increase. This group needs support in forming conditions of interrelations with global financial institutions.

The third group. Developing countries.

Countries remain on the early stage of development and have low indices K_S and K_N .

7.2. All three groups need to have own regulations and targets to develop group macroeconomic policy – international, monetary, budget and trade.

7.3. All three groups have opposite economic targets. The existent rules of forming and implementing the global economic policy do not take into consideration their targets.

Thus, we can make the following conclusions:

- In order to develop optimal global policy directed towards maintaining sustainable development the global system needs to form regional political institutions like the World Bank. These institutions would form regional macroeconomic policy individually for every group of countries. The groups should combine on a global scale in order to regulate economic relations between groups. It would result in optimizing the global economic policy.

- The risks of extremely non-equilibrium states (the world crises) should be distributed between all groups of countries in order to eliminate dependence of the world economy on the economic state of the USA. Correspondingly this distribution applies to:

- formation of the world reserves;
- formation of the world currency;
- formation of the world interest rate;
- formation of conditions to receive support from the IMF to regulate balance of payment;
- conditions of trading;

- In general, activities directed towards regional distribution of the main economic functions of the global institutions will increase the coefficient K_S of the world economy and gain resistance to the world crises.

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Chapter 10. Recommendations for a Long-term Strategy of Partnership among Civilizations¹⁷

The long-term forecasts are elaborated not only for and not so much for anticipation of possible ways society will develop in future but, and the practical importance of forecasts is in it, for validation of a long-range strategy allowing the implementation of an optimal scenario of future development. Therefore it is reasonable to complete the global forecast of development of civilizations for the

¹⁷ The chapter author – Prof. Yu.V. Yakovets (Dr. Economics), R.A.N.S. Academician

prospect of 2050 by the validation of a long-term strategy oriented at the implementation of the innovative-breakthrough scenario of development of civilizations based on their partnership.

10.1. Experience in the Formulation and Implementation of the Global Strategy

UN Global Strategies

For six decades of the United Nations performs not a little experience is accumulated in the formulation and implementation of global strategies – both general and private.

It can be included in the number of global strategies the formulation of international strategy of economic development for a long-term period in the 50-70s, validation of the strategy for sustainable development endorsed at the World Summit of 1992 in Rio de Janeiro and definition of the millennium development goals for 2015 by the UN General Assembly.

The international strategies of economic development (IDS) were worked out by the Center for Planning and Forecasting specially established at the UN Secretariat in the interests of development (from 1979 – Forecast and Advance Researches) with the involvement of other UN entities, further reviewed at the UN Economic and Social Council and approved at the UN General Assembly. The first IDS was adopted for 1961-1970, the second - for 1970-1978. In 1977 based on a long-term forecast for 2000 worked out by the UN expert group headed by Nobel Laureate Wassily Leontieff the UN General Assembly adopted a proposal to work out the prospects of socio-economic development of world economy for 1990-2000. However, such prospects have never been either worked out or adopted. It was prevented on the one part by the spread of neo-liberal concepts oriented at the discontinuing of the governmental participant in economy and long-range forecasting, and on the other hand – expanding crisis situation related to the disintegration of the world system of socialism and the USSR, intensification of the chaotic character in the global development

The IDS as a matter of fact constituted a global strategic plan. S.M. Menshikov defines them as follows: “The IDS are a document where the basic lines trends of socio-economic development of the world (mainly of the developing countries) are formulated as well as the measures are listed for economic and social policy which are recommended in various groups of countries for the implementation of the outlined strategy points. The IDS are formulated for decades based on numerous qualitative indices, the IDS also include general specific figures describing the economic growth of developing countries”¹⁸

Regrettably, experience of global forecasting accumulated in the UN (with the application of the unique world model of Wassily Leontieff)¹⁹ and global strategic planning are currently not in use. The UN Secretariat undertakes efforts on a regular basis for a short-term (up to 3 years) global forecast based on the LINK model under the guidance of Nobel Laureate in economics Lawrence Klein

The global strategy of sustainable development was validated in the report of the World Commission on Environment and Development chaired by Prime Minister of Norway Gro Harlem Brundtland, published²⁰ and endorse at the World Summit for Sustainable in 1992, Rio de Janeiro, and then restated and particularized at the World Summit for Sustainable Development (RIO-10) in Johannesburg in 2002.

¹⁸ Cross-regional Cross-sectoral Models of World Economy under the editorship of A.G. Granberg and S.M. Menshikov. Novosibirsk: Nauka, 1983, p.9-10.

¹⁹ The Future of World Economy. The Report of the UN Expert Group headed by Wassily Leontieff. M.: Mezhdunarodnie Otnoshenia, 1978.

²⁰ Our Common Future. Oxford – New-York; Oxford University Press, 1987;

The Commission report validated the concepts for sustainable development envisaging the efficient use of resources in interests of both present and future generations, prospects for development of world economy beginning from human resources, biological species and eco-systems, energy and industrial development, urbanization problem, use of the Ocean and Antarctica, peace and security, development and environment, and also the proposals for joint efforts were validated, organizational and legal reforms for the implementation of the strategy for sustainable development both on the national and global levels. New prospects for international cooperation were defined and efforts to implement them. “At the global level, an extensive institutional capacity exists that could be redirected towards sustainable development. The United Nations, as the only intergovernmental organization with universal membership, should clearly be the locus for new institutional initiatives of a global character.”²¹

Based on this global strategy the UN has undertaken significant activities to implement the outlined action plan, development of partnership relations. National strategies for sustainable development are adopted in many countries.

However, radical changes in the world economy and global development, world crises of 2001-2002 and especially in 2008-2009 have shown that not only developing but developed countries are unable to secure sustainability of development under the established conditions that a ghost of a global ecological catastrophe has not receded but approximated and supplemented by a cluster of global crises – energy-ecological, food, demographic, and technological. It is necessary to map out a new global strategy adequate to the realities of the 21st century.

The millennium development goals were determined at the Millennium Summit – a special session of the UN General Assembly in September 2000. They include 8 goals and 18 targets with specific figures for 2015 to attain them.

1. Eradicate extreme poverty and hunger - halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day and the proportion of people who suffer from hunger
2. Achieve universal primary education - ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling
3. Promote gender equality and empower women - eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015
4. Reduce child mortality - reduce by two thirds, between 1990 and 2015, the under-five mortality rate.
5. Improve maternal health – reduce by three quarters the maternal mortality rate.
6. Combat HIV/AIDS, malaria and other diseases - have halted by 2015 and begun to reverse the incidence of these and other major diseases.
7. Ensure environmental sustainability - integrate the principles of sustainable development into country policies and programmes; halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation; by 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers.
8. Develop a global partnership for development: develop further an open, rule-based, predictable, non-discriminatory trading and financial system; address the special needs of least developed countries, this includes tariff- and quota-free access for their exports; enhanced debt relief for heavily indebted poor countries; cancellation of official bilateral debt; and more generous official development

²¹ Ibid. p. 283

assistance; address the special needs of landlocked countries and small island developing states; deal comprehensively with developing countries' debt; develop decent and productive work for youth; in cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries; in cooperation with the private sector, make available benefits of new technologies, especially information and communications.

As it is seen from the given list the goals set are far from covering all the circle of basic lines of global development, especially technological, economic and ecological. The UN and its organizations focused on the attainment of the goals set and first achieved certain successes. However, the global financial-economic crisis of 2008-2009 upset all the plans and was accompanied by regress in many of the tasks set. A share of poor and starving population in the developing countries has considerably increased, the opportunities in education, public health, employment reduced, the economic situation of the poor countries and strata of population deteriorated.

The changed situation in the world economy requires the revision of development goals, improvement of their complexity, expanding horizon that is proposed below in the form of the system of goals of a long-term strategy of partnership of civilizations.

Experience of Strategic Integration Partnership in Europe

Experience of a long-term integration-based partnership in Western Europe pursued for more than half a century has proved more successful. While the matter in question is mainly about a western European civilizations recently joint by eastern European, however this experience has a key significance as the model of the integration-based partnership is tested by experience here and polished that may be extended – in a modified form- to all world community in future.

Successive steps in this direction beginning from the Shuman plan and ending by the Lisbon agreement, are pursued with an increasing effect (although with difficulties) have led to the significant results.

First, the common economic space based on the principles of regulation, socially oriented market economy with one customs borders, common currency for many (Euro zone), central bank, common tax system, common strategic priorities, assistance mechanism for less developed countries, regions, agriculture, was created. This gives an additional effect to ensure a sustainable growth and implementation.

Second, the single scientific-technological space is being formed based on the framework scientific-technological programmes with common financing, innovative Eureka programme, protection of intellectual property is being formed that contributes to the competitive growth and establishment of a favorable innovative-investment climate in general in the European Union.

Third, it is ensured the unity in the pursuance of the energy and economy policy establishing common ecological standards for reducing emissions into the environment, formation of energy-carbon economy, and pollution free food.

Fourth, it is ensured the common humanitarian space, requirement for the observance of rights and freedoms of human, a freedom of movement within the union, requirements for the systems of education and public health.

Fifth, it is implemented the counteraction of political disunity of Europe tearing by bloody wars within centuries, to the establishment of the public confederation of states with common supranational bodies of legislative, executive and judicial powers, with the common law system. The European

Union has turned into the zone of peace where the arising conflicts are resolved by a peaceful way – a reference standard for the future global community based on partnership of civilizations.

Sixth, the common information space, Eurovision system, common technological requirements containing requirements for information channels has been reached.

Seventh, in the latest years experience of partnership of civilizations is accumulated in the activity of the European Union. It is related both with the entering of the countries of the eastern European civilizations into the European Union that has generated a good deal of problems and development of partnership relations with the USA and Canada (north American civilization), Russia and other countries of the Eurasian civilization, Turkey, Albania, countries of North Africa, Moslem civilization.

Experience of the European integration partnership should be used in the formulation of a long-term strategy of partnership among civilizations on a global scale.

10.2. A Need and Specifics of the Global Strategy of Partnership among Civilizations

From Dialogue to Partnership among Civilizations

In recent three decades the problem of interaction of civilizations has passed three stages.

In the post-war decades the *confrontation of civilizations* prevailed against the background of the “cold war” grouped around two poles with a space between them. The western civilization was on the one pole and later differentiated into the western European, north American, Latin American, Oceanic and Japanese civilizations. On the other pole – Eurasian (USSR), eastern European and Chinese civilizations. The Indian, Buddhist, Moslem and African civilizations were between them with the struggle between two poles for the influence in them. The partnership strategy of civilizations prevailed inside the poles, sometimes suspended by conflicts (Soviet-Chinese, suppression of movements in Hungary and Czechoslovakia).

The disintegration of the world system of socialism and the USSR, termination of the cold war resulted in the intensification of chaotic character in dynamics of civilizations, orientation of the Eurasian and eastern Slavic civilizations at the western values and aggravation of contradictions between the West and the Moslem civilization. S. Huntington put forward the concept of a growing threat of the *clash of civilizations*²². As a counter to it President of Iran M. Hattami put forward the concept of *dialogue among civilizations*. This concept was endorsed by the UN, 2001 was declared the Year of Dialogue Among Civilizations. The UN General Secretary set up a commission of intellectuals (comprised of representatives of 10 civilizations) which worked out the concept of dialogue among civilizations.²³ At the session of the UN General Assembly in November 2001 resolution “Global Agenda for Dialogue among Civilizations” determined the global action plan in this direction was adopted. In various countries tens of international conferences were held and many a book on the problems of dialogue among civilizations was published. A scientific validation of dialogue among civilizations contains in Volume I of the monograph “Civilizations: Theory, History, Dialogue, and the Future”²⁴; there will also find an overview of the development of dialogue of local civilizations in various historic periods.

However, the dialogue is not the concerted actions of civilizations but only the creation of necessary prerequisites to this end, finding understanding, common interests and priorities. The development of

²² Huntington Samuel P. The Clash of Civilizations and Remaking of World Order. N.Y.: Simon and Shuster. 1996

²³ Crossing the Divide. Dialogue among Civilizations 2001; Передвиная М.: L, 2002.

²⁴ B.N. Kuzyk, Yu.V. Yakovets. Civilizations: Theory, History, Dialogue, and the Future. Volume 1. A Theory and History of Civilizations. M.: INES. 2006.

dialogue among civilizations is necessary but only the first step towards concerted actions, cooperation and its higher form – **strategic partnership of civilizations**. The essence of the recent stage of interaction among civilizations of the fifth generation is just in the transition from dialogue to partnership, the essence of the recent stage of interaction among civilizations for the near decades.

The basic outlines of the partnership among civilizations were first marked out by the Pitirim Sorokin – Nikolai Kondratieff International Institute and approved at the 3rd International Kondratieff Conference (Moscow, R.A.P.S. 2001)

A need for transition to a long-term strategy of partnership of civilizations in response to the challenges of a new century formed the basis of recommendations for a long-term strategy of the global forecast “Future of Civilizations” for 2050 viewing the prospects of dynamics and interaction of civilizations – energy-ecological, socio-demographic, innovative-technological, economic, geopolitical, socio-cultural and in the summary form it is given in this closing part of the global forecast envisaged to discuss at the roundtable session within the 64th session of the UN General Assembly in October 2009.

Features of the Global Strategy of Partnership of Civilizations

What are the distinctions and advantages of the proposed strategy against the previous and now operative global strategic documents?

First, the subjects of a long-term strategy become for the first time not groups of the state in this or that combination but *local civilizations*. Notwithstanding their boundaries are often not clearly defined, they are fairly diverse by their composition – from one country (Japanese civilization) to a few tens of countries (Latin American, Moslem, African civilizations) – nevertheless civilizations become for the first time full-scale characters in the global arena. These are twelve local civilizations of the fifth generation which we have united into three groups: civilizations of Europe (western European, eastern European, and Eurasian), civilizations of America and Oceania (north American, Latin American, and Oceanic) recently gemmated from the western European and ancient civilizations of Asia and Africa (Japanese, Chinese, Indian, Buddhist, Moslem, African – to the south of the Sahara). The foundation for such grouping and division between actors in the global arena is first of all the differences in the system of civilizational values. Our researches have shown that relations between civilizations, their transformations in the course of civilizational crises, revolutions are exactly the pivotal problem of the 21st century. It gives a new aspect for both a long-term global forecast and for a long-range strategy.

Second, both a long-term forecast of future of civilizations basing on the methodology of integral macro forecasting and recommendations worked out basing on such forecast for a long-range strategy of partnership among civilizations are relied upon a theory of cycles, crises and innovations, on each kind of civilizations (local, world, global) goes through definite stages of long-term and super long-term cycles objectively determined that a change of cycles is accompanied by civilizational crises which surmounting occurs basing on a wave of epochal and basic innovations. Although each local civilization has own inimitable rhythm of cyclical fluctuations, own features of crises and the composition of innovations nevertheless synchronization of radical changes occurs based on a change of world civilizations and historical super cycles in dynamics of the global civilization.

In the historical rifts similar to the occurring in the first quarter of the 21st century three groups of local civilizations are distinguished: vanguard, first implementing the pressing changes and leading in global dynamics; catching up which pick up and expand a wave of civilizational innovations; lagging which cannot independently implement modernization and are behind the vanguard by one-two historical periods. Such approach is effected for the first time in the world prognostics and global

strategic planning, it is a basic innovation by itself and dictates a need for a civilizational approach to a foresight of the future of humanity for a distant prospect.

Third, a civilizational approach opens up an opportunity of system-based researches into the future of social mega-systems basing on the components of the civilizational genotype including all base factors of civilizational dynamics: primary – natural-ecological (in our case energy-ecological), secondary – technological and economic, tertiary – geo-political and socio-cultural. This enables to implement the mutual relation and mutual influence of changes in all elements making the pyramid of civilizations that is impossible for other global strategies oriented mainly at separate components of the genotype of civilization (demographic, ecological, economic, geo-political, etc.) With due regard of mutual influence of all components and their development strategy make the strategy of civilizational partnership more system-based, synergetic and workable, leaves less space for disregarded factors which might influence the change of a real path of dynamics of civilizations, impede or render impossible the attainment of the end goals set.

Fourth, in validation of the strategy like a long-term forecast the qualitative analysis is combined, complemented and tested using a small number of resumptive indicators quantitatively measurable and resting among other things on the balance estimations. In order to ensure a long-range strategy one has to rest on the balance estimations of labor resources, energy resources that requires a better accuracy in strategic estimations, render them more reliable and workable.

Fifth, the strategy of civilizational development and partnership under development should be implemented basing on the system of global institutes and mechanisms failing which it becomes a total of good wishes, unattainable goals. Therefore our recommendations include proposals about institutes and mechanisms of partnership among civilizations – both by separate components and basic lines of the strategy and in general by formulation and pursuance of the global strategy on a scale of a global community, in the UN. Its the formation of efficiently operating institutes and mechanisms for the pursuance of the strategy of partnership is just the formidable task related to the surmounting differences and contradictions of colliding forces but failing this the global strategic planning will not start implementing.

10.3. The Nodal Directions in Strategic Partnership of Civilizations

Let us review recommendations for a long-range strategy of partnership of civilizations by six directions – components of the genotype of civilizations.

A Strategy of Energy-Ecological Partnership

The global ecological forecasts are elaborated most in detail within a long time. After publications of the Club of Rome's forecasts about an inevitable depletion of natural resources and coming ecological catastrophe the concerned the alarmed world community made the governments and the UN formulating a strategy precluding such catastrophe. At the Stockholm conference of 1972, at the summits on sustainable development in 1992 and 2002 an extensive programme of measures for the improvement of ecological dynamics was put forward. The Global Environment Facility and UNEP (the UN organization for environment) which publish on a regular basis long-term ecological forecasts with the elements of a global strategy. Such recent forecast GEO-4 appeared in 2008 and includes a forecast of ecological dynamics by types of natural resources and development in the regional aspect by continents for 2050, validates the strategic directions in the improvement of the ecological situation on the planet.

The G-8 leaders address the problems of ecological and energy security and strategy for its ensuring almost at each summit, the leading countries of other civilizations (China, India, Brasilia, R.S.A., Mexico, etc.) are engaged to discuss such matters.

Thus, the final document of the G-8 summit in L'Aquila, Italy (8-10 July 2009) "Responsible Leadership for a Sustainable Future" comprises a number of strategic measures in ecology and energy:

- it is recognized necessary to ensure a shift to a low-carbon economy, reduce greenhouse gases emissions into the atmosphere by 2050 and 50% in the world in general, and for developed countries consuming the major portion of energy resources – up to 80%;
- measures for financial stimulus to support the creation of "green" workplaces, ensuring energy efficiency and sustainable growth under lower level of carbon emissions, especially alternative and renewable energy sources were determined;
- a need for the improvement in the predictability of economic markets and mitigating sharp fluctuations of world prices for energy resources has been noted;
- it envisaged to take a global and embracing agreement for reducing hazardous emissions into the atmosphere before the end of 2009 at the Copenhagen conference to replace the Kyoto Protocol expiring in 2012;
- it is noted that as a result of measures taken a necessary average temperature should not exceed the pre-industrial period for more than 2°C;
- more favorable market conditions for clean goods are ensured;
- it is recognized necessary to increase investments in the fundamental and applied researches and efforts in clean technologies;
- measures are outlined for reducing degradation of forests and lands (deforestation accounts for approximately 20% of annual CO₂ emissions);
- the development and diffusion of innovative technologies for catching and storing carbon is supported;
- a struggle against energy poverty is intensified in many regions, especially in Asia and Africa.

Part III of the Global Forecast "Future of Civilizations" – "Energy-Ecological Future of Civilizations" validates our recommendations for a global strategy of energy-ecological partnership of civilizations.²⁵

The global energy-ecological strategy (further the Strategy) should be targeted at the system of attainable goals in the long-term prospect including the general goal, goals by separate energy and other natural resources and local goals by separate civilizations and countries and their partnership in the attainment of common goals.

The general goals of the Strategy may be formulated as follows: *the attainment by the mid-21st century an optimal level of satisfaction of reasonable needs of all civilizations and countries of the planet in energy and other natural resources under saving of such resources in the interest of future generations and reducing approximately double the emissions of greenhouse gases and other pollutants of the environment, establishment of a noospheric energy-ecological mode of production and consumption.*

The general goal thus formulated comprises four interrelated elements distributed in time and space.

First, optimization of the level of consumption of energy, forest, land, water and other natural resources, surmounting a wasteful industrial mode of production and consumption, closing on the level

²⁵ The Energy-Ecological Future of Civilizations. Part 3 Global Forecast "Future of Civilizations" for 2050. M.: SKII, 2008.

of consumption in all civilizations and countries of the planet by the middle of the century. It will require an estimation of the rational level of consumption in the context of natural-climate, socio-economic and civilizational features and determination of a strategic way to reach such level by periods up to 2050 based on partnership of civilizations and countries.

Second, *strategy of saving* of energy and other natural resources in the context of interests of future generations, replacement of non-renewable natural resources with alternative energy sources and materials that will allow extending the exploitation and satisfaction of needs in such resources for a super long prospect.

Third, *to reduce emissions* into the atmosphere by the middle of the 21st century approximately double so that to prevent unfavorable climate changes, ecological catastrophes. Such goal is set forth at the G-8 summit in Japan (2008), it should be extended to other polluting activities of the environment.

Fourth, the end result of the attainment of the goals referred to above is *the establishment of a noospheric energy-ecological mode of production and consumption* on the planet that would ensure an optimal, harmonious co-evolution of society and nature and would guarantee optimal natural-environmental conditions of development of the global civilization for a more distant outlook, for centuries.

This general goal should be particularized in three aspects:

By structure – by separate natural resources (mineral, land, water and others) and pollutions of (atmosphere, water, land, lithosphere, radioactive and other pollutions);

In space – in energy-ecological strategies of civilizations, countries in the context of their distinctions in the natural-geographical location, level and structure of production and consumption;

in time – by ten-year periods to the middle of the century with a regular update of the Strategy, and then its extension beyond 2050.

The tree of the Strategy's goals is given in Fig. 10.1.

To attain the goals of the Strategy referred to above an innovative breakthrough will be required in the primary directions of the energy-ecological activity on a global scale.

Optimization of consumption. This problem has two sides: wasteful energy consumption and other natural resources under prevailing technologies in the industrial and private consumption that leads to depletion of non-renewable resources and extreme pollution of the environment; on the other hand, an extreme gap in the level of consumption by countries and civilizations, a low per capita power consumption and endowment with resources of a significant portion of the humanity.

It appears necessary in this regard:

* to estimate the level of consumption established of energy and other natural resources and elaboration of consumption standards optimal and distributed in time and space for separate resources on a global scale and by civilizations and countries in the context of their natural-climate, technological, socio-economic and civilizational distinctive features and energy-ecological needs, food patterns and way of life of population.

* to elaborate the system of measures for reaching the efficient consumption norms, to elaborate, master and transfer, on the scale of planet, resource-saving technologies, rationalizations of needs and attainment of the optimal level of consumption on the scale of the planet;

* to surmount an extreme gap in the consumption level of basic resources by countries and civilizations, including both an extreme resource-consumption in a number of developed countries and an extreme low level of consumption not ensuring reproduction in a number of developing countries.

The attainment of such goals will require not only technological, economic and state-political conditions but efforts of states, global and national civil societies for spreading the noospheric ethics, surmounting the resource-wasteful model of consumption and rationalization of needs of people and families. It means a drastic change in the mode of life and consumption model established in the industrial period and reached dangerous points in the second half of the 20th century. It will also require a global course to surmounting militarization of economy and society taking away a significant portion of resources, especially in the periods of military conflicts, and for reducing losses at all stages of production, processing, transportation and consumption of energy and other resources.

Saving of energy resources. Another direction in the implementation of the Strategy is the prevalence of a tendency, on a planetary scale, for resource-saving in the interest of future generations. The now high rates of production of energy and other mineral resources, felling of tropical forests – green lungs of the planet, reduction of plough lands, reduction of the endowment level with fresh water mean in actual fact that the recent generations live on credit from the future generation leaving a depleted and dirty planet for them with meagre resources required for reproduction and life of people. Such dangerous tendency undermines the basic principles of sustainable development proclaimed at the Earth Summit in Rio de Janeiro in 1992 and restated at Johannesburg Summit 2002.

The implementation of this direction will require:

- Increasing the efforts and resources for reproduction of natural resources – geologic exploration (with the unification of criteria for the inclusion of explored mineral resources in produced for recovery to work a out a global cadastre of mineral resources, forestry, water management, fishery, melioration and increase of soil fertility);
- increasing the complete extraction of mineral, forest and other natural resources, raising the oil recovery coefficient, reduction of losses in production and beneficiation;
- reducing losses in transportation of mineral and other natural resources, electric and heat energy, diffusion of non-waste and low-waste technologies, establishment of the network of independent co-generation plants, small water power plants, enhancement of the complexity in refinement of oil and crude ore.

Alternative sources of energy and materials. The key direction in saving of fossil fuel and resources is their large-scale replacement with alternative sources – hydrogen energy and fuel cells, biofuel of the second generation, renewable sources of energy, composites, and nanomaterials. Such replacement should occur in the industry, construction, transport, in housing and utilities and private household of all countries and civilizations based on their partnership and transfer of technologies. This allows lifting the restrictions of the economic growth and improving the standard of life of population related to depletion of natural resources and growing prices for them.

It will be required making an estimation based on the agreed criteria for comparative economic and ecological efficiency of alternative sources of energy and material competing with each other in the context of natural-climate and other features of various civilizations and countries, ensuring partnership of civilizations in the development, innovative adoption and distribution of the most efficient sources.

Ecological imperative. In order to ensure a double reduction by the middle of the 21st century emissions of greenhouse gases and other pollutions of the environment it is necessary:

- to undertake a global inventory and estimation of the effect of all hazardous emissions and pollutions;
- to elaborate and to launch the global system of eco-monitoring based on the observation and measurement of the level and sources of pollutions from space, the land and water surface, the use of the outputs for forecasting of the level of pollutions and their impact on the climate changes;

- to undertake the elaboration and introduction of the global system of standards for reduction of hazardous emissions differentiated in time by pollutions, civilizations and countries, compensation of pollutions and penal fees for exceeding the internationally recognized standards to the global environment facility for financing the activities to pursue the energy-ecological strategy requiring an international support, first of all, in the areas of environmental disasters (for instance, in the Central Africa).

The establishment process of the noosphere acquires thus specific outlines, indicators and stimuli that would enable the commonwealth of civilizations and states to implement it more well-aimed, fast and efficiently.

A Strategy of Socio-Demographic Partnership²⁶

A significant place is given to the problems of demographic and social development in the UN documents on the global strategy. These problems take a central place in the Millennium Development Goals adopted at the special session of the UN General Assembly in September 2001: promote gender equality and empower women, improve maternal health; combat HIV/AIDs, malaria and other diseases. At the conferences on population organized by the UN much focused was given to the issues of overpopulation, reduction of extremely high population growth rates in the developing countries, family planning. The outcome document of the G-8 Summit in Italy (July 2009) attention is paid to a deteriorating situation of migrants under the economic crisis conditions. A number of the G-8 Summit documents address the issues of improvement of social development in Africa; it is envisaged to allocate 60 bln. dollars for combating dangerous diseases. However, these strategies do not bear a system-based nature or differentiated in a civilizational aspect, more often than not declarative and supported by required resources.

Part 4 of the Global Forecast “Future of Civilizations” for 2050 envisages a system of efforts for a long-range strategy of socio-demographic dynamics of civilizations.

In some countries they reach 1-2% of GDP. The preservation of safe environment for the maintenance of a high standard of life demands reorienting the development of humanity in the consumption area. To regulate the influence of consumption of the environment it is necessary to have a set of indicators allowing its evaluation; social, economic, political tools are required for shaping an ecological consumption: ecological taxes, financial incentives of population, fashion, public relations, ecological labeling, ecological education and upbringing.

Along with that it is necessary to use various mechanisms for redistribution of resources between countries and civilizations in favor of poor and less developed so that to promote their positive dynamics.

However, for various regions and civilizations vectors of demographic development will be differently directed. For western European, eastern European, Indo-European and Japanese civilizations a hasty growth of a share of elderly and old people will become a major challenge as well as depopulation which will spread to many leading countries of these civilizations.

For north-American and Australian civilizations the adaptation process of numerous groups of migrants to their basic civilizational values will likely be the primary problem.

For Indian, Chinese, Moslem, Latin American and African civilizations the challenges of the future are connected with a growth of the population size. The African civilization will have most difficulties at that as the one with the lowest level of economic development.

²⁶ The section authors –N.M. Rimashevskaya, Yu. V. Yakovets, V.G. Dobrokhleb

For all leading world civilizations it is typical an increasing gap between the poor and the rich both inside of each leading country and between various civilizations. By standard of life which may be represented in the accumulated form by a GDP indicator per capita, a gap between the leading countries, for instance, between western European and African civilizations was 150 times in 2005, against Indian – almost 50 times. An indicator of quality of life an anticipated life span at birth may act as an indicator of quality of life. Thus, according to the medium variant of the forecast for 2050 the anticipated life span, for instance, for countries with low income will be 67.2 years for all population; and by countries with high income – 82.4 years.

A differentiated global demographic strategy is designed to respond to various demographic challenges. Its main objective is in the improvement of the standard and quality of life population of various civilizations, first of all, aimed at the elimination of extreme poverty. The main mechanism for attaining the objective of the demographic strategy is the formation of a new system of social institutes which should take into account demographic challenges each civilization faces.

For western European, eastern European, Indo-European and Japanese civilizations – those institutes are significant which promote an increase of the layer of the “young old people”, people of the third age retaining motivation and resource potential for participation in the life of family and society. It is also necessary a search for the means to support the pension system and social care services for the elderly people. Measures for pronatal and migration policy will have a vital importance.

For Indian, Chinese, Moslem, Latin American and African civilizations it is necessary to create a social system allowing modernizing economy, building up a human capital under the conditions of a high growth of population size.

The significant directions of the global migration strategy are:

- assistance of people in the implementation of human right to free movement, choice of the place of stay and residence;
- enhancement of the role the migrants play both in stimulating development and reducing the poverty in the countries of origin and development of recipient countries;
- increase the responsibility and obligations of the state related to protection of the rights of migrants and those national who are willing or obliged to the country of their origin.
- Adoption of coordinated measures aimed at combating illegal migration, unlawful contracting and using the labor of foreign workers, human trafficking, violations of laws and crimes in the migration area linked to the activities on counteracting crime and terrorism at the international and national levels;
- Assisting the adaptation and integration of migrants which should be accompanied by objective information about migration and migrants in the sphere of politics, mass media and public discussions.

Several central topics that have already found reflection in detailed recommendations with respect to the actions at the national level stand out in the International strategy of actions on the aging issues. These major topics correlating to a great extent with previous declarations, obligations and programmes of the UN include the following:

a) ensuring safe life conditions of the elderly people that implies the restatement of the poverty eradication among the elderly people and development of the UN Principles for older persons; b) establishment the conditions so that the elderly can be empowered to participate efficiently in the social, economic and political life of society, and among other things through a volunteer and income bearing labor; c) establishment of opportunities for development of individual abilities; d) ensuring guarantees for the observance of economic, social and cultural rights of the elderly, and also their civil

and political rights, including liquidation of all forms of age discrimination; e) undertaking obligations with respect to the ensuring of the equal rights of the elderly women by eliminating sex based discrimination, and also all other forms of discrimination; f) recognition of the key significance of relation, solidarity and mutual help of generations in the interests of social development; g) rendering to the older persons medical aid and support when necessary; h) establishment of partnership relations between governmental institutions of all levels, civil society, private sector and directly with the older persons, civil society for translating of the International Strategy into the practical actions; i) conducting scientific researches and studying experience in order to analyze individual, social and medical effect of aging, especially in the developing countries.

Recommendations with respect to the actions may be subdivided into three priority directions: development under the conditions of the aging world; ensuring public health and welfare in the old age; ensuring favorable and positive conditions for people of all age groups. Security of the elderly people significantly depends on the advance in the solution of these three tasks. The priority directions have been worked out so that to direct the activity related to the formulation of policy and its pursuance to attain a specific goal of adaptation to the conditions of the aging world where success is determined by the improvement of the standard of life of the elderly people and stability of various mechanisms both formal and informal on which the welfare of people depend throughout their life.

Innovative-Technological Partnership of Civilizations

A worthy respond to new challenges of the 21st century may only be given based on the partnership of civilizations in the pursuance of the strategy of an innovative-technological breakthrough, assimilation and diffusion of epochal and basic innovations, ensuring a transition to the six technological order, post-industrial technological mode of production. It will allow surmounting the present global technological crisis (underlying the energy-ecological, food, and economic crises) and ensure sustainable development on the scale of the planet.

It should be noted that not sufficient attention is paid to the issues of technological development in the strategic documents of the UN, G-8, G-20, in the performance of other international organizations. The outcome document of the G-8 summit (Italy, July 2009) includes a section addressing the innovations and the right of intellectual property, a significant role of innovations is stated in the solution of global problems of environment, public health and poverty, however the main focus is paid to protection of the intellectual property rights, it is prescribed to work out and to implement innovative economic, ecological and energy strategies. However, the main focus is laid to a private capital at that, it is not envisaged the investment of major funds in the formulation and implementation of the global innovative-technological strategy, bridging up a technological gap between the vanguard and lagging countries and civilizations. There is no a specialized organization in the UN system responsible for the formulation and implementation of the global innovative-technological strategy. It is largely determined by a widespread opinion that the private capital should deal with innovations in the market competition, and the role of states and international organizations is limited to the establishment of a favorable innovative climate and support of development of the innovative structure. Meanwhile, the assimilation of capital-intensive and highly risky basic technological innovations requires a direct governmental support and participation, especially at the launching period.

Part 5 of the Global Forecast “Future of Civilizations” for 2050 validates recommendations for the strategy of the innovative-technological partnership of civilization for a long-term outlook.

The partnership of civilizations in the technological development and global innovative breakthrough is a key factor of surmounting a current cluster of global crises (technological, energy-ecological, food, economic) and well-directed formation of the post-industrial technological mode of production as a basis of transition to the integral post-industrial civilization. This is determined by a

number of factors.

First, basing only on leaping-like development of technologies, implementation of strategies of the innovative breakthrough on a global scale a slowing down of the rates of economic growth may be surmounted and increase in the growth of labor productivity at the stage of the late industrial development at the end of the 20th – beginning of the 21st century, ensure a material and technical foundation for a significant speeding up of the growth rates of labor productivity and gross domestic product under the conditions of slowing down the growth rates of population, reducing a share of able-bodied population in its overall size and dropping a specific weight of population in the innovative age. On this basis only modernization of technological base of society may be implemented, its adaptation to drastically changing conditions of development of global and local civilizations.

Second, the technological partnership is a necessary condition for surmounting the gap formed between a bunch of the vanguard countries in the economy of which the fifth technological order prevails and the foundations of the six order are being laid, and many half of population on the earth – the number of technologically lagging countries and civilizations where the third and even relict technological orders prevail, pre-industrial, technological modes of production that determines an extremely low level of labor productivity and generates poverty and pauperism of the most population in these countries. Such technological breakthrough is a basis of an economic gap between rich and poor countries, for exacerbation of geo-political and social contradictions and put the brakes on the advance to the next whorl of the spiral of dynamics of civilizations. Apparently, failing partnership of civilizations, organized assistance from the vanguard countries to the lagging countries it is impossible for the latter to break forth a technological lagging and poverty.

Third, the establishment of the sixth technological order and the post-industrial technological mode of production requires enormous investments in modernization of the technological base of society, and also investments in the framing of a scientific and personnel bases for the implementation of the strategy of such transition. Moreover, such concentration of efforts should be performed not only at the level of states and civilizational interstate unions but on a global scale. Thus requires to polish up institutes and mechanisms for a technological partnership of civilizations that would allow focusing resources and solve the tasks of the establishment of a new technological mode of production in a relatively tight historical terms and on a scale of all planet under a significant bridging up of the gap between the vanguard and lagging countries and civilizations based on their technological partnership.

At the moment the sphere of technological partnership is most backward under modern mechanisms for interaction of states and civilizations, in the system of bodies and activities of the UN and its organizations. Even though certain experience in the arrangement of such partnership is available, first of all in the field of information technologies and formation of a global information society, including a number of international conferences organized by the UN, however this is only one area of the innovative breakthrough, and the focus was made on technological problems but not to the content of information networks to solve pressing tasks of transiting to the post-industrial society. Actually the area of international technological cooperation is farmed out to the transnational corporations which have fast taken over the developing global high-tech market and dictate their own terms ensuring the influx of enormous sizes of world technological quasi-rent to such corporations and developed countries where the headquarters of such corporations are registered. Such unrestricted TNC dictate on the world technological market is the main factor of a deepening technological gap between the developed and developing countries.

A technological policy of the European Union may serve as an example of cooperation between states in the field of technologies and innovations. Two scientific-technological programmes targeted at the ensuring of an innovative breakthrough are effective here. This is a framework programme in

science and technologies of the European Union adopted every four-five years and envisaging the allocation of major joint resources for a priority area of a technological breakthrough. Furthermore, long-term innovative-technological programmes exist within the EEC so called platforms that determine long-term goals of the innovative breakthrough in this or that area (for instance, in the hydrogen energy), form certain mechanisms and envisage the allocation of the funds to attain such goals.

The Eureka programme envisages a selection of the most promising innovative-technological projects and uniting the efforts of the countries concerned not only of the EU members to implement such projects and obtaining specific results. This allows the European community setting and solving major targets in the implementation of the innovative breakthrough in technological or other priority areas.

It needs to be clearly understood that the surmounting of modern deep crisis to a large extent caused by negative effects of the present-day structure and mechanisms for a global technological advance is impossible failing to determine the priorities and working out a mechanism for their achievement based on partnership of civilizations on a global scale.

The prime task for the near-term outlook becomes the formation of a technological partnership of civilizations as one of the major, key parts of the general system of partnership among civilizations on a global scale. The technological partnership of civilizations should targeted at the attainment of the following basic goals:

- Uniting of efforts of countries and civilizations for the implementation, on a global scale, the strategy of the innovative breakthrough ensuring a large-scale assimilation and spread of the sixth technological order on the planet implementing the accomplishments of the scientific-technological revolution of the first quarter of the 21st century;
- Surmounting the established technological polarization in the development of countries and civilizations based on the union of efforts and working out a mechanism for transfer of high technologies from the vanguard countries and civilizations to the lagging and ensuring such approximation based on mobilization of financial and human resources;
- Working out a mechanism for a global regulation of technological development, implementation of the innovative breakthrough strategy, restricting the effects of the dominance of transnational corporations in such area, establishment of conditions for a more equal and just distribution of achievements of the modern STR and fruits of globalization in the technological area between various civilizations, countries and social strata that is a basis for surmounting economic polarization;
- Formation of the system of technological partnership of civilizations will required well-defined innovative-technological development on a global scale scientifically validated based on a super long-term forecast, selections of the system of priorities of such innovative-technological breakthrough, joint programs to implement such projects and formation of a mechanism for a resource support of their implementation.

A Strategy of Economic Partnership of Civilizations and Transformation of Globalization

The global economic crisis of 2008-2009 has brought to the forefront the problems of formulation and implementation of the global economic strategy ensuring surmounting the crisis and its effects and entering the path of sustainable economic development.

These problems lay in the center of the performance of the 63rd session of the UN General Assembly – and at the discussion at the International Conference on the global economic and financial crisis and its impact on development specially held in June 2009, the outcome document of this conference was approved by the UN General Assembly on 09 July 2009.

The outcome documents of the G-8 meetings in Washington November 2008) and London (April 2009), G-8 summit in Italy (July 2009) are dedicated to the strategy for surmounting the global economic crisis and reforms of the international monetary and financial system.

However, the said documents mainly include short-term and medium term measure, although a need for formulating a long-term strategy is noted.

Thus, the final document of the Conference on the issue of the global financial-economic crisis and its impact on the development of humanity reduces the causes of the crisis to the failures in the international financial and economic system, especially the performance of international and national financial institutes, although as it has been shown in chapter 6 of this forecast, the causes are a far deeper and more fundamental; they are in the depletion of the development potential of the industrial economic system and technological mode of production adequate to it, defects of a neo-liberal model of globalization. Hence the proposed list of measures for surmounting the crisis and its negative impact, especially for the developing countries, is designed to remedy the failures in the international financial system, enhancing its transparency and responsibility, strengthening the assistance to the developing countries for the implementation of the goals set in the Millennium Development Declaration, although it is recognized that the attainment of such goals under crisis conditions has become rather difficult and reverse tendencies have outlined in some goals. More radical proposals of the UN Commission on Reforms of the International Monetary and Financial System are ignored as a matter of fact. The final document of the G-8 summit in Italy (July 2009) is of the same nature.

Not denying the need for urgent short-term and medium-term measures for eliminating the global financial-economic crisis and improvement of the established international financial-economic institutions we therewith believe it necessary to concentrate the focus of the global community on the elaboration and implementation of radical measures of a long-term nature adequate to deep transformations of local and global civilizations, world economic system in the first half of the 21st century. For such purpose we recommend the formulation of a long-term strategy of economic partnership of civilizations which basic points set forth in part 6 of the Global Forecast “Future of Civilizations”.

The primary areas of the radical innovative update of the world economic system and outlines of the upcoming integral economic system set forth in the report of B.N. Kuzyk and Yu. V. Yakovets at the 15th World Congress of the International Economic Association (Istanbul, June 2008) “The Establishment of the Integral Economic System as a Global Transformation of the 21st Century” and in this part 6 of the Global Forecast “Future of Civilizations” for 2050.

A need for such long-term strategy is dictated by several circumstances.

First, as the first half of the 21st century is a period of a *civilizational revolution* preceded by a global civilizational crisis (more specifically a cluster of global crises) of the end of the 20th beginning of the 21st centuries and which drastically transforms all sides of society life, all elements of the genotype of civilization – socio-demographic and energy-ecological, technological and economic, geo-political and socio-cultural. This revolution comprises three basic elements:

a change of the industrial world civilization prevailing for two centuries with the post-industrial world civilization integral by its contents;

a replacement of the fourth generation of local civilizations under which the dominance of the West has been observed for five centuries, with the more differentiated fifth generation with a shift of creative activity to the East;

a transition from the second historical super-cycle in dynamics of the global civilization with its semi-millennial life cycle (period of the Middle Ages, early industrial and industrial world civilization)

to the third historical super-cycle to cover the triad of the post-industrial world civilizations with an about semi-millennial time period (in the context of the historic time compression law).

Second, the industrial economic system oriented at the system of market-capitalist relations, every possible exploitation of labor and natural resources and militarization for the sake of deriving superprofits prevailed in the vanguard civilizations and world economy during two centuries has mainly exhausted its growth potential, accumulated a considerable share of parasitic elements of a “soap bubble” economy, brought to the dangerous edge the gap between the rich and poor, vanguard and lagging countries and civilizations, is becoming, as the present global crisis demonstrates, increasingly dangerous for the present and future generations and requires a replacement with the integral economic system - a more harmonized noospheric co-evolution of society and nature built on the principles of partnership, humanization and social justice. A long-range horizon of the foresight and strategy determines the main direction and ways to transform the economic system and globalization.

Third, urgent short-term and medium-term measures now undertaken not in the context of a long-range outlook might give unexpected and undesirable results, lead to conservation and extension of the agony of the industrial economic system lived its historical period and institutes adequate to it and thus extend and make a crisis process of transformation more painful. Such scenario is preferred by developed countries, TNC and international financial centers and international economic organizations representing their interests but it is much harder for the most countries and civilizations and humanity in general.

Fourth, a neo-liberal model of spontaneous market self-regulation of economy and globalization prevailed in the last quarter of the century has shown its inadequacy. It is necessary to shift to the model of a harmonious combination of market enterprise and self-regulation with governmental and inter-governmental regulation of functioning and development of economy in the context of interests of the present, past and future generations, principles of social partnership and noospheric approach, partnership of civilizations in the multi-polar world, in the context of a need for the governmental support to the non-market sector where reproduction of labor, intellectual and natural resources takes place, ensuring the partnership of economic orders and social strata, states and civilizations. The global transformation becomes ever more targeted and manageable, and this implies the elaboration and consistent implementation of long-term national and global strategies, forming the institutes of partnership on a national and global scale.

In order to ensure the implementation of the innovative-breakthrough scenario of the establishment of the integral economic system, a long-term economic strategy should be targeted at support of progressive shifts in the real economy of states, civilizational unions and in the global economy. Real economy, production of a wide range of goods and services for satisfying continuously growing demands of population, production and public sector of economy was always, is and will be the basis of business life, market and non-market sectors of economy, the supreme goal and mission of its functioning and development. What are principal directions of these strategic shifts in the long-term outlook until the mid of the 21st century?

From our view point the principal direction of long-range shifts in the reproductive structure of economy supported by national governments, civilizational supranational unions and international economic organizations should become, **first**, modernization and advance development of the consumer sector (that meets the social orientation of the integral economic system) and specially the agro-food complex (to surmount the food crisis, hunger on the planet and ensuring a stable balanced food of the population on the planet), housing and utilities economy (to satisfy day-to-day needs of families in comfortable homes and quality public utilities services) and social complex, especially of public health (to strengthen the health, reducing mortality level, surmounting epidemics) and education

(to get a necessary level of knowledge and skills and innovative trend in staff training for all population).

Such structural shifts will help to ensure a social orientation of the post-industrial economy and surmount the gap in the level and quality of life between the rich countries of the “golden billion” and poor countries and civilizations.

Second, high development rates of the innovative-investment sector to ensure the demands in the innovative updating of economy, assimilation and spread of the sixth technological order. One should be looking at termination of the arms race and gradual demilitarization of economy, conversion of the defense-industrial complex at that by channeling intellectual and economic resources released to the development of the invest machine building, civil high-tech products.

Third, the realignment of the structure of the energy-commodities sector by replacing of fossil fuel and commodities with alternative (first of all renewable) sources of energy and materials (nanomaterials and composites) and gradual transition to a noospheric mode of production and consumption under a considerable reduction of hazardous emissions into the environment. The efforts of governments, interstate unions should be targeted at assimilation and spread of the achievements of the energy-ecological revolution of the first half of the 21st century.

Fourth, a significant reduction of extremely swelling market infrastructure which is used by TNC and monopolies for redistribution of the riches in their favor will be needed. In many countries a specific weight of trade has grown in GDP under an enormous number of intermediaries increasing transaction costs beyond measure. World financial centers and finance-credit organizations are taken away by the pursuit of super profit by blowing market capitalization (virtual economy) that has become a push for the evolvement of the global crisis. The number of the managerial staff (and in addition to, corrupted in many countries) is increased beyond measure. It is necessary to support tendencies to the reduction of the number of the employed in trade through an extensive spread of e-commerce, reduce the number of stock exchanges and banks and put them under control of society, reduce the number of officials while increasing their responsibility for the management efficiency.

The technological structure of economy is determined by the relation of technological orders (TO) in the gross output of national, civilizational and global economy. The principal areas of the structural shifts in this direction:

- a gradual replacement of the now prevailing fifth TO – material and technical base of the fifth Kondratieff cycle which entered the down wave from the crisis of 2001-2002, with the promising sixth TO which is at the innovative assimilation phase now and be prevailing, determining the competitive capacity of goods and services in the 20-40s of the 21st century;

- the ousting in economy of the lagging countries of the fourth TO prevailed in the third quarter of the 20th century which still takes a significant part in economy of many countries and civilizations of the second echelon, the third order prevailed in the first half of the 20th century and still persisted in the countries and civilizations of the third echelon, and also relict early industrial (first and second) and pre-industrial TO prevailed in the 19th century and previous centuries and which lost the competitive capacity long ago but still persist in the backward countries and civilizations of the fourth echelon in the natural-patriarchal family households.

The relation of the orders changes, especially in the periods of technological revolutions baptizing a change of technological modes of productions (approximately once in a half of a century) and technological modes of production (once in a half of centuries) in the vanguard countries and civilizations.

The 10s-20s years of the 21st century are characterized by the evolvement of the global technological revolution targeted at the mastering of a cluster of the sixth TO innovations as the first

stage of the post-industrial technological mode of production ensuring an increase in the growth rate of labor productivity and efficiency of reproduction. A long-term economic strategy of this period should be targeted at:

- support of basic technological innovations ensuring assimilation and spread of the first generations of the sixth TO;
- promotion to the spread of technologies of the sixth order both vertically (by sectors, national economy complexes, reproductive sectors) and horizontally (by countries and civilizations) so that to bring up the technological level of the lagging sectors and countries;
- setting the investment (both internal and direct foreign) the innovative nature targeted at the mastering and spread of technologies of the sixth order;
- training professional staff orientated at basic innovations and having necessary knowledge and skills for that;
- creation of financial and legal framework to support basic innovations of a long-term nature, high capital intensity and increased level of risk through direct governmental support in the launching period, tax preferences, insurance of innovative risks.

The leaders of the upcoming technological revolution will be the northern American, western European, Japanese, Chinese civilizations, and also partially oceanic (Australia) and Buddhist (the Republic of Korea) civilization. In the second echelon – eastern European, Eurasian, Indian, Latin American civilizations. Among outsiders – African and a significant part of the Moslem civilization who will require a large-scale support in modernization of economy from the vanguard civilizations and global community.

The institutional structure of economy is determined by relation of economic orders based on various forms of ownership and forms of distribution and exchange adequate to it.

In the first quarter of the 20th century a *transnational order* expressing the TNC impact and compradors related to it developed at the advance rate based on globalization. National *private business capitalism* retained its positions. It revived in the post-Socialist countries as a result of neo-liberal market reforms. The privatization policy led to the diminishing influence of the *governmental monopoly order*. In the post-Socialist countries the governmental-socialist order partially transformed into the governmental monopoly (in the Eurasian and Eastern European civilizations). The tendency towards strengthening the role of *small commodities* order (small business) and patriarchal order (family households in Russian and other post-Soviet countries) has taken shape.

However, in the process of institutional transformations the optimization of the structures has not been ensured and improvement of the efficiency of all orders – each in its niche.

In the near decades the economic strategy should be targeted at the restriction of the transnational order, creation of global anti-monopoly laws, ensuring better transparency of TNC and strengthening control over their performance. A concurrent policy of active support of small commodities order, ensuring conditions for enterprise and income of millions of small businesses, and also development of cooperation of family households for raising their productivity and marketability, using the principles of cooperation of Alexander Chayanov and Nikolai Kondratieff should be pursued.

National private business capitalism will mainly preserve its positions but will be to a larger extent under control of the government and society. The governmental order (governmental-capitalist and governmental-socialist) will retain its positions and in some countries it will increase as a result of measures undertaken.

In any case a long-term economic strategy should be aimed at the preservation and optimization of the multi-order structure so that each order filled its niche and the balanced partnership of orders at various stages of the economic cycle is reached.

It is necessary a long-term strategy of transformation of global monetary, financial-credit and price relations. Along with the shifts in the real economy transformations in the system of instruments of virtual economy which in the last decades split off from real economy and formed a kind of “economy of soap bubbles” burst in the crisis periods of 2001-2002 and especially the global crisis of 2008-2009. The matter in question is transformation of world monetary, financial-credit, price and rent relations. Such problems have been addressed in detail by Group 20 and the UN Commission report in terms of short-term and medium-term strategy. It is necessary to consider them in the context of a long-term strategy of the establishment of the integral economic system

World Monetary Relations

Within centuries the functions of the world money was performed by gold which has real value equivalent to the labor cost of all other goods and services circulating on the world markets.

A refusal from the golden standard and assigning the function of the world money to one of the national currencies – US dollars changed drastically the situation. Goods and services coming to the world market are exchanged into US dollars, almost lost its connection with gold and not backed by it. In addition the accumulation of the US foreign and internal debt and crisis upheavals of the American economy has become one of significant factors of the global crisis.

Several freely convertible currencies circulate on the world market. This is dollar, Euro, pound sterling, Japanese Yen, and Swiss franc. The proportions of such currency exchange constantly vary; this is one of the factors of instability of the world economy and unreliability of economic calculations.

The establishment of the multi-polar world makes the tendency towards formation of several reserve currencies is more real, the establishment of bi-currency settlement systems, etc. But these are half-measures as in any case national currencies show the specifics of economy they serve.

It appears long-range more and more often proposals stated (in particular by the President of the Republic of Kazakhstan) to create the global currency reflecting the functioning of global economy and free of influence of national specifics and tendencies. In such case one should take into account experience of conversion from the nominal unit of account ECU to real monetary supranational unit of currency – Euro accumulated by the EU. The principles of real value backup of such currency should be observed at that.

Certainly, such path is uneasy and long-term, will take not one decade. But it is important to determine the final goal of movement and move along this path step by step.

The world market can not function normally failing the developed system of ***financial-credit relations*** and institutes, world financial centers, banks, stock exchanges, insurance companies, etc. They make settlements and transfers of investments and securities, determine market capitalization of companies, stock indices serve a kind of the barometer describing the state of the investment climate and health of economy at various cycle stages. But one should not forget that the principal part of capital circulating in this sphere is virtual, fictitious capital which has no independent value. Splitting off from the tendencies of the real economy movement, it becomes a false mirror and one of the strong factors of periodical economic crises.

This is the tendency of a split off of virtual capitalism from real, formation of “soap bubbles” of financial capital gave rise and act as a system fact of the global economic crisis of 2008-2009 which started as the mortgage crisis in the US economy already in 2007.

In the Group 20 documents and UN Expert Commission a lot of validated proposals to reform the world financial system, strengthening its transparency and responsibility, supervision over efficiency of

the performance, improvement of the accounting statements is made. Not repeating such recommendations the following recommendation could be proposed.

It appears advisable of completing now existing stock exchanges where the securities are listed of the companies admitted, with one more instrument – *stock exchange of innovative projects* where innovative-investment projects passed an innovative-technological evaluation would be listed so that to attract strategic investors for them. The implementation of the pilot project to establish the Moscow International Stock Exchange of Innovative Projects is one of the primary goals of the International Strategic Innovative-Technological Alliance set up in Moscow at the of 2008. The goal of such project is to provide conditions for raising investments to implement an innovative-breakthrough strategy. It is anticipated to establish the divisions of the alliance stock exchange in Almaty, Dnepropetrovsk, Istanbul, Munich, Johannesburg, Hong Kong, and Mexico.

A regulation strategy of world prices and rent relation will be necessary. A lack of the estimation of the international value of goods and services and world market fluctuations lead to periodical sharp changes in world prices and rent income related to it, redistribution of the value between national economies.

Sharp fluctuations of the world prices and their relation by fuel, commodities, finished goods undermine stability of economy and reliability of economic estimations for the states and companies involved in the international trade. Although direct fixing of world prices for millions of goods and services circulating on the world markets is almost impossible, nevertheless there is experience of price regulation in the market economy which could be used. Not mentioning experience of the work of the price commission headed by John Galbraith in the Franklin Roosevelt administration, experience of the 70s years worked out under Nixon could be used. Under conditions of high inflation neither company could increase prices failing the submission of the evidence of objective conditionality of such price increase to the federal price commission (which by its number exceeded the State Price Committee under the USSR Council of Minister). The inflational price growth was soon suspended, the Price Commission was terminated.

It appears that it would be reasonable to establish a dedicated international body which would be engaged in analysis and forecasting of the tendency in price dynamics and estimation of the implications of such changes and would issue certain recommendations for possible price changes. Such body could operate in linkage with a dedicated international anti-monopoly body. As experience of the European Union demonstrates, such moves are possible and efficient in this direction.

In this connection the question becomes now how to regulate world rent income. The matter in question is both natural rent (mining, forest, water, land) and ecological anti-rent (super profits arising as a result of predatory exploitation of natural resources and extreme pollution of the environment) and technological and financial quasi-rent. At the round table meeting of the Global Civil Forum of the World Summit on Sustainable Development in Johannesburg (2002) we put forward a proposal on imposing a kind of taxes on world rent income and establishing of three global funds for such account: ecological (with the deduction of the ecological anti-rent to such already existing fund instead of selling quotas to hazardous emissions), technological (taxation of profits in trading weapons and high tech goods) and socio-cultural (taxation of financial quasi-rent generated on the stock exchange markets). This proposal was endorsed by the round table participants published²⁷ and submitted to the UN but received no attention. Perhaps time will come to return to such issue.

Only some issues pertaining to transformation of the world system of monetary, financial-credit, price and rent relations have been addressed above, some basic innovations have been proposed in this

²⁷ Yakovets Yu.V. Rent, Anti-rent, Quasi-rent in Global Civilizational Economy.M: Akademkniga, 2003

sphere. Obviously a circle of such innovations in the elaboration of the strategy for economic partnership of civilizations has to be expanded considerably.

Strategy of the Establishment of the Multi-polar World Order Based on Partnership of Civilizations

The long-range strategy of partnership of civilizations will be incomplete and inefficient if it sets aside deep transformations of a geo-political sphere, model of the world order and interaction of civilizations, geo-political world order which render a significant impact on dynamics of civilizations speeding up or slowing down its dynamics.

In recent decades the prevailing model of the world order suffered drastic changes. The model of a bipolar world the foundations of which were laid in Yalta and Potsdam and in the establishment of the UN terminated its existence at the end of the 80s – beginning of the 90s with the end of the “cold war” and dissolution of the USSR and the world system of socialism. Based on this an attempt to form the unipolar world order under the dominance of one superpower – the USA was undertaken. However, this attempt could not but fail that became obvious in the first decade of the 21st century. The multi-polar world has become a reality. A strategic choice is made between its two models – multi-polar world based on the confrontation and conflicts of civilizations or on their dialogue and partnership.

We believe that it is the second model corresponds adequately to a humanistically noospheric post-industrial society. Our conclusion was also corroborated by a global financial-economic crisis. The consciousness of a common threat has relegated to the background the inevitable contradictions between civilizations and leading countries, they have united their efforts in counteracting the growing threats of the 21st century. Part 7 of the Global Forecast “Future of Civilizations” validate our recommendations for such strategy.

The innovative-breakthrough scenario of geopolitical dynamics is in a gradual formation of the multi-polar world order model based on dialogue and partnership of civilizations. Then, basing on the principles of equality and reaching a consensus in the solution of intricate geopolitical problems, a long-term strategy of partnership of civilizations will be jointly formulated and implemented, and based on it a number of specific measures for surmounting global crises and shaping the regulation for all system of international relations, including geopolitical. The preconditions for such optimistic scenario are gradually formed. It should be noted that the second scenario implies the existence of certain preconditions so that to validated it and implement. Positive sides are in its meeting the relation of forces already formed and finding understanding, dialogue between civilizations within G-8, G – 20 which has the goal of partnership of civilizations and leading countries of the world to surmount the financial crisis hit the world and in the performance of the Security Council and other UN bodies of G-192 and other international organizations. On the other hand, the background is that such model of the multi-polar world order meets the essence and principles of the post-industrial humanistically noospheric society under establishment, transition from the industrial world civilization to the post-industrial, integral and is a component of the genotype of such civilization.

In order to implement the optimistic, innovative-breakthrough scenario of geopolitical dynamics of civilizations and leading countries certain *conditions* and *factors* are necessary.

First, it is necessary to elaborate, update on a regular basis and extend a long-term forecast of geopolitical dynamics as a component of the general development forecast for the global civilization. The attempts to make such forecast already exist: the global forecast of the future of civilizations for 2050 underway by the Russian and Kazakhstan scientists which allows foreseeing the inevitability of cycles, crises and waves of innovations, surmounting ways of such crises, to use a geocivilizational approach so that to take into account the relation of dynamics of all sides of society, including also a

geopolitical component. It allows to a full extent taking into account the effect and ways of establishment of noosphere and make balance estimations applying macro models similar to those which were once proposed by Wassily Leontieff. Such forecast will be mainly completed in 2009 and presented at the United Nations as a precondition for formulating a strategy of partnership of civilizations.

Second, it will be required within the UN as it was in the seventies when the world model and forecast of world economy for 2000 was made the establishment of a special division for coordination of works in the long-term global forecast, including geopolitical and creation of the centers for scientific elaboration of such kind of forecasts.

Third, it is necessary, based on the forecast to formulate and update on a regular basis a long-term strategy of geopolitical development and interaction of states and civilizations so that to discuss it within the UN, within the world summits on sustainable development and at other forums, including scientific. Such strategy should determined basic lines of behavior and interaction of civilizations and leading countries in geopolitical relations and in other areas.

Fourth, it will be necessary to create the institutes that would be able to perform a geopolitical coordination of states and civilizations. It is necessary to proceed from the prospect of strengthening the authoritative functions on the global level for coordination of activity of civilizations and leading countries, formulation and adoption of strategic decisions. In order to do so the model to form in a long-term outlook the World Confederation of states and civilizations based on the United Nations and specialized organizations. In such case the role of the house of civilization may be played by an extended membership of the Security Council so that to find critical decisions for knotty questions based on dialogue and elaboration of concerted decisions. It should be taken into account that of all states and territories in actual fact only twenty two states are with the population over fifty million people representing about three fourths of the total population on the earth. Democratic principles should be relied on and on who represents real interests of the most population on the earth and hence participates in the elaboration and taking decisions. It corresponds to the principles of the multi-polar world as it is just about such centers of force the bulk of population on the earth is concentrated. Along with that the forum is necessary so that all countries on an equal legal basis – large, medium, small – have an opportunity to make their contribution to discussion and decision of strategic problems and the UN General Assembly may become such form as the chamber of states numbering 192 members.

Fifth, such step to the confederation implies the separation of powers principle and a concurrent specific impact on various areas of activity. It appears that the Security Council trends to the right of taking decisions in its updated and expanded membership as the upper chamber of the World Parliament, together with the General Assembly, determine rules of global law which would have a mandatory nature and be implemented in practice, enjoying a certain support from executive and judicial authorities which would settle disputes, conflicts and rely on international bodies exercising the implementation of such decisions and control over the compliance with the rules of global law. This is a step to the confederation which would allow preserving the diversity of the components of the global society concurrently taking a common stand and strategy.

The bodies specializing on separate issues of functioning of the global community will also be necessary as a part of the executive system of confederation as well as responsible for formulation and implementation of common strategy based on the UNEP, International Energy Agency, for solution of ecological and energy problems, based on the International Labor Organization and division for demography for formulation and implementation of demographic and migration policy and policy in the area of labor and employment based on decision of the problems related with the food support, surmounting food crisis – FAO on the basis of the UNESCO – organization for cooperation in science,

culture, education and ethics. This system is of a confederative nature and is built on the basis of concerted policy. Also, special bodies responsible for formulation and implementation of common policy in finance, economy, currency on the basis of UN Economic and Social Council, International Monetary Fund, World Bank, WTO and other international economic organizations will be required.

Sixth, in the context of the diversity of the regions of the world, continents, civilizations formation of the network of regional bodies of such confederation will be required. As a matter of fact such regional bodies already exist, they unite the western European and the eastern European civilization in the form of the European Union, North America and Mexico – in the form of NAFTA, the African Union unites the African and a part of the Moslem civilization on the scale of the African continent. The unions of Latin American countries exist, SCO, APEC represent the system of cooperation between civilizations. It appears that it may be such coordination body under the Security Council or under the UN Secretary General where representatives of these unions could meet on a regular basis and agree on approaches.

Seventh, it will be required the elaboration of a mechanism which will ensure functioning of all system of management and regulation within the confederation. This first of all refers to finance as it is necessary to ensure the adequate level of financing of not only the maintenance of the confederation bodies but programmes allowing ensuring the approximation of economic, technological and educational levels of various countries, eliminate the gap existing now between them and is one of the major reasons for discord riving the global system. It maybe, with a glance to experience within the EEC, a certain level of taxation for an earmarked financing of a certain line of activity. At the World Summit on sustainable development in Johannesburg in 2002 we proposed to create such mechanism in the form of a sort of taxation of super profits and establishment of specialized Global Facilities. Such facilities exist now, one of them – the global environment facility but it is based on the principle of volunteer contributions of various states. As it appears the decision of such directions for global programmes and projects of financing of technological, energy-ecological, social development will be possible here. Financial support and concentration of efforts of various states will be required so that to work out and implement the system of global innovative programmes which would allow faster surmounting a cluster of crises hit now the world and fulfill a transition to the sixth technological order and based on partnership of civilizations, to narrow a gap in the level of technological development of vanguard and lagging countries and civilization through the establishment of the global technological facility. Another such direction may be the expansion of the functions and change in the sources of financing of global environment facility so that to speed up the transition of all global system to the noospheric energy-ecological mode of production and consumption and reduce double the emissions by 2050, under the auspices of the UNESCO to create the global socio-cultural facility with the objective to enhance the education level, development of science, culture in all countries.

Eighth, the fulfillment of the said activities to formulate and implement concerted global policy, innovative programmes and projects oriented at the strategy of innovative breakthrough based on partnership of civilizations, approximation of their level of economic, social, ecological and technological development. This is a long and complicated process, it requires a new thinking. It is noted in the book of Alvin Toffler “The Third Wave” that a global thinking is now gradually formed. Formation of the global system will require a global thinking and master knowledge, first of all by the ones who take decisions – political, economic, ecological, and technological. The system of steps will be required which assist in the formation of a new type of thinking, on the one hand, reflecting common interest of all humanity, a totality of all countries and civilizations, transition to a knowledge-based society, i.e. to create the system involving all types of education and all channels of information, Internet and other mass media and mass communication.

Socio-Cultural Partnership of Civilizations

The long-range strategy of partnership of civilizations should cover socio-cultural spheres – science, education, culture, ethics, religion. A civilizational revolution of the first half of the 21st century is accompanied by radical transformation in such sphere the role of which significantly increases in the post-industrial integral society. It should be mentioned that the UN specialized organization in this area – UNESCO – has done a lot for development of partnership of civilizations and countries in culture and education, preservation of cultural heritage and diversity of culture. But under the conditions of the establishing integral socio-cultural system a need arises in the formulation of a new strategy of dialogue and partnership of civilizations, cultures and confessions. Our approaches to such strategy are addressed in part 8 of Global Forecast “Future of Civilizations” for 2050.

Dialogue and partnership of civilizations is implemented through a network of institutes, certain organization forms, mechanisms and legal framework for its implementation. The United Nations Organization (UNO) is the most extensive global institute with a network of organizations subordinated to it. The UNESCO heading the international cooperation in science, education and culture is the center for dialogue and partnership of civilizations in the socio-cultural sphere.

The advantages of this international organization include:

First, it has a global, overall nature uniting 198 countries – UNESCO members, all 12 local civilizations of the fifth generation. There are no analog and competing organizations with this organization in this area, it means that it bears all responsibility for global dynamics of socio-cultural sphere, opportunities and efficiency of impact of the global community on this sphere.

Second, the UNESCO is of a cross-disciplinary nature. Its machinery and national commissions as well as among hundreds of thousands of analysts involved in its performance (scientists, pedagogues, cultural professionals, engineers, businessmen, public and religious figures), various specialists are represented that ensures a manysidedness in vision of socio-cultural processes and performance of projects, ensures a balanced democratic nature of decisions taken.

Third, high professionalism of both organization employees on global and national levels and retained specialists allow solving arising problems balanced, using the supreme intellectual potential of the planet.

The UNESCO activity has brought a good deal of fruit as the organization of activities related to the World Cultural and Environmental Heritage, modernization of educational process, movement for culture of peace and tolerance, preservation of cultural diversity, development of dialogue among civilizations, determination of priorities and mechanisms for creation of information-based society, etc.

However, the UNESCO potential is used not enough. A lack of a long-term strategy for its activity in the context of specifics of global socio-cultural processes; lagging in the decision on the partnership problem in science; a lack of sources of financing that limits the opportunity to implement major projects and delay their implementation periods.

It appears effectual the following **strategic steps** to improve the UNESCO performance efficiency, its role in cross-civilizational dialogue and partnership in socio-cultural sphere.

1. The formulation, relying on the long-term forecast for socio-cultural dynamics of civilizations of the global strategy in this area and its execution in the form of the **Universal Declaration of Dialogue and Partnership among Civilizations in the Socio-Cultural Sphere**. While the forecast may be prepared by a group of scientists (its foundations are addressed in this book), then the draft strategic document should be prepared by the international group of scientific, cultural, educational, religious and political figures, businessmen participating in socio-

cultural investments, placed on the Internet, discussed at the international conferences and adopted by the UNESCO General Conference.

2. Humanity, especially in the critical, crisis periods, needs a far vision of its future so that to choose its optimal variant more consciously, evaluating fairly reliably the preconditions, driving forces and effect of its implementation. In other words, it is necessary a **long-term global forecasting**, and not only the insights of single men of genius but collective vision of the best intellectuals of the planet. The UN works now at medium-term economic forecasting. Apparently, the arrangement of a long-term global forecasting is the UNESCO thing as in such forecasts is the sense and the supreme product of science which is within the terms of reference of the UNESCO. It seems that the UNESCO could deal with the organization of a long-term scientific forecasting by establishing the international scientific prognostic center to this effect. It would be good to create such center in Russia where there is the vanguard scientific school of scientific-civilizational forecasting and practical experience of making a number of forecasts. The center could develop a methodology of global forecasting and based on it prepare on a regular basis and submit to the UN and UNESCO and place on the Internet long-term global forecasts, hold international and Internet-conferences to discuss them, influence the ideas about the future and its optimization not only scientists and teachers but politicians, governmental and international officials, businessmen and public figures.
3. It has already been mentioned above the specific projects related to the use of information-telecommunication technologies (ITT). In order to implement such pilot projects it is necessary that the UNESCO to undertake the initiative and organizing role in **humanization of Internet**, assisting the preservation of cultural, civilizational and educational diversity, dialogue and partnership of civilizations, cultures and confessions. A number of steps are undertaken in this direction but they are obviously not enough. Tens of portal and hundreds of Internet sites are necessary on a multilingual basis, TV films so that to reflect all the assets and diversity of civilizations and priorities in their partnership to respond to the challenges of the 21st century. The longstops should be arranged (including based on restrictions and free consent of information companies) to use information flows for the outreach of violence, racial hatred, xenophobia, and pornography.

10.4. Institutes and Mechanisms for Partnership of Civilizations

Global Institutes of Dialogue and Partnership of Civilizations

In society any type of business is realized using adequate public institutes adequate to goals and functions of such type of business. Interaction of states and civilizations in the international arena has already worked put a network of such institutes which reforming is ahead so that to use them for more efficient partnership of civilizations. What are these institutes?

World Summits. It is the supreme form of dialogue of states and civilizations for formulating common long-term strategy. Summits in Rio de Janeiro in 1992, in Johannesburg 2002 became such form. For instance, the latter included not only the work of representatives of all states and meetings of their leaders but the Global Forum of civil society discussed a various circle of world problems. In a total the summit was attended by about 60 thous. Peoples

We propose to hold such third summit in 2012 to discuss a long-term strategy of partnership of civilizations in response to the challenges of the 21st century in the center of Eurasia – in the capital of Kazakhstan – Astana.

It would be appropriate to constitute the World Summit as the world forums of the leaders of all states and international organizations supplemented by global civil forums. Such forum would become the world institute of partnership of civilizations and states. The UN could deal with preparations for and holding of such summits.

The United Nations Organizations. This is the only world's representative, democratic, universal organization uniting almost all states of the world (it is 192 UN member now) representing the interests of the vast majority of the world's population, all civilizations and almost all national states. It acts as the General Assembly, Security Council, UN Secretary General as well as the whole network of specialized organizations covering almost all types of activities and almost all continents. Furthermore, there is a number of independent organizations (OSCE, WTO, ILO, etc.).

With all its imperfections – weakening of a forecast-strategic function, bureaucracy of the numerous army of international officials, contradictions in settlement of international conflicts – the UN is the only universal institute in the system of strategic partnership of civilizations and states, in ensuring functioning and development of global community in the interests of all humanity. The attempts to ignore the UN, pass over the Security Council, replace the UN in separate functions by G-20, International Monetary Fund, NATO or other organizations contradict the general tendency to uniting the world community, and they are finally doomed to a failure. The conflicts in Yugoslavia, Iraq have demonstrated it. The tendencies to ignore the UN in formulating a strategy for surmounting the global financial crisis can also be seen in the documents of G-20 by delegating the pursuance of the strategy for overcoming the crisis to those international financial organizations which contributed to its rise (International Monetary Fund, World Bank, Council for Financial Stability) where a decisive word belong to the group of the richest countries.

We are persuaded of the *principal line in the development of global institutes of partnership of states and civilizations is the expansion of the competence, enhancement of the role and responsibility of the United Nations Organizations with its gradual transformation into the World Confederation of States and Civilizations*, the supreme authority representing the interests of the global civil society, all humanity in the preservation of diversity of all components of its international subjects (civilizations, states, nations, economies, etc.). In doing so experience of the formation of the similar confederation in the form of the European Union now uniting two civilizations – western European and eastern European and transformed Europe from the continent of discords and bloody wars into the area of peace, consensus, tolerance and sustainable development should be summarized and be used creatively.

The proposals to create the authoritative bodies representing the interests of all humanity and ensuring peace on all the planet, in the form of the World Confederation, World Government, etc. was put forward by many outstanding thinkers – Emmanuel Kant, Herbert Wells, Albert Einstein, Arnold Toynbee, etc. However, in the 21st century the global preconditions mature for it.

First, the reality of challenges of a new century adequate response to which may be given by the united humanity only. This is the cluster of global crises – energy-ecological, demographic, technological, economic, geopolitical, socio-cultural; this is the depth of a civilizational crisis of the last quarter of the 20th – first quarter of the 21st centuries, the recovery from which is possible based on a global civilizational revolution only, a wave of epochal and basic innovations transforming all structure of society, all components of the genotype of civilization.

Second, this is the reality of a threat of self-destruction of humanity and death of civilization in the event if joint adequate responses to new challenges are not found and implemented so that to eliminate a global ecological catastrophe, demographic problems of humanity, its loss in the event of the extensive use of available stocks of nuclear weapons, other means of mass destruction a large-application of which threatens with a multiple destruction of all living beings on the Earth planet.

Third, the scale and period of transformations which have to be undertaken by the organized humanity in the 21st century so that the history of civilizations can continue. The historical time compresses the same way as the shagreen not leaving time for long deliberations and experiments.

Fourth, a certain practical experience of interstate and civilizational partnership is accumulated within the UN and other international organizations of G-8, G-20, European Union, APEC, SCO and other international organizations that holds out a hope for working out an adequate global partnership.

In the formulating the concept and long-term strategy for the UN transformation into the World Confederation of States and Civilizations it is necessary to sum up such experience and rely upon the outlooks for development of civilization in the 21st century.

We put forward an idea to transform the UN into the World Confederation of States and Civilizations in 2005 at the 2nd World Congress of Global Civilization in New York²⁸ and updated in volume 2 of the monograph “Civilizations: Theory, History, Dialogue, and the Future” the presentation of which was held in October 2006 at the UN Dag Hammarskjold library.²⁹ These points were supported and more reasons were adduced in volume 7 of the Global Forecast “Future of Civilizations” for 2050³⁰.

Group 8 and Group 2. A certain experience of dialogue and partnership of civilizations is accumulated in such authoritative organizations as G-8 (where 4 leading civilizations – north American (USA, Canada), western European (UK, France, Germany, Italy), Japanese (Japan) and Eurasian (Russia) are represented) but to determine on economic issues the leaders of the UN, European Union, some other world leading countries and G-20 where almost all local civilizations of the fifth generation where the vast majority of the world population live, are invited.

These organizations, especially G-8, have accumulated a large experience in the formulation of strategies on the most topical issues of the global civilization. However, the strategies taken by them have no mandatory force, and the tone in such institutes is defined by the utmost rich civilizations and states playing a leading role in the world now. Therefore the strategies outlined by them are targeted at partial improvements of existing systems and orders and not for their radical transformation.

Regional unions. The enormous positive experience of regional interstate and cross-civilizational unions is accumulated implementing the strategy of partnership in this or that region of the Earth. The APEC – Asia-Pacific Economic Cooperation coordinating the activities of the vast many of civilizations is largest but a weakly integrated so far. The most successful experience of partnership is accumulated in the European Union that has already been discussed above. The Shanghai Cooperation Organization is gaining pace where five civilizations (Chinese, Eurasian, Indian, Buddhist, Moslem) are represented this or that way. A civilizational union operates in North America (NASDAQ), Latin American (Mercator), Africa (African Union), in the Islamic world (Organization of Islamic States), in Europe (OSCE), in Southeastern Asia (ASEAN), etc. Such regional civilizational and interstate unions will undoubtedly remain in future being governed by own long-term strategy based on the global partnership of civilizations with a concurrent reflection of specifics of each particular region.

Global Law

The prime institute of global partnership of civilizations is the formation of the global law separate elements of which are already available.

²⁸ Kuzyk B.N., Yakovets Yu.V., M.:INES, 2005.

²⁹ Kuzyk B.N., Yakovets Yu.V. “Civilizations: Theory, History, Dialogue, and the Future, Vol. 2.M.: INES, 2006

³⁰ The Forecast of Geopolitical Dynamics and Partnership of Civilizations. Part 7 of the Global Forecast “Future of Civilizations” for 2050. M.:SKII, 2009.

Mechanisms for Civilizational Partnership

Experience of elaboration and application of mechanisms for civilizational partnership which will undoubtedly receive further development in prospect gradually accumulates ensuring efficient functioning of civilizational partnership. Let us call basic elements of such mechanisms.

Long-term forecasts. It is impossible to take and implement strategic decisions failing a fairly reliable far vision of preconditions, factors and effect after they are implemented, system of long-term global forecasting. This function should be exercised by international teams of scientists under the UNESCO's assignments. The first experience of long-term foresight of the future of civilizations is undertaken by the Russian and Kazakhstan scientists with the involvement of scientists from other countries endorsed by the Russian Ministry of Internal Affairs and the President of Kazakhstan. Experience of the formulation of a long-term forecast for world economy in the 70s years in the UN under the guidance of Nobel Laureate Wassily Leontieff was taken into account to this effect. Further such forecasts are necessary to be made once in five or ten years extending their horizon and deliver at the World Summits and in the UN as a basis for the formulation of long-term global strategies.

Long-term global strategies. Long-term strategies for partnership of civilizations with a horizon of 20-25 years in general for the global civilization by six components of the genotype of civilization (energy-ecological, socio-demographic, innovative-technological, economic, geopolitical, sociocultural) is effectual to make by groups of high level on the instruction of the UN Secretary General, consider at the sessions of the UN General Assembly and approve at the World Summits each 10 years beginning from 2012.

Long-term global programmes and projects. To implement long-term strategies global programs and major projects for a long-term prospect worked out by the UN authorized bodies with the involvement of scientists and approved by the UN General Assembly are required. They should include a clearly defined structure, the tree of goals, system of projects, multichannel financing, distribution by terms and directions and a contractual basis determining the procedure for the performance, sizes and sources of financing and procedure for settlement of possible disputes among the parties. Such programmes and projects may be both bilateral and multilateral, both technological and humanitarian, both by lines of activity (for instance, by nanotechnologies, alternative and renewable energy) and regional (for instance, by Africa or regions of the North).

Financial mechanisms. The existing financing mechanisms for the implementation of the strategy to carry on joint programmes from the funds of the parties concerned, financing from global funds and donors (sponsorship support) should be complemented in prospect by the establishment of special-purpose multilateral facilities for global programmes and projects, taxation of some types of the global activity so that to remove a part of rent income, monopoly super profits, penalties for damage caused to the environment (removal of the world ecological rent). Such mechanism was proposed at the roundtable session of the Glonal Civil Forum – Summit on sustainable development in Johannesburg (2002), supported by the meeting participants, published³¹ but has not gained response yet. In the formation of the World Confederation of states and civilizations it is necessary to envisage steady financial receipts of tax nature for its functioning and performance of the mission charged to it.

Human resources for partnership of civilizations. To formulate and implement global strategies for partnership of civilizations, programmes and projects human resources of high professional training is necessary. Now such resources are almost not trained that adversely tells on global strategic decisions taken and their fulfillment. A global programme under the aegis of UN and UNESCO will be required for arrangement of education in all forms so that to train, reeducate and upgrading the

³¹ Yakovets Yu.V. Rent, Anti-Rent, Quasi-Rent in a Global Civilizational Dimension. M.: Akademkniga, 2003.

international officials, leaders and persons in charge for the fulfillment of global programmes and projects with a public exam taking by applicants for this or that position. Experience of the UN University may be useful here as well as of the Global Innovative Internet University under way with the use of the multilingual portal “New Paradigm” (www.newparadigm.ru) and library “New Paradigm”. The programme of training international officials and specialists should have both general courses in macroeconomy, history and future of civilizations, forecasting and strategic planning for which textbooks are already available³² and special courses corresponding to the profile of a future line of profession and primary business of an official and specialist.

Coordination of all efforts for training human resources for civilizational partnership is reasonable to vest in the UNESCO and the guiding and training center established under its auspices (or the UNESCO institute for information technologies in education operating in Moscow).

The formation of institutes and mechanisms of global partnership of civilizations is a fundamentally new matter requiring a high professionalism and surmounting not only the force of inertia but resistance of those who are benefit from existing orders. However, such matter is eased that approximately from 2010 the process of changing generations³³ will begin worldwide, including in the international arena, and the new generation taking the heritage of the previous generation revises and coordinates it basing on the circumstances changed and own experience. A cluster of global crisis the coping with which requires fundamentally new approaches determines it. It may be anticipated that the concept of reforming existing institutes and institutes being and mechanisms of partnership of civilizations will be mainly worked out in the 10s of the 21st century, and in the 20s its innovative assimilation will begin and in the 30s a large-scale spread. If such innovative-breakthrough scenario is implemented, the generation of the 50s of the 21st c. will inherit an efficiently functioning strategy of civilizational partnership, tried and tested institutes and mechanisms for its pursuance.

10.5. A Strategy of the Innovative Renewal of the Eurasian Civilizations and Integration in the CIS Space³⁴

The integration problems in the strategy of the innovative modernization of economy acquire the investment support now.

First, the financial of crisis of a global scale broke out. Our states have already experienced to a full extent and continue to experience negative consequences of the crisis in the world economy. It is already clear today that this is a manmade crisis, a speculative disbalance as a matter of fact in the development of the world economy provoked by a number of leading players. Today our states exert enormous effort to recover from it. Positive moves already exist both in Kazakhstan and in Russia. Certain stabilization on other world markets brings about cautious optimism on other world markets. Nevertheless, this will be a protracted crisis in all appearances. In this connection it becomes more and more obvious that the key to the solution of problem lies only in the union of potential of the states of the Commonwealth of Independent States and taking coordinated decisions. Only like that and not otherwise. The leaders of our states – both Nursultan Abishevich Nazarbaev and Dmitry Anatolievich Medvedev and Vladimir Vladimirovich Putin spoke not once about it.

Second, objective preconditions exist for the implementation of such task. First of all, despite the crisis, the state of the Community has reformed fairly well for the recent 18 years and passed basic

³² Kuzyk B.N., Yakovets Yu.V. *Civilizations: Forecast and the Future*. M.: INES, 2008. (published in Russian, English and Arabic); Kuzyk B.N., Kushlin V.I., Yakovets Yu.V. *Programming, Forecasting, and Strategic Planning*.

³³ Yakovets Yu.V. *The Post-war Generation. Scientific Memoir Sketches*. M.: INES, 2008.

³⁴ The authors of the section – N.A. Abykaev – Doctor (economics), R.A.N.S. foreign member, *President of the Kazakhstan National Academy of Natural Sciences*

Prof. A.T. Spitsyn, Doctor (Economics), R.A.N.S. Academician

painful transformations. We have a powerful human and resource potential. And what is more significant – well progresses in the Commonwealth itself, in the understanding of advantages in the integration of economies of the countries. The latest agreements in Astana and Bishkek at the level of the heads of the states and governments of the CIS indicate it.

In this context the integration problems in the strategy of innovative modernization of economy have an increasingly actual significance in the CIS space both in terms of theory and in practice.

In the course of the global crisis a new world system should be formed based on new approaches to regulating the global economic system. The existing model is imperfect, especially in the monetary-financial system and its institutes. In this connection according to the leading political scientists and economists the proposals for discussion by President of Kazakhstan N.A. Nazarbayev **on a radical renovation of monetary-financial system** deserve a special focus.

Along with that one should think already now about the ways of the post-crisis development. The matter in question is the concept of sustainable development which preserves its viability. The principles for sustainable development under the aegis of the UN on the basis of economy of world space, including the space of the CIS countries approved by the world community have an important significance. The strategy of sustainable development “appeals to” innovations, breakthrough technologies. The primary attention is given to transition to the innovative economy in such sustainable development strategy that indicates not only experience of developed countries but also the practice of China, Russia and Kazakhstan. This is first of all the mobility of economy and society orienting at technologies.

Speaking about regional integration unions they first of all mean the EurAsEC. The Eurasian Economic Community is most promising among such unions as of today. Practicable mechanisms for economic integration have come into existence for the EurAsEC countries like for the SCO. At the February (2009) EurAsEC summit in Moscow breakthrough decisions about the establishment of the joint Anti-Crisis Facility in size of 10 billion US dollars and international Center for High Technologies. Specific economic projects such as the creation of common energy system, single cycle in the nuclear energy, construction of the Eurasian transport arteries, etc. are brought in, discussed and taken.

N.A.Nazarbaev notes that the system crisis may be surmounted through an efficient path of system renewal, and the crisis will end only when we together begin to act concertedly and adequately solving pressing integration problems in the CIS space. The also include a proposal to devise meaningful measures for integration interaction by 2020 of the CIS countries at the meeting of the heads of the Governments ended recently in Astana.

The integration unions of various countries shaped up evolutionarily, integrated into states with the market economy into the single economic space, interstate entity. The Commonwealth of Independent States (CIS) emerged a different way, in the post-Soviet state the sovereign states embarked upon the construction of market economy, its institutional, economic-legal basis and market infrastructure. The CIS countries began to solve concurrently two the utmost intricate tasks: internal – state-political construction, transition to the market system of business practice and external – enter into integration in the CIS.

It was significant to use *business-cooperation ties* of enterprises within the common economic national complex of the Soviet Union. Economic and political ties with other countries of the world developed actively on a new basis. There was no such set of tasks in the formation of other international integration interactions. It was difficult to take for a certain prototype for CIS, for instance, the model of the European Union or any other international integration grouping in the context of real conditions of the post-Soviet space.

In the CIS *a real mechanism of cooperation is taking shape* allowing taking into account a different extent of readiness to and interest in integration of this process participants. The emergence of various levels of integration was the result of such tendency: common cooperation of all Commonwealth members; Customs union, then the Eurasian Economic Community.

On the regional levels tens of economic unions and communities which also promote a closer political cooperation emerge. Under conditions of the complex economic situation almost in all post-Soviet states their concerted actions, constructive cooperation, search for mutually acceptable compromise decisions were of inclusive significance. In many independent states they have begun to realize that it is impossible to preserve stability, ensure security, reform and modernize economy, to integrate into the world community failing such cooperation and understanding.

In order to get into the waterway of the world development it is necessary for the countries of the Commonwealth to integrate first of all economically. Production-technological and cooperation ties between enterprises, identical system of construction of their organizational and financial structures, single scientific-technical base of new independent states are determined by their former affiliation with the single national economic complex. In this context *economic relations of the CIS countries with the Russian Federation* holds a specific place. A huge size of the territory of the Commonwealth countries, transport and energy infrastructure completing each other, the attractiveness of the markets are those factor which undoubtedly contribute to deepening cooperation under globalization in general and markets specifically.

The strategy of the CIS countries economic integration includes such significant lines as *a transition to the innovative path of development of economy*, its infrastructure and institutional transformations, introduction of efficient methods for economic regulation of the market, optimal use of the tax system, credits, customs duties and other boosters, perfection of monetary policy, implementation of the opportunities of financial markets and structural dynamics of capital flows. The problems of sustainable development of Russia and CIS countries depend on restructuring and modernization of industrial sectors and complexes, operating transport systems, implementation of long-range power saving programmes, financing of the agro-industrial complex and support of business organizations.

Dynamics of integration processes manifests itself in the establishment and functioning of *corporations and strategic alliances*, including at the level between countries. The uniting of financial funds of the corporate sector economy participants significantly expands their innovative capabilities, promotes the pursuance of concerted technical-economic, structural and financial policy, efficiently manage the investment resources. The goal to create interstate corporations is in strengthening the economic potential for CIS member countries and developing new markets. This ensures an intensive market circulation of the products manufactured and financial resources. In order to develop integration processes in the CIS the Interstate bank efficiently operating is also significant.

The Agreement on the desire of the states to fulfill the provisions of the Agreement establishing the Economic Union has also a long-range significance for development of integration processes in the CIS countries. The parties determines the Customs Union as an "economic union of states" (Byelorussia, Kazakhstan, Kirgizia, Russia and Tajikistan) basing on the principles of the single customs territory and similar mechanism for regulation of economy, basing on the market principles of business practices and harmonized legislation. It has been done a lot within the Customs Union to create a free trade area, unification of customs laws concerning foreign economic activity, establishment of the single procedures for tariff and non-tariff regulation and mechanism for its change, introduction of the single trade regime with third countries and international organizations. Further development envisages the *creation of the single customs territory* and ensuring the principle of the unity of its management by a supranational body. In doing so the state has the exclusive jurisdiction with respect to the customs affairs in its customs territory.

The progress of real integration in the CIS system may be reached upon awareness of present-day world economic environment of economic vital activity. In Russia and other CIS countries major forms of production developed originally in the form of governmental concerns and various holdings. Then the formation process of new *forms of integration of industrial and financial capital* has speeded up both in Russia and other CIS countries.

The progress in the development of real integration in the CIS system may be reached under the establishment of conditions for strengthening of world economic environment of economic life activity of economic entities. The main features of such world economic environment are in the following.

Foreign trade has mainly become the derivative, final and initial stage of more complicated, complex by their nature, widely diversified trade-economic and scientific-production forms of economic cooperation. They cover almost *all the sphere of innovative-reproductive cycle*. In the world economy economic entities of various forms of ownership, organizational-economic and institutional form interact. An intensive process of expanding the range of products manufacturing by firms attributing not only to one but several sectors and types of production occurs. A return to international monopolies-conglomerates goes concurrently. Transnationalization of production has acquired an unprecedented scale, TNC have become the major power of world economy. As it is noted in the UN report on the TNC development issues, the latter purport now to the spheres the reliability of which is traditionally protected by national governments.

The forms of *the international scientific-cooperation* has a primary significance for economic development. For the recent 25 years the international cooperation of production in the world came to the fore among other forms of foreign economic ties due to objective advantages inherent to it. It involved the industries and productions of high technologies which are remarkable for a high rate of a scientific-technological advance in the industrially developed countries of the world. First of all, these are sectors of the machine-building complex, including electronics. The international cooperation of production has mainly transformed into the international scientific-production cooperation. The strengthening of its role in the national economy and world economy, impact on the efficiency of economy of countries and their economic entities, raising their competitive capacity is rooted in the deep economic, technological and scientific-technological processes evolved from the beginning of the 80s of the 20th century.

The international cooperation is more and more based on the major and prompt employment of the most recent results of fundamental science in the production technologies. Such tendency bears a pronounced long-term, prospective nature. Its taking account of is significant in evaluation of the outlooks for integration within the CIS framework and its entering the world economy, in the formulation of foreign economic, and specifically, industrial policy of the country for the future. The international scientific-production cooperation has become a basis of the economic strategy and “managerial progress” (management) on the scale of national companies and TNC, diversification of their production and return to conglomerate processes on their basis appeared first in the 70s. In its turn a competitive fighting of companies for a scientific-technological progressiveness, fast update and high competitive ability of goods and services has intensified, changes in the structure of export-import good flows occurred in commodity and geographical aspects, and also in the flows of funds.

This is all necessary to take account of in practice of cooperation relation of CIS countries. An elimination of the gap in the development of international scientific-production cooperation may contribute to efficient integration within the Commonwealth, and also efficient entering of each of them into the world economy. Cooperation was and will be a material-innovative base of integration processes in the world economy and on regional markets. It is necessary to bridge the lagging in this area so that economy and especially high-tech productions of CIS countries will be included step-by-step in the world scientific-technological advance but will not be the “sellers” of material and energy intensive products, resources and fuel.

The positions of Russia are significant for other CIS countries and allow orientating them in the prospects for relations with Russia in the scientific-production area. It is important that the innovative potential of Russia will become the *reproductive-integration center* for the Commonwealth. An active inclusion of enterprises of Russia’s industrial complexes in the international scientific-production cooperation within the CIS framework, processes of world economic transnationalization and globalization in the 21st c. is possible only on a high level of development of national science, high-tech productions, first of all, in machine-building and electronics inseparable from it. The question arises about a mechanism which is able to ensure a coordinated level of efforts in Russia and other CIS countries in this area. It should not be given out to the farming out to the unregulated market. To sell to the companies of far-abroad countries everything that the CIS countries have is also not a solution. To locate TNC subsidiaries on their territories even with a certain interest of government and private national capital of CIS countries means to render more complicated the formation and development of

national innovative-reproduction core of economy in them with negative socio-economic effects resulting from it.

The optimistic variant of the forecast is connected with the innovative development of international scientific-production cooperation within CIS, especially in production and export of science-intensive, high-tech products, and not in extensive, autarkical production buildup and fuel and raw commodities export. The path of quality-based *realignment of material-production base of foreign economic ties* of the Commonwealth countries, their economy, improvement of the structure of export and import is seen in it. An active inclusion of the CIS enterprises in the world cooperation process will orient import of foreign capital, and imports of goods along with it to Russia and CIS countries by the lines promoting a speedup of the scientific-technological advance; improvement of competitive ability of national products on the world market; increase in currency receipts to the Commonwealth countries and foreign currency profits of direct commodity producers-exporters.

The advantages of international scientific-production cooperation, their effect increases many times when the leading firms in the relevant productions of industrially developed countries and also TNC join its partners from the Commonwealth countries. Foreign economic, and moreover interstate foreign political relations are based not on the “universal human values” but competition, seeking for getting corporate and national economic and other benefits. It is hardly that the West will promote a fast revival of strong Russia and any other CIS country. The facts of tough struggle for buying-up or destruction of all created for decades in the national economic complex of the former Soviet declare themselves, especially of high technologies companies, information sector saying nothing of natural resources.

The international scientific-production cooperation is inseparable from *international cooperation of production* when relations of partners connected with transfer or joint devising of new technologies make the original point for cooperation. In international scientific-production cooperation they may not be present or manifest themselves very weakly. This especially refers to the contracting cooperation which may be long-term, short-term, and also combine cooperation ties long-term for one articles and short-term for another. This form does not usually involve all innovative-reproduction vertical in cooperation. Therefore it is not unreasonable to orient at it as a long-range end in itself. Under a certain turn of events as the world experience shows, a customer may suspend or not renew the orders, find new partners for it thus putting the contractor into an awkward situation.

Dynamics of integration processes manifests itself first of all in the creation and functioning of corporations and financial industrial groups, including at the level between the countries. The union of financial funds of the corporate economy sector participants significantly expands their investment capabilities, helps to pursue the common technical-economic, structural and innovative policy, and manage efficiently the resources. To strengthen an economic potential of the member countries and CIS in general, to develop new markets it is important the establishment and *efficient functioning of transnational structures*. The international financial industrial groups should ensure an intensive market circulation of products manufactured and financial resources. Under this agreement the treaties to establish them are signed between the governments of Russia, Byelorussia, Kazakhstan, Uzbekistan, Kirgizia and Tajikistan.

A deepening of integration process will promote the alignment of development level of economy and life of population in the CIS countries, and also improving the production, social and financial infrastructure. The stability of finance and currency, solution of the payment system will increase a growth of the purchasing power of nationals. Efficient foreign economic ties, well-defined laws, legal, economic and personal security are targeted at stability and activization of investment activity. As the analysis has shown, the deepening of integration is attainable employing modern interstate formations.

Regional development and interregional factors reflect complicated socio-economic phenomena, tendencies and stages which are necessary to take account of as mutually conditioned components. The following important factor groups determining regional and interregional features of economic stabilization of CIS countries may be distinguished: 1) sectoral specialization of regions related to the description of their natural-resource potential; 2) the performance of specific government

(federal) functions (defense, transit, foreign economic) by the region that influences the imbalances of the sectoral structure of economy; 3) geographical location determining the differences in transport costs and expenses for reproduction of manpower.

In the area of the use of interregional investment opportunities of CIS countries economy the following may be among the priorities for its optimization: 1) the elaboration of the criteria for government investment support of a limited number of the most distressed, first of all, depressive districts and effective mechanism for its provision; 2) mutual linking of interregional investment programmes developed according to the single methodology and serving as a base for a shared financing of long-range projects with the inclusion of private and foreign capital; 3) strengthening of financial base of investment activity at the territorial level for account of “fixed” taxes and special-purpose investment transfers; 4) the formation of the network of regional and interregional investment banks and banking pools with the orientation to financing of innovative programs for development of CIS countries regions.

The establishment of the Customs Union in 1995 of five states – Belarus, Kazakhstan, Kyrgyzstan, Russia and Tajikistan and its efficient functioning has become a powerful booster of integration processes and investment cooperation. This first of all concerns the adoption and application of the General Customs Tariff, non-tariff protection measures of the national market against unfair foreign competition common for all members, agreed trade policy with respect to third countries, management of single customs territory. The CIS member countries signed the Treaty *establishing the Payment Union* the goal of which was to ensure uninterrupted settlements in the regime of mutual convertibility of national currencies and forming the payment system based on it.

The extent the trade-economic and investment interaction depends on the solution of the issues pertaining to foreign exchange – financial interaction is described by the situation with a value added tax throughout the CIS. As is known there are two principles of VAT charging in the world practice – by place of manufacturing and by place of consumption. The first principle is applied as a rule in taxation of national production and consumption, the second - in foreign trade. Many countries encouraging their export (that promotes a growth of production), exempt it of all indirect taxes – customs duties, VAT and excises. In such case the manufacturer exporting commodities is refunded or offset the tax amounts previously paid on purchased materials and goods used in production of goods for export.

In trade with the far abroad CIS countries began at once to apply an *international principle of VAT charging* – by the destination point. In the conditions of limited working assets with the manufacturer it becomes more beneficial for him to trade with the far abroad not to divert its funds to pay the tax to the budget. This has become one of the major reasons for a many time reduction of mutual trade and level of economic ties inside the CIS.

The basic principle should envisage a compensation of the budget losses related to the refund of taxes previously paid in other Commonwealth countries. In the developed countries they also charge VAT in the national consumption but in Germany, the UK, other countries of Europe, China, Iran, Turkey the situation is entirely different. They have already established or developing economy saturated its national market and developing new market spaces. There is no removal of raw materials and the removal of finished goods is promoted. For the CIS countries it is significant to rise own production on the innovative basis, investing intensively in it, to strengthen its national market. It needs that the *domestic producer should be the master of own market* failing this it is difficult to transit to a sustainable economic growth, its innovative and investment support.

In the unification of currency – financial system a significant role is assigned to the policy of the member states of the integration entity. It is reasonable a seeking for harmonization of tax systems of the CIS states, unify the types of intricate taxes as well as their charge procedure. Basic principles of such interaction envisage the ensuring of the proper performance of tax laws and provision of mutual assistance in the elimination of violations, and also the provision of information on the compliance with tax laws to legal and physical entities and exchange of information on current changes in laws.

The choice of indicators and tools may be viewed as a total of such mechanisms as refinancing of commercial banks, differentiation of the standards for mandatory reserves and transactions on the open

market. Differentiation of standards for mandatory reserves depending on the structure of banking resources is a medium for inducing the banks and consolidation of the funds for long-term projects, and also it may be used to neutralize adverse effects of the changes on the interest rates if the goals of internal and foreign monetary policy do not coincide.

The enhancement of liquidity, reduction of the standards for mandatory reserves and increase in refinancing expand investment opportunities of crediting the economy. The policy of impact on the functioning of the open market requiring for continuous monitoring and adjustment may lead to the same effect. The CIS states should issue security to this end establishing the conditions for further credit expansion. However, currently the floating of capital to the real sector of economy is still “blocking”. Along with that the formation of efficiently functioning infrastructure of the market, including in CIS, creates objective preconditions for an *optimal use of monetary-credit mechanism* for promoting the innovative economic growth.

The formation of the investment potential of Russia and CIS countries, development strategy for financial markets are linked to the establishment of the security market as a macroeconomic regulator of economic processes. A civilized stock market of the CIS countries contributes to the growth of financial and investment activity of all subjects of the market streamlining financial-economic ties between the stock market participants. In such case it is important to involve optimally the mechanisms for redistribution of investment resources for their concentration in the most long-range sectors of reproduction for innovative modernization of national economies.

Thus, the interstate integration as a prospect of innovative modernization of national economies of CIS countries is a determining component of the strategy for economic dynamics of the Eurasian civilization.

Afterword

The Global Forecast is Done – the Global Strategy Required³⁵

Outcome of the Efforts of the International Team of Scientists

To conclude, an intensive three-year labor of the international creative team uniting the scientists of Russia and Kazakhstan, and also Ukraine, the USA, the UK, France, Germany, Japan, Lebanon and other countries is coming to an end.

The idea to make a long-term forecast “Future of Civilizations” for a long-term prospect of 2050 was given birth to in October 2006 at the roundtable session at the permanent mission of the Russian Federation to the UN. The roundtable was devoted to 100th birth anniversary of Wassily Leontieff headed the preparation of a long-term development forecast for world economy in the 70s in the UN based on the unique cross-sectoral – interregional model. This idea was endorsed by Russian Minister of Foreign Affairs S.V. Lavrov, and then by President of Kazakhstan N.A. Nazarbaev. There were prepared, published and discussed the concept and programme for forecast, nine parts of the Global Forecast (“A Theory and Methodology of Global Civilizational Forecasting”, “Tendencies, Crisis Situations and Scenarios for Dynamics of Civilizations”, “Energy-Ecological Future of Civilizations”, “Socio-Demographic Dynamics of Civilizations”, “The Forecast of Innovative-Technological Dynamics of Civilizations”, “The Forecast of Economic Dynamics of Civilizations and Transformation by Globalization”, “The Forecast of Geopolitical Dynamics and Interaction of Civilizations”, “A Socio-Cultural Future of Civilizations” and the summary part “Future of Civilizations and Strategy of Civilizational Partnership”. The findings were reported at the civilizational forums in Moscow, Astana and Almaty, at the international scientific conference in Moscow devoted to the 120th birth anniversary

³⁵ The author of the section – Prof. Yu. V. Yakovets, Doctors (Economics), R.A.N.S. Academician

of Pitirim Sorokin, at three cross-disciplinary discussions in Moscow, at the UN Information Center in Moscow, and at the UNESCO headquarters.

The publication of a six-volume monograph of B.N. Kuzyk and Yu.V. Yakovets “Civilizations: Theory, History, Dialogue, and the Future” (which was presented at the UN and the UNESCO headquarters), monograph of G.V. Ossipov., B.N.Kuzyk and Yu.V. Yakovets “Prospects for Socio-Cultural Dynamics and Partnership of Civilizations”, B.N. Kuzyk and Yu.V. Yakovets “The Global Energy-Ecological Revolution of the 21st Century”, “The Establishment of the Integral Economic System as a Global Transformation of the 21st Century” preceded and accompanied such intensive job.

This international scientific project is unique; it has no analogs in the world social-economic thought. In what is its uniqueness?

First, *dynamics of world and global civilizations* for the 2nd half of the 20th century and the outlook for the first half of the 21st century have become the subject of a deep research into for the first time. The researches into the history of civilizations for a longer period were undertaken not once before – Francois Guizot, Thomas Buckle, Arnold Toynbee, Pitirim Sorokin but a long-term forecast of dynamics of civilizations in three aspects – the establishment of the fifth generation of local civilization, post-industrial world civilization and the third historical supercycle in dynamics of the global civilization has never been published before.

Second, the global forecast for dynamics of civilizations has been based for the first time on the *methodology for integral forecasting* worked out by the Russian scientists and synthesizing and system-based developing a theory of foresight and the doctrine of cycles, crises and innovations of Nikolai Kondratieff and Joseph Schumpeter, civilizational approach to the history and future of humanity of Pitirim Sorokin, Arnold Toynbee and Fernand Braudel, the noosphere doctrine of Vladimir Vernadsky and Nikita Moisseev, a balance-based approach to macro forecasting of Wassily Leontieff. This synthesis has opened up new opportunities for studying the past and foreseeing the future. A cluster of global crises of the beginning of the 21st century, including a global financial-economic crisis of 2008-2009 was not unexpected and unpredictable for us: on the contrary, they are regular, predictable and moreover – necessary crowning a transition from the industrial world civilization exhausted its potential to a more perfect integral world civilization with all its components – a noospheric energy-ecological mode of production and consumption, post-industrial technological mode of production, integral economic and socio-cultural system, multi-polar world order basing on dialogue and partnership of civilizations.

Third, the international creative team has not restricted to the research into the tendencies established and possible scenarios (inertia-based and innovative-breakthrough) of dynamics of civilizations. The forecast has served as a basis for working out scientifically validated and elaborated long-term *strategies for partnership of civilizations* implementing the innovative-breakthrough scenario of dynamics of civilizations into life in the second half of the 21st century ensuring the overcoming of a cluster of global crises and implementation of a great civilizational revolution to transform the world. Not only strategic areas of activity of the global community are proposed but also the institutes and mechanisms for their partnership, including transformation of the UN into the World Confederation of States and Civilizations as the main tool in the implementation of the strategy for partnership of civilizations. The result of the efforts of the international team is not only an elaborated forecast for the future of civilizations for a prospect of the mid-21st century but recommendations, a kind of an action plan for the implementation of the optimistic scenario of the future of humanity in response to new challenges and threats of the century already in. The scientists have done their part, now the governmental and international figures and politicians will have their say now – whether they will be able overcoming many an existing contradiction, to work out jointly and implement into

practice a long-term strategy which will allow overcoming the cluster of global crises and bring the humanity to a new, integral basis of development and partnership of civilizations.

The 21st Century, Civilizational Crises and Revolution

The 20th century was a period of confronting states, their blocs and social systems, two the utmost bloody world wars in the history replaced by the “cold ware” brought humanity to the brink of self-destruction, the peak of technological and economic dynamics of polarization between the rich and the poor, vanguard and lagging countries, against the poverty and hunger of the hundreds of millions of people on the earth. The achievements of information development were accompanied by degradation of culture and morals, predatory exploitation of natural resources and a growing pollution of the environment has exceed the critical reference and made the global ecological catastrophe and irreversible climate changes real. The contrasts of the industrial development have exceed reasonable limits dooming a powerful industrial civilization to leaving the historical arena.

The 21st century began from the cluster of global crises, explosion of contradictions exposed the humanity to despair, anticipation of the apocalypses. But our researches show that the clusters of global civilizational crises are only the precursors and a background for a *global civilizational revolution* which includes three mutually connected flows in it – the establishment of the post-industrial integral world civilization, fifth more differentiated generation of local civilizations and the third historical super-cycle in dynamics of the global civilization. It is this historical rift determines the fate of humanity for the coming centuries. Therefore we view the modern global society as the world of civilizations. The rifts and overturns occurring in it should be the focus of attention of a joint socio-economic thought, its new trend – *civiliography*.

Global Energy –Ecological Revolution

In the current century a victorious anthem of the industrial subduing the nature is discontinued, relations of nature and society change radically. A global ecological imperative has arisen: whether the humanity continues exploiting the natural resources beyond reason and building up pollution of the environment violating natural cycles of the circle in nature and thus dooming itself to a completion of itself life cycle in not that distant future, the death of civilization is similar to the death of Pompeii but on a planetary scale; or the global, world and local civilizations will embark upon the path of reason, the path of noosphere, rational co-evolution of society and nature. The real preconditions for both scenarios exist but the first scenario leading to the depletion of natural resources and ecological catastrophe prevails now. A long-term energy-ecological strategy will be required based on partnership of civilizations and leading to a noosphere, energy-ecological mode of production and consumption, their environmental optimization. The basic outlines of such strategy are formulated in part 3 of the Global Forecast and chapter ten of this part.

Humanization and Social Orientation of Civilization

Along with energy-ecological a *socio-demographic crisis* goes around the planet. It has many faces: in one countries and civilizations depopulation which may become global by the end of the 21st century grows rapidly as well as fast aging of population; in others, especially on the African continent – overpopulation, excess of manpower, large-scale unemployment, hunger and poverty. The single humanity is torn up into the reverse poles – depopulation an overpopulation, riches and poverty, overconsumption and hunger. The inertia-based scenario is fraught with the exacerbation of socio-demographic conflicts of civilizations. The global financial-economic crisis of 2008-2009 has aggravated polarization, sown the seeds of the outburst. To eliminate a demographic catastrophe – not less dangerous than ecological, threats of polarization and growing migration flows – is possible only based on the strategy of socio-demographic partnership of civilizations, uniting healthy forces of the

planet to overcome the global socio-demographic crisis, reaching the optimal moderate demographic growth and approximation of social conditions for all countries and civilizations. The basics of such strategy are formulated in part 4 of the Global Forecast and chapter 10 of the summary part.

A Global Technological Revolution

To overcome demographic, ecological restrictions of the economic growth and advance of civilizations is possible only on the basis of a new scientific-technological revolution, strategy of an innovative breakthrough in each local civilization and on a global scale. The now prevailing industrial technological mode of production, its last stage – fifth technological order has mainly exhausted its potential, is in the state of a deep crisis. The fundamental basics for the establishment of the post-industrial technological mode of production, six technological order based on the cluster of epochal and base innovations are being concurrency laid that will become the content of the global technological revolution of the second quarter of the 21st century. It will give a new impetus to the rise of production forces, increase in the growth rates of labor efficiency. However, a threat of a deepening gap between the vanguard and lagging civilizations and countries as a result of such revolution under the inertia-based scenario of technological dynamics. For eliminating such threat, implementation of an innovative-breakthrough scenario a long-term strategy of technological partnership of civilizations validated in part 5 of the Global Forecast and chapter 10 of this part should be targeted.

From the Industrial to Integral Economic System

The industrial economic system established itself in the vanguard countries as a result of the industrial revolution reached the record growth rates of national wealth (GDP), especially in the third quarter of the 20th century, the fourth Kondratieff cycle. However, from the end of the 20th century it becomes more and more obvious that the industrial economic system exhausted its potential, is in the state of decline and growing elements of parasitism, that a neo-liberal model of globalization only fuels such processes, the gap between the rich and the poor countries and civilizations. It was demonstrated vividly by the global financial-economic crisis of 2008-2009. Two scenarios to respond to this crisis are taking shape. Inertia-based – to preserve the now prevailing economic system and globalization model partially improving them, by “robbing Peter to pay Paul”; innovative-breakthrough – to work out the foundations of the integral economic system the elements of which already exist in reality, to formulated and consistently implement a strategy of transition based on economic partnership of civilizations and humanistically-noospheric model of globalization. This scenario is addressed in part 6 of the Global Forecast and chapter 10 of this part.

To the Multi-polar World Order Based on Partnership of Civilizations

The post-war world order was characterized as a bipolar, as an adversarial position and confrontation (under conditions of the “cold war” which was from to time closer to a dangerous brink of escalating into the self-destructive thermonuclear world war) of two world systems headed by two super-powers – the USA and the USSR struggling for the influence in the “third world”. However, from the 90s of the 20th c. this bipolar system disintegrated. A period of instability and chaotic fluctuations came and the sole superpower remained in the world purported to the hegemony in the single pole world was not slow to take advantage of it. However, there was never the single-pole world order in the history of civilizations and could not be and the attempt to establish it failed. The reality is the multi-polar world order and the choice of its model: whether it is based on the adversarial position and confrontation of civilizations threatening to grow into their clash (inertia-based scenario) or a crucially new model of dialogue and partnership of civilizations to respond to the challenges of the 21st century (innovative-breakthrough scenario). Part 7 of the Global Forecast and chapter 10 of this part

validate the reality and paths to implements the second scenario. This reality is increasing under the conditions of awareness of a general threat of global economic,energy-ecological, and food crises.

The Establishment of the Integral Socio-Cultural System

More than a century and a half ago Pitirim Sorokin proved that the prevailing system within five centuries in the West (and gradually spreading to the East) mainly exhausted itself, is in the state of crisis and decaying and will be replaced in prospect by the prevailing integral socio-cultural system. The information revolution was used by TNC so that to delay such process, spread the western system of civilizational values on the planet. However, an increasing number of the intellectuals, figures of culture, science, religion are committed to the need of replacing the prevailing socio-cultural system. The crisis of science brings nearer the time of the great scientific revolution of the 21st century the result of which will be assimilating and spreading the post-industrial scientific paradigm, establishment of a knowledge-based society. A revolution in education that should adapt the new generation to the realities of the 21st century contributes to the same. The signs of Renaissance of high culture in response to the present excessively commercialized and depersonalized model of mass anti-culture appear. The response to the now tendencies of moral degradation of society will be the promotion of humanistically noospheric ethics. Religions going through a period of their revival should become aware of its role and responsibility for the preservation of family and moral principles of society.

All these tendencies, prospects and recommendations for socio-cultural partnership of civilizations are addressed in part 8 of the Global Forecast and chapters 8 and 10 of the closing part.

A Path to the Global Strategy of Civilizational Partnership

After completing our research we intend to present it at the roundtable session within the 64th session of the UN General Assembly, and the forecast of socio-cultural dynamics and recommendations for a new strategy to the UNESCO – within the UNESCO General Conference in autumn this year. These materials will be translated into English, published and place on the Internet (site: www.globfuture.newparadigm.ru). At the roundtable meeting it is envisage to present new monographs giving a scientific and practical validation of the strategy proposed in the Global Forecast: by N.A. Nazarbaev “The Strategy of Radical Transformation of Global Community and Partnership of Civilizations”, B.N. Kuzyk nd Yu.V. Yakovets “The Establishment of Integral Civilization (volume 6 of the monograph “Civilizations: Theory, History, Dialogue, and the Future”) and Yu.V. Yakovets “The Great Scientific Revolution of the 21st Century”.

We hope that they give ear to the voice of the scientists, that resolutions of the UN General Assembly to work out the draft Global Strategy of Partnership will be taken (to be discussed at the World Summit in 2012 in Astana and to establish a high level commission to make such draft) and the UNESCO General Conference to formulate the strategy of socio-cultural dynamics and partnership of civilizations (to be discussed at a regular UNESCO General Conference in 2011) and to establish the commission to formulate the draft strategy.

Provided that our optimistic, innovative-breakthrough scenario of a further course of developments occurs, the proposals of scientists are adopted at the global level and be effected, the global community alarmed by the present cluster of crisis will be armed in a few years with a scientifically-validated long-term strategy that will allow based on partnership of civilizations, its efficiently operating institutes and mechanisms, creating the integral civilization on the earth in all diversity of elements making it – noospheric, energy-ecological mode of production and consumption, sustainable socio-demographic and economic development, innovative knowledge-based society, multi-polar world order based on dialogue and partnership of civilizations, integral socio-cultural system uniting creative forces of the Truth (science), Good (ethics) and Beauty (culture). In such case we may consider our mission completed, and our debt to the past, present and future generations repaid.