

DEVELOPMENT STRATEGY

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Assessment of the critical threshold values of the indicators of the state of Russian society and their use in the socio-economic development management*



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The method of critical (threshold) indicators of studying and constructing the objects and their functional relations has been long and successfully used in various fields of scientific knowledge. It is applied most effectively in technological developments, for example, in mathematical justification of machines

reliability: threshold loading parameters for a technical object are calculated, the excess of which leads to its breakdown. When carrying out such calculations, as a rule, a set of simulation conditions is used, in which the conformity of objects to the required parameters is assessed empirically.

* The following text was published in the journal "Bulletin of the Russian Academy of Sciences" (vol.82. 2012. No.7) under the heading "From the RAS Presidium". The editorial board of the journal made the following introductory statement to the text: "Judging by the officially published indicators, Russia's socio-economic development seems relatively positive, especially in comparison with that of the 1990s. However, a more detailed analysis of the situation, based on the system of indicators reflecting the fundamental social and economic processes, proves that Russian society and economy are on the verge of breakdown. This issue was highlighted by Academician S. Yu. Glazyev and Professor V. V. Lokosov in their academic report at the meeting of RAS Presidium. They proposed a new approach toward the assessment of the socio-economic system condition. We publish the extended text of their report and the materials of its discussion (in the narrative). [Note. The present issue provides the text without discussion materials.]

The method of critical threshold indicators has been successfully applied in the study of living systems: in medicine – for diagnostics of a human organism condition, in ecology – when determining the biosphere pollution degree. It is present indirectly in the widespread methods of microeconomic analysis when assessing the companies' financial condition, making up ratings of economic agents and calculating insurance risks.

In the social sciences, this method was introduced not long ago. In 1994, at the Institute of Social and Political Studies of RAS (ISPS RAS) an idea was put forward to apply the method of critical threshold indicators for the study of society, and a scale of 20 such indicators was developed [1, p. 556-568]¹. In 1996, by order of the RF Security Council Secretary, the system of economic security indicators was developed and approved [2], which was discussed and received the recommendation of the Department of Economics of RAS. In 2000, the Section for Economic and Social Security of the Scientific Council under the RF Security Council approved the list of 19 indicators and the corresponding threshold values [3]. Since then, these parameters have been used in evaluating Russia's economic security; a lot of interesting studies in this field have been published [4, p. 36-38].

However, at present, there is no unanimous opinion concerning the justification of critical threshold values of socio-economic condition indicators, as well as the very set of the latter, which is connected with the absence of a general theory of socio-economic systems stability. Scientific schools have different views on what has to be and what actually is going on in economic and social system, consequently, they have different estimations of socio-economic processes regarding their causes and management purposes.

¹ The idea of developing the system of critical threshold indicators of Russian society's development was proposed by V.V. Lokosov.

For instance, the libertarian doctrine considers the export of capital and brain drain to be the natural peculiarities of an open socio-economic system, and it is no use trying to eliminate them, as it will cause the deviation from the optimal distribution of resources under global competitiveness. On the contrary, the modern evolutionary paradigm, based on analyzing actual processes of reproduction and competition of national socio-economic systems, considers the export of capital and brain drain the result of "failures" in market mechanisms and flaws in the functioning of state regulation institutions that should be eliminated by the socio-economic development management system.

The authors' viewpoint is based on the comprehensive interdisciplinary approach to the study of the dynamics of Russia's condition regarding its self-reproduction and development ability as an integral social system. Accordingly, the state of the economy and society as dynamic systems is characterized by various indicators, reflecting their reproduction and development ability.

The indicator's value is regarded as *critical threshold*, when going beyond its limits indicates the emergence of a threat to the functioning of an economy and society's life due to the disturbance of the regular flow of the processes reflected by this indicator. As a rule, the critical threshold indicator is determined as a figure, exceeding (in case of an increasing indicator) or decreasing (in case of a declining indicator) of which is the evidence of the system's entering the risk zone. It would be correct to define two critical threshold indicator values, marking the boundaries of the range of values permissible for the system's normal functioning and development. For example, usually, critical threshold value of birth rate is determined as the minimally acceptable for the simple reproduction of population. At the same time, as Chinese experience proves, under certain conditions, the society can be interested

in stabilizing and even reducing population size, which causes limiting the number of children in a family. A similar situation occurs in connection with the widely used inflation rate: its value shouldn't exceed the critical threshold indicator, reflecting the transition of an economy to the state of turbulence, but at the same time, inflation reduction below zero may cause troubles in reproduction processes in the economy.

One should also distinguish between the indicators and their corresponding critical threshold values, determining a system's *simple reproduction* ability and a system's *development ability*. Going beyond the limits of the former means that the system loses its self-preservation ability, which causes a threat of its destruction or transition to a qualitatively new stage. Going beyond the limits of the latter reflects the system's loss of competitiveness, which can cause a threat of its submission to or absorption by another socio-economic system. Extended reproduction may seem to indicate sustainable development, but in actual global competitive environment it may not prevent from its collapse under the influence of external challenges and threats. This idea is obvious due to our historic experience, however, it is often ignored in traditional econometric and sociometric studies, based on extrapolation of established trends without considering the limits of real socio-economic systems sustainability.

We study the *reproduction of a socio-economic system* in the unity of its demographic, social, cultural and axiological, industrial and technological, natural resource and macro-economic components. All these subsystems should form a harmonious relationship and ensure the balanced reproduction of a social system as a whole, which is achieved by the proper functioning of relevant institutions.

The use of critical threshold values of the indicators in socio-economic development

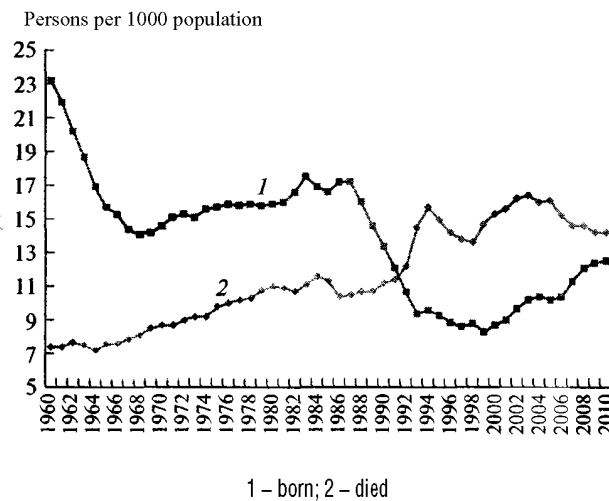
management should be based not on ideological doctrines, but on a pragmatic, systematic approach. It claims that the society is a system, in which the connection between its elements is based on certain regularities and is supported by established reproduction processes, but all the same, it is exposed to the uncontrolled external influence and internal stresses. Each of its subsystems performs vitally important functions, and disturbing even one of them can result in instability, unpredictability and uncontrollability of the whole system. The indicators, reflecting the performance of these subsystems, have critical threshold values, the reaching of which sharply increases the chances of these systems' collapse or their transition to a new stage that poses a threat to the security of the society in general.

Society management should be scientifically grounded, based on the mathematical modeling of social processes, calculation and prediction of the consequences of decisions taken. For this purpose it is necessary to carry out systematic measurements of a range of socio-economic condition indicators and reveal the threats to social and economic security by determining their relation to critical threshold values analytically. The value of the critical threshold indicators is established on the basis of specific studies, expert assessments and mathematical modeling.

The characteristics of the results of Russia's socio-economic condition indicators measurements, systematized by the authors according to the social, economic and management subsystems, in relation to critical threshold values, will be given below.

The condition of the society. Demographic processes are the most studied and easily interpreted ones. Here the level is considered critical threshold if its reaching makes the maintenance of a simple population reproduction impossible. *Figure 1* shows that, according to these indicators, Russian society has already been

Figure 1. General indicators of birth rates and death rates in the USSR and Russia in 1960 – 2010



Source: Demographic yearbook of Russia. 2010. Moscow: Rosstat, 2010.

beyond the critical limits for a long time. The graphs representing population birth and mortality rates form a kind of “demographic cross”, which reflects the transition from an extended reproduction towards a narrowed one, started in 1990s.

Both key demographic indicators – birth rate and death rate – have been far beyond the critical values for a long time (*tab. 1*). This leads to a steady decline in the number of population. According to demographic forecasts, if current trends remain unchanged, it may have been reduced to 127 million people by 2030 with the prospect of further reduction.

The population’s health condition is also unsatisfactory, which is reflected by such indicator as average life expectancy. Despite the recent-years increase, it is still below critical level, which, according to our estimations, is 75 years (judging by the present-day views on a normal life expectancy regarding healthcare opportunities and creative activity period, as well as worldwide average values of this indicator). Though average life expectancy is a demographic indicator, it characterizes the condition of a society in general, reflecting the level and quality of life of population.

Demographic indicators are among the few that have objective and accurate threshold values, beyond which a society faces reproduction decrease that leads to its weakening up to extinction or absorption by other social systems. Not all indicators of the society’s condition have such objectively accurate critical threshold values: the latter can largely depend on the state of public consciousness, historical conditions, traditions and values, and even genetic peculiarities of the representatives of a given society.

For instance, demographic statistics, in addition to population’s physical reproduction indicators, uses the notion of its mechanical reproduction that differs from the former by the balance of migration. To a certain extent, narrowed population reproduction mode may be compensated by the inflow of immigrants, as it is happening in today’s Russia.

However, as historical experience proves, if this inflow exceeds a certain level, the society can face tension arising out of ethnic or even civilization conflicts that contain a threat of a social system disintegration or absorption (an example can be found in the separation of Kosovo from Serbia, which caused enormous

Table 1. Indicators characterizing the reproduction of human potential in Russia

Indicator	Critical threshold value	Actual condition, 2010	Actual value compared with the critical threshold value
Birth rate (per 1000 population)	22	12.5	1.76 times less
Mortality rate (per 1000 population)	12.5	1.2	1.14 times more
Natural increase (per 1000 population)	12.5	-1.7	Population decline
Migration gain (persons per 1000 citizens)	1.1	1.3	1.2 times more
Share of migrants (in % to the number of population)	3	9	3 times more
Labour productivity (thousand \$ per an individual in prices and according to the purchasing-power parity):	27.9	15.4	1.8 times less
in % to the world average	142	82	1.7 times less
in % to the developed countries	50	25	2 times less
Labour productivity growth rates, % annually	12	5.9	2 times less
Population lifespan, years	75	68.7	6.3 years less
Incomes gap between 10% of the wealthiest and 10% of the poorest population groups, times	8	16.6 (40 including hidden incomes)	2.08 times more
Gini coefficient (degree of deviation of actual distribution of monetary incomes from their equal distribution between the country's citizens)	0.3	0.4	1.3 times more
Share of population with incomes below the subsistence level, %	7	12.6	5.6 % more
Share of population spending less than \$ 2.5 a day, %	0.5	17	34 times more
Share of homeless and other declassed population groups (in % to the total number of population)	1.5	15	10 times more
Unemployment rate according to the methodology of the International Labour Organization (ILO)	5.0	10.2	2.04 times more
Crime rate (number of recorded crimes per 100 thousand population)	1000	1839	1.84 times more
Basic required level of consumed kilocalories a day	3000	2564	14.5% less
Share of imported medicines, %	45	81	1.8 times more
Level of satisfaction with the obtained education (in % to the total number of population)	40	24	1.67 times less
Level of satisfaction with medical service (in % to the total number of population)	40	14	2.86 times less
Conventional rate of depopulation (birth/death ratio)	1	1.25	1.25 times more
Social homogeneity level (in % to the total number of population)	65	9–12	5.4 – 7.2 times less
Ration of per capita monetary incomes to the subsistence level, times	3.5	3.3	1.06 times less
Total fertility rate (average number of children born to one woman in her child-bearing years)	2.15	1.55	0.72 times less
Population ageing coefficient (share of individuals older than 65 years to the total number of population, %)	7	12.9	1.84 times more
Human Development Index (HDI), points	0.800	0.719	by 0.081 points less
Alcohol consumption rate (litres of absolute alcohol per capita)	8	15.5	1.94 times more
Share of drug consumers, %	3.5	7	2 times more
Number of suicides (per 100 thousand population)	20	23.4	1.17 times more
Mental disorders prevalence rate (per 1000 population)	360	354	Within the normal range

damage to Serbian society). It is impossible to determine the critical threshold value of the share of immigrants in the population: it can vary significantly depending on the ethnic composition of immigrants, assimilation potential of the hosting society and its system of values.

In such cases, the critical threshold values are determined empirically on the basis of analyzing the existing social experience. For instance, it was found that in German army the number of immigrants from the former Soviet republics should not exceed 10% of the total number of military personnel [5], and in Holland the share of immigrants living in an apartment building, should not exceed 10% of the number of native residents. These facts lead to the conclusion, that in European society the share of people, different in some important socio-cultural characteristics, should not exceed 10%, otherwise the integrity, manageability and socio-cultural security of the entire community are under threat. Though this critical threshold value is not clearly justified, it is taken into account in the practice of social management. In Russia the share of immigrants (taking into account expert estimates of illegal immigration) among the working age population is approaching 10%, and in Moscow – 15%, which already causes a certain social tension.

In general, as table 1 proves, Russian society has long been living in critical threshold conditions, which concerns not only the physical reproduction of population but also the standard of living. This is evidenced by the suicide and alcoholization statistics.

According to the World Health Organization (WHO) estimates, the critical level of suicides is defined to be 20 suicides on 100 thousand population. In Russia this indicator is almost twice as high. At the regional level it is 3.5 – 4 times higher: for example, in the Republic of Altai, the Chita Oblast, the Kirov Oblast, the Arkhangelsk Oblast, Udmurtia and Bashkiria

it equals 69 – 85 suicides per 100 thousand inhabitants. It should be noted that in tsarist Russia this indicator was 3 suicides per 100 thousand people.

Alcohol and drug abuse is also a distinctive feature of the population's unsatisfactory living standard. The critical threshold value of pure alcohol consumption per capita, the excess of which leads to society degradation and prevailing of mortality over birth rate, is considered to be 8 litres per year. In present-day Russia this figure reaches 15 litres. According to WHO estimates, if the disease covers 11% of population, it is qualified as a critical pandemic and poses a threat to the preservation of society. In Russia, the share of people suffering from alcoholism and drug addiction already exceeds 11%. The society's excessive criminalization also proves its degradation: crime rate in Russia exceeds the critical threshold value more than twice.

Going beyond critical threshold values by the level of suicide and alcoholism indicates demoralization of society and the loss of axiological landmarks. The share of the homeless and other social groups, drawn from a normal social life, points to the fact that the amount of population, which lost the basics of life, went beyond critical limits. According to sociologists' estimates [6], more than 15% of Russians are living on the social "bottom", where basic moral values and constraints are lost. This is caused mainly by the loss of working opportunities and the meaning of life – the share of people who found themselves in a state of long-term unemployment and did not have a chance to self-actualize, far exceeded the maximum critical level.

According to the calculations based on the International Labour Organization methodology, the share of the unemployed among economically active population twice exceeded the maximum critical level established by the Scientific Council of the RF Security Council.

The critical level is exceeded by one more indicator widely used for describing social inequality – the incomes gap between 10% of the wealthiest and 10% of the poorest population groups. According to international standards, Russian society remains poor: the share of individuals with incomes below \$ 2.5 per day exceeds the critical value more than 30-fold. In fact, Russian society is splitting by income level, ethnic composition, qualification and education level into the isolated groups, potentially hostile towards each other. This provokes social conflicts, reduces human potential and impedes its development.

Maintaining the existing trends of human potential degradation deprives Russian society of even a simple reproduction ability, not to mention the sustainable development ability. Meanwhile, one can't accurately determine the period within which these trends will become irreversible, as the maximum duration of exceeding the critical threshold indicators, after which it would still be possible to preserve the society, has not been scientifically estimated. There is a significant time lag between the condition of critical threshold pressures and transition to the "point of no return", when the changes become irreversible and turn into the self-sustaining process of socio-economic system's destruction.

The condition of Russian society long ago overcame the threshold value on many parameters without obvious signs of the social system disintegration. As a matter of fact, this disintegration is already going on, but it is not perceived by the ruling elite, which tries to ignore the decay of basic social subsystems and reproduction mechanisms – the family, intergenerational continuity, cultural and moral values. Absence of open manifestations of wide-scale conflicts creates an illusion that the disease will pass away on its own, and stepping beyond the critical point is temporary and harmless.

The critical threshold values should be interpreted taking into account integration interrelations of a social system. There are at least three important features of the society's functioning that should be considered when creating and using the system of critical threshold indicators of its development: the compensatory mechanism of interaction between the structures and elements of the social system, the synergy effect and the "domino principle" [7, 8]. The latter works as a "chain reaction" of the destructive social power release after the collapse of institutions uniting the society, due to the termination of its reproduction mechanisms. In this case, the situation resembles the course of pathological brain diseases that become evident after the destruction of more than half of its cells. Up to this point a person looks normal, although the nervous system functioning indicators have been exceeding the critical threshold values for a long time. When the disease reveals itself, brain degeneration becomes irreversible and incurable.

Historical experience shows that the collapse of a social system usually occurs unexpectedly for the majority of ordinary citizens, as well as for the ruling elite. This can be explained by the nonlinearity and fundamental complexity of social processes. They can continue for a long time with the excess of critical values of main indicators unnoticeably for public opinion till the system reaches the bifurcation point, when the disintegration of its linking reproduction mechanisms takes place, and after that, either transition to a new stage, or absorption by more viable systems, or collapse.

The key role in determining the possible duration of the society's functioning beyond the limits of critical threshold values of indicators characterizing its condition belongs to the selective ability of the management system. It should be sufficient for the timely detection of emerging threats, their neutralization,

halting the destructive processes, overcoming the arising restrictions and opening up new development prospects. The characteristics of the management system's condition has its own critical threshold level as well. According to well-known researchers C. Jung [9, p. 115] and M. Dogan [10, p. 151], if more than 40% of the population are extremely unsatisfied with the socio-political organization of the society, and believe that the current political system must be radically changed, then the existing political regime loses its legitimacy and the likelihood of its collapse increases greatly. This does not imply the inevitable collapse of the entire social system, but makes it highly vulnerable to external and internal threats. According to ISPS RAS data, if in the 1990s, this figure exceeded 40%, then by 2008, its value decreased to 20%, and then again went up, and it is currently close to 30%.

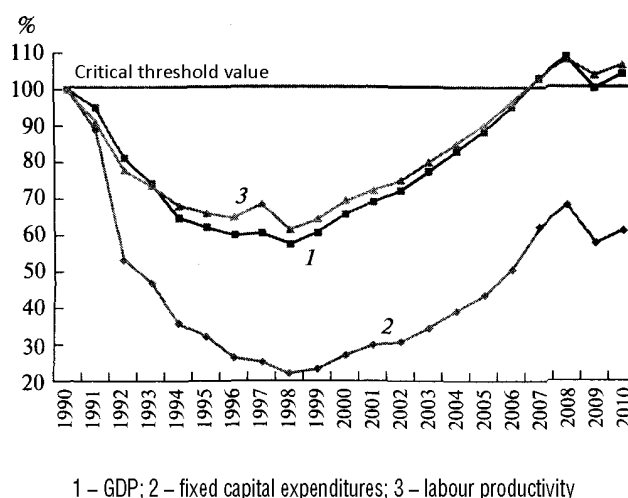
The condition of the economy. The indicators of the society's condition are to the large extent determined by the condition of its economy. Russian economy has been already deteriorating for a long time, including its structure, industrial, technological and investment potential. Although, Russian economy reached the 1990 pre-reform level according to GDP

volume and labour productivity, it still lags behind it by 40% regarding the volume of fixed capital expenditures (*fig. 2*). This means that during the last two decades, the economy has been working "flat out" – due to excessive exploitation of production capacities, created in Soviet times.

Surpassing the 1990 production level regarding GDP volume doesn't indicate the recovery of economic potential, its quality has deteriorated significantly: the share of machine-building and other branches of manufacturing industry and material production in general dropped sharply, meanwhile, the share of circulation sphere and export-reoriented raw material industries increased (*fig. 3*). Energy extraction volume significantly exceeds that of the Soviet period, while the volume of machinery and equipment production is 40% lower [11].

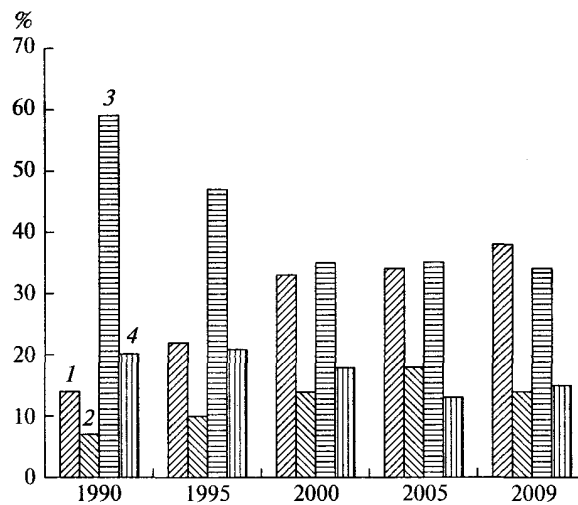
The economy functions in the unity of labour, natural resource, industrial-technological, macroeconomic and institutional subsystems (*tab. 2*). During the Soviet period, the natural resources subsystem maintains the limited production mode, which is characterized by the ratio of natural resource stocks increase and their extraction volume.

Figure 2. Growth rates of basic economic indicators in the USSR and Russia in 1990 – 2010, in % to 1900.



Source: Statistical Yearbook of Russia. Moscow: Goskomstat, 2001; Statistical Yearbook of Russia. Moscow: Rosstat, 2009.

Figure 3. Sector dynamics of GDP structure in the USSR and Russia in 1990 – 2009, %



1 – transaction sector (finances, trade, real estate business, renting); 2 – export-oriented sector (fuel and energy complex and metallurgy); 3 – domestic-oriented sector (machine building, processing industry, transport, communication, construction, agriculture); 4 – other.

Source: National economy of the USSR in 1990, Rosstat data, the authors' calculations.

Table 2. Indicators characterizing the reproduction of economic potential in Russia

Indicator	Critical threshold value	Actual condition, 2010	Actual value compared with the critical threshold value
Volume of fixed capital expenditures, in % to GDP	25	20.4	1.23 times less
Depreciation of fixed assets, %	40	78	1.95 times more
Share of mechanical engineering in the industry, %	25	14	1.79 times less
Share of processing branches in the industry, %	70	64.8	0.93 times less
Share of unprofitable organizations (in % to the total number of functioning organizations)	25	27.3	1.1 times more
Production profitability, %	15	11.4	By 3.6 lower
Return on the assets, %	12	6.8	By 5.2 lower
Inflation rate, %	15	8.8	Within the normal range
Social inflation rate, %	15	24	1.6 times more
Share of domestic production in the formation of meat resources and meat products on the internal market, %	70	61.3	By 8.7 lower
Share of material production in GDP, %	66	32	2.06 times less
Level of monetization (M2) for the end of the year, in % to GDP	50	12	4.17 times less

This ratio has been below the maximum critical level (which is equal to 1) for virtually all types of minerals for a long time. Nevertheless, the provision of Russian economy and society with raw materials doesn't arouse much concern for the time being, due to the considerable amount of previously discovered and developed mineral deposits, vast land and water resources.

The condition of production and technological subsystem is characterized by supercritical depreciation of fixed assets. According to official statistics, their depreciation rate equals 50%, but, by expert estimations, physical depreciation of fixed assets in many economic sectors, including basic ones, reaches 80%, which greatly exceeds the critical value.

The latter, in the conditions of the present-day scientific and technological progress, is estimated at 35%, including 25% for the active side, and 40% for the liability side of fixed assets. Although, when these values are exceeded, the economy retains its extended reproduction ability, it loses its competitiveness, lagging behind other countries in science and technology level and efficiency.

Russian economy has been already functioning in reduced reproduction mode for a long time, many vitally important branches of machine-building and processing industries have actually ceased to exist. The share of mechanical engineering in the industry decreased twice in relation to the critical threshold level estimated at 25% by the Non-Governmental Council for National Security of Russia. In total, the share of manufacturing branches in the industry fell by 8% below the critical threshold level, estimated at 70%. Degradation of Russian industry is reflected in the share of Russian high-tech products in the world market, which decreased to 0.2%.

The loss of the economy's independent self-development ability is proved by the share of equipment import that more than twice exceeded the critical limit, which means the production processes' reorientation toward the foreign technological base. This also causes the loss of the country's self-development ability and its involvement in unequal foreign economic exchange, fraught with the danger of national wealth outflow.

The excess of the 35% share of imported goods in the populations' overall consumption means that the country has fallen into critical dependence on the outside world. Meanwhile, the 25% import share for foodstuffs is considered the critical threshold level, its further increase will pose a threat to the country's food security. According to both indicators, Russia has been below the critical threshold level for a long time. This fact has not been taken into account yet due to the sustainable high positive balance

of payments and excessive foreign exchange reserves that cover the country's need for imports manifold, given the existing level of purchasing power.

In the conditions of high openness and in the absence of a target-oriented development policy, Russian economy has actually split into two sectors: domestic, which is deteriorating, and export-oriented (mainly raw materials), which, regarding the reproduction mechanisms, is acquiring enclave features and is moving toward the financing at the expense of foreign sources. As a result, Russian economy, which specializes in exports of raw materials in exchange for finished products, acquires the features of a colony, which leads to unequal foreign economic exchange and deprives it of the independent self-reproduction and development ability. This is reflected in the share of primary commodities in export, which significantly exceeds the critical threshold value that we estimate at 40%. The big share of energy exports regarding their production volume, that equals 2/3, indicates the actual degradation of manufacturing industry. Due to this fact and also the reorientation towards the foreign technological base and a high level of imports of consumer goods, Russian economy finds itself in the grip of foreign dependence that determines its evolution in accordance with the needs of the external market, rather than internal development (*tab. 3*).

Of course, many of the indicators stated in table 3 are of a relative nature. In the vast majority of countries, their values go outside the critical limits. However, they characterize the immunity of a national economy to external and internal threats. For Russia, as a great power, which played a leading role in world development for most of its thousand-year history, this stability is of fundamental importance.

The sustainably high positive balance of payments and manifold excess of the critical level of foreign exchange reserves volume are

often perceived as the signs of a sustainable and independent external economic position of Russia. However, the cause-and-effect analysis in the macroeconomic and foreign economic subsystems interaction mechanisms proves the opposite. The positive balance of payments in Russia is the result of deteriorating economic structure that acquires the raw material specialization, systematic undervaluation of the ruble regarding its equilibrium value, curbing of the final demand at the expense of restricting the money supply through sterilizing a part of the budget revenues.

In other words, monetary and foreign exchange policy mechanisms have made Russian economy dependent on the interests of raw materials exporters and international speculative capital, and critically dependent on the global market situation. This dependence is aggravated by the binding of money supply to the growth of foreign exchange reserves, as a result, Russian economy reproduction is guided by the external demand for its goods and the supply of foreign credits. At the same time, along with foreign exchange reserves growth and large-scale export of capital, external indebtedness is increasing, and the dependence of Russian economy on external credit is going far beyond critical limits. And though the share of foreign banks in Russia's bank assets hasn't reached the threshold value, the ratio between foreign credits to Russian corporations and money supply greatly exceeds the critical limit, that we have established on the level, ensuring the protection of the country's banking system against external shocks (see table 3).

Accordingly, even though the values of the indicators, traditionally reflecting the country's foreign economic condition (balance of payments, the volume of state foreign debt to GDP, the coefficient of foreign exchange reserves sufficiency, etc.) are favourable, in reality, the country's economy is extremely dependent on foreign creditors and global prices for energy and raw materials.

This can be supplemented by "offshoring" the property rights for the key Russian enterprises, as well as the significant share of depositary receipts in their authorized capital reaching 60% for the basic branches of economy, this figure exceeds 5-fold the critical threshold value established on the basis of objective requirements to the selective capacity of national economy management system. The share of foreign investors in the ownership structure of free-floating stocks in the Russian market permanently exceeds the critical threshold value calculated taking into account the requirements to market stability towards the fluctuations of foreign speculative capital inflow.

Artificial reduction of all mechanisms of money emission to foreign currency purchase significantly narrowed the developmental opportunities of Russian banking system. The reproduction of the economy is not supported by its financial subsystem. Banks do not possess lending opportunities, sufficient for the economy development, which is reflected in the indicators of the ratio between the loans to the non-financial sector and GDP, which are 3-5 times lower than in developed countries. The overall volume of the economy monetization throughout the post-Soviet period remains substantially lower than the critical threshold level essential for ensuring the smooth circulation of capital estimated by the experts at 50% of GDP. At the same time, Russian financial system remains a donor to the global economy. By providing its foreign exchange reserves to the external environment at 2 – 3% per annum, our enterprises and banks attract foreign credits at 7 – 8% per annum. Financial system experiences a considerable loss of resources due to unequal foreign economic exchange. This is the result of the economy split into the internal sector determining the reproduction of economic and human potential, and external raw materials and financial sectors oriented at the export

Table 3. Indicators, characterizing the external economic dependence of Russia

Indicator	Critical threshold value	Actual condition, 2010	Actual value compared with the critical threshold value
International reserves sufficiency index (in % to the 3-month volume of goods and services import)	9	20.4	2.3 times more
Volume of aggregate foreign debt (in % to GDP for the end of the year)	25	32.5	1.3 times more
Share of imported equipment in the domestic demand, %	30	65.6	2.18 times more
Share of imported foodstuffs in GDP, %	25 – 30	32	1.07 – 1.28 times more
Share of import in the material production, %	25	94	3.76 times more
Share of foreign capital in the investments, %	25	36	1.44 times more
Amount of foreign liabilities of commercial banks and other sectors, in % to GDP	25	29.5	1.18 times more
Share of overdue and unrecovered foreign loans (in % of the total volume of received loans)	25	50	2 times more
Share of foreign investors in ownership structure of free-floating stocks, %	30	60	2 times more
Share of foreign credits to M2, %	20	36.4	By 16.4 more
Trade balance deficit: according to the balance of payments methodology, %	15	Surplus 26.3	Within the normal range
GDP in % to the global volume	7,5	2.5	3 times less
per capita, %	100	107	Within the normal range
GDP in % to the volume of EU states	25	10	2.5 times less
per capita, %	75	35	2.14 times less
Volume of foreign currency in % to the ruble money in the national currency	10	50	5 times more
Volume of foreign currency in cash in % to the volume of cash rubles	25	100	4 times more
Share of expenditures on the foreign debt servicing (in % to the total volume of federal budget expenditures)	20	1.9	Within the normal range
Ratio of foreign trade turnover to GDP, in %	30	41.6	By 11.6 more

of capital and not actually involved in the mechanisms of reproduction of the inwardly oriented sector of the economic system, ensuring its vitality.

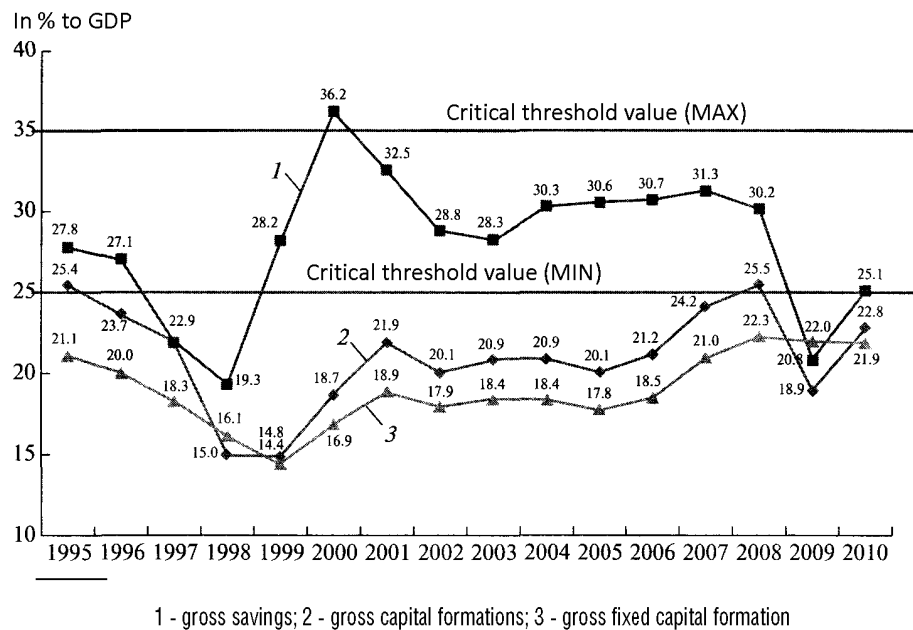
The underdevelopment of the banking system and the absence of mechanisms of its refinancing by the Central Bank are among the main causes of the extremely low standard of accumulation, which has long been significantly below the level necessary for simple reproduction, and also 1.5 times lower than the savings rate (*fig. 4*). At the same time, inflation reduction to an acceptable level in the absence of banking system refinancing mechanisms doesn't allow to improve the investment activity to a regular level.

The internal reproduction mechanisms do not provide for the maintenance of the existing economic potential, not to mention its development. The existing price structure impedes the opportunities for the simple reproduction

of manufacturing industries and construction, the major part of production is unprofitable or distressed, and this makes it impossible to invest in the renewal and modernization of their assets. For example, the profitability of such key branches, as mechanical engineering and construction, which determine the investment opportunities, is below the Central Bank refinance rate. This means that the loan capital for the reproduction of these branches is not available, which causes their narrowing and degradation.

Most of the indicators reflecting the state of Russian economy are outside the limits of the critical values, depicting its self-reproduction ability. It has been functioning in the limited reproduction mode, despite the existing opportunities of transforming accumulated savings into investments and directing the rich natural resources base to the technological development.

Figure 4. Gross capital formation and gross savings in Russian economy in 1995 – 2010, in % to GDP



Source: National accounts of Russia in 2003 – 2010: statistical yearbook. Moscow: Rosstat, 2011

The situation is even worse with indicators, reflecting the development ability of Russian economic system and its competitiveness (*tab. 4*). The share of innovation-active enterprises, the share of new products in the total volume of machine-building products and the relation of R&D expenditures to GDP in Russian economy is 3 times lower than the developed countries' level, which in this case should be considered as critical threshold. According to economy efficiency indicators, this gap is multiple.

Over the past two decades there has been a significant decline in the Russian science and technology potential, its share in the global system has reduced sharply. After a 20-fold drop in the early 1990s, the volume of R & D expenditures increased and stabilized at a low level – just over 1% of GDP, which ensures neither reproduction, nor preservation of the existing scientific and technological potential. Given the present-day rates of knowledge accumulation, the total volume of which is doubled every quarter of the century, the cessation of scientific

research for one year leads to a depreciation of the existing knowledge by 25%. Lagging behind the world level of institutions, that form the intellectual potential (*tab. 5*), makes it difficult to overcome the degradation tendencies and create the necessary conditions for sustainable economic development. The share of Russia in the global knowledge economy has declined to a marginal level.

Under the current state of affairs, the prerequisites for restoring the economy's normal reproduction capacity are absent: the rate of accumulation is at an extremely low level, that we estimate at 25%, and the indicators of labour productivity increase are lagging 6-fold from the critical threshold value, set with regard to the necessity of overcoming the Russian economy's backwardness in the foreseeable future. Stepping on the path of sustainable development requires, according to our estimates, the increase of saving rate, as a minimum, up to 35%. It can be achieved, because the volume of savings in the economy 1.5 times exceeds the volume of investments, and there are other reserves,

Table 4. Indicators reflecting the competitiveness of Russian economy

Indicator	Critical threshold value	Actual condition, 2010	Actual value compared with the critical threshold value
Share of innovation-active enterprises, %	40	9.3	4.3 times less
Share of processing industry products in the export, %	50	23	2.17 times less
Dispatched innovation products (in % to the total volume of industrial products)	15 – 20	1.7	8.82 – 11.76 times less
Share of innovations, in % to GDP	3.2	0.9	3.6 times less
Share of new kinds of products in the total volume of mechanical engineering production, %	7	2.6	3.7 times less
R&D expenditures, in % to GDP	3	1.5	2 times less
Unit indicators of energy consumption (tons of petroleum per \$ 1 thousand of GDP):			
overall energy resources expenditure	0.15	1.65	11 times more
electricity expenditures	0.02	0.17	8.5 times more
oil and gas expenditures	0.10	1.16	11.6 times more
Losses of natural resources during extraction (in % to the total volume)	3 – 8	10 – 65	3.3 – 8.1 times more
Average annual rate of labour productivity increase, %	6	1	6 times less
Share of Russian high-end technologies in the world, %	12	0.3	40 times less
Share of intellectual property in the business worth, %	25	10	2.5 times less
Share of state expenditures on ecology, in % to GDP	5	0.8	6.3 times less

Table 5. Russia's position among 58 countries in the rating of institutes forming labour potential (according to the Global Competitiveness Report data for 2007 – 2008)

Point of comparison	Russia	China	India	USA	Germany	Japan
Correspondence of education system with the requirements of competitive economy	43	32	26	16	20	23
Quality of education in the fields of mathematics and natural sciences	27	37	10	30	26	20
Quality of higher education	35	49	39	5	20	22
Quality of primary education	30	32	46	23	22	21
Education expenditures	44	55	39	24	32	47
Availability of Internet in schools	38	32	39	11	20	22
Quality of business schools	49	54	8	6	24	47
Scope of the training of companies' employees	54	41	29	11	9	4
Availability of local research and education centres	49	34	28	2	3	6

which are not used due to many reasons, including a large-scale outflow of capital.

When assessing the above stated measurement results, it is necessary to note, that, despite their limited character, they objectively reflect the socio-economic condition of Russia. For a long time, the country has been far beyond the critical values for the majority of indicators, characterizing the reproduction and development ability of the economy and society. This indicates the presence of actual threats to the national security, and the remaining time for their neutralizing and restoring the country's sustainable development

ability is wearing out. At the same time, taking the measurable indicators out of the critical threshold values area is not a goal in itself. The society and economy are changing constantly, and their performance is of non-linear and non-equilibrium character. The technological structure of the economy and intellectual structure of the society is transforming quickly. Trying to provide the stability by maintaining a simple and even extended reproduction of the existing social and economic subsystems in the conditions of rapid structural changes in the world economy is clearly not enough for successful or just sustainable development.

When grounding the conclusions of the conducted analysis and objectives of sustainable socio-economic development, it is necessary to take into account the patterns of modern economic growth. Today, it can be considered proven, that the world economic development is uneven, forming a sequence of long waves, connected with the change of technological modes [12]. This shift is accompanied by dramatic changes in the technological structure of the economy.

Under the current global crisis, the transition to the new (sixth) technological mode is taking place. In this connection, the policy of Russia's modernization and development should set the goal of a prompt formation of the new technological mode. According to the estimates, up to the present time, the period of the "embryonic development" of this mode has been passed [13]. After a few years, it will reach the exponential growth, and, as a result, the next long wave of economic development will begin.

The nucleus of a new technological mode is the complex of nanotechnologies, biotechnologies, information-communication and social technologies. Although, today, the world remains in the state of depression and crisis turbulence, the complex of industries, defining a new technological mode, is characterized by the sustainable growth rate of 35% per year. Taking these facts into account and relying on our available capabilities and science and technology potential, one should aim to concentrate the resources in these areas specifically. It is necessary not only to renew the basic funds, but to focus primarily on the technological structure modernization, to invest in the development of principally new directions, which nowadays become the drivers of economic growth and the formation of the sixth technological mode. After the world overcomes the economic depression, and the long wave of development begins, the countries, that managed to become leaders in the economic sectors crucial for the new

technological mode, will gain huge advantage and provide for long-term sources of super profits (intellectual rent) by building scientific and technological superiority.

The revealed regularities in the long-term economic development allow for grounding the strategy of Russian economy priority development in conditions of the new technological mode advancement [14]. For Russia, where industry and science have considerable resources in a number of areas crucial for establishing the sixth technological mode, the possibility of developing the perspective trends of global economic growth before other countries is opening up.

The condition of the management system.

Although the indicators of Russia's socio-economic condition have improved greatly compared to those of mid-1990s, when their list was formed for the first time, the observed values of most of them exceed the critical threshold level. The country came out of the critical zone regarding the indicators of the state financial system's condition, but it remains within the boundaries of the critical value according to the indicators reflecting the industrial-technological sphere condition, human and scientific-technological potential. The investment and innovation activity indicators remain extremely low, as well as other indicators reflecting the efficiency of the economy and its development capacity.

The recovery of Russian economy's expanded reproduction and modernization ability requires taking into account the regularities of the long-term economic development and working out the right strategy along with its efficient implementation mechanisms. This requires a qualitative improvement of the management system, tackling the extreme corruption, shadow activity and losses. The latter, measured for Russian economy in general, account for about half of GDP, many times exceeding the maximum critical value, which corresponds to modern ideas about effective management of the economy.

According to the estimates of V.M. Simchera [15], the level of overall national economic costs in the Russian Federation on the account of interindustry balance manifold exceeds the GDP volume, which testifies to the negative contribution of the management system in economic growth (*tab. 6*).

As a result of the poor condition of the management system, Russia's resource potential efficiency usage coefficient is more than twice below the critical threshold value, including the agricultural land usage coefficient [16]. Wide-scale export of capital, having reached for the 2 decades the astronomical value of \$ 1 trillion; brain drain that is also devastating for the economy and society; the loss of the most part of scientific, industrial and human

potential are the consequences of unsatisfactory performance of market self-organization mechanisms and state regulation institutions.

Actual self-estrangement of the ruling elite from the society and depriving the overwhelming majority of citizens of exercisable rights to participate in management processes impede the feedbacks between the society and the state. The latter conforms to the oligarchic interests and becomes a tool of receiving the administrative markup by a corrupt bureaucracy, protected from liability to the society thanks to the existing political system. It results in the extremely high level of administrative-corrupted markup in the price of expense allocated resources given extremely low salaries and innovation activity.

Table 6. Estimations of the Russian economy management quality

Indicator	Critical threshold value	Actual condition, 2010	Actual value compared with the critical threshold value
Level of economic losses, in % to GDP	7	50	7.1 times higher
Level of economic losses, \$ billion:			
at the ruble exchange rate	105	750	7.1 times higher
at the purchasing-power parity	175	1250	7.1 times higher
Level of economic losses, in % to GDP	0.8	1.2	1.5 times higher
Russia's overall resource potential efficiency usage coefficient (% of GDP to national wealth, i.e. the overall monetary volume of natural, labour, gold and currency and intellectual resources)	75	18	4.2 times lower
Actually developed potential efficiency usage coefficient	18	9	2 times lower
Share of rent and profit in the price for raw material resources, %	25	65	2.6 times higher
agricultural land usage coefficient, %	100	50	2 times lower
Share of shadow economy, in % to GDP	25	45	1.8 times more
Share of "off-the-books" salaries, in % to reported salaries	25	39.6	1.58 times more
Differentiation of RF subjects:			
according to GRP per capita, times	5	21.1	4.22 times higher
according to monetary incomes, times	5	6.5	1.3 times higher
Index of confidence in official information	100	18	5.56 times lower
Citizens' distrust of the governing bodies, protest actions, corruption level, rating of business environment, export of capital and profit	35	85	2.43 times higher
Share of corruption and shadow economy, in % to GDP	5	40	8 times higher
Federal budget deficit, in % to GDP	3	4.2	1.4 times higher
Russia's overall economic losses coefficient, in % to GDP	7	50	7.1 times higher
Volume of aggregate foreign debt (in % to GDP for the end of the year)	60	6.5	Within the normal range
Share of citizens supporting the radical change of the political system, %	40	31	Within the normal range
Level of satisfaction with the activity of executive power bodies of the RF subjects	40	30	1.3 times lower
Level of population confidence in the central government authorities	50	39	1.28 times lower
Level of population confidence in the army	40	46	Within the normal range

Extremely high level of corruption reflects the inability of state authorities to solve the complex tasks of socio-economic development, connected with the necessity of implementing the large-scale projects and concentrating resources on breakthrough directions of science and technology progress. In these circumstances, it is hardly possible to expect the increase in the business and innovation activity, which is proved by the state of business conditions.

Business circles respond to the state by tax evasion, capital flight, transfer of property rights to offshore areas: the share of the “underground” economy in GDP, the share of the export of capital to the volume of profit generated by the economy, the share of assets in the basic economic sectors, transferred to offshore areas greatly exceed the critical threshold values. Similarly, the citizens respond to their removal from participating in management by the distrust towards the state authorities (see table 6). In other words, state institutions pretend to govern, and citizens pretend to submit.

At the same time, commonly used indicators of state management condition are quite satisfactory. The Russian state possesses a balanced budget, a moderate debt, the exchange rate of the ruble demonstrates stability, the nominal volumes of GDP are growing well along with the incomes of citizens who rarely resort to any form of protest actions. The country's top leadership was surprised to face the rallies of those dissatisfied with the results of 2011 – 2012 parliamentary and presidential elections. However, even a cursory analysis of the relatively small number of indicators reflecting the state of the economy and society shows that the basic mechanisms of their reproduction function in conditions of extreme stress.

The analysis given above proves the necessity of official establishment and systematic measurement of the set of critical threshold

indicators reflecting the social development, which will allow receiving accurate information concerning the results of decisions taken and use it in follow-up activities.

Expert testing of the critical threshold indicators method should be expanded by simulation of the social processes designing and modeling based on the analysis of statistics, empirical data, probability analysis and making up graphic representations of threats. Elaborating the method of critical threshold indicators reflecting the society's development can become an important step towards the incorporation of social sciences into the modern Russian society management system. The system itself needs radical modernization, aligning with the objective complexity of Russia's socio-economic development goals.

The transition to the target-oriented development policy, backed by adequate monetary, industrial, scientific-technological and structural policy is necessary for implementing the opportunities of priority development and removing the economic condition indicators out of the critical threshold zone. The list of measures aimed at ensuring the priority development of Russian economy was developed by the scientists of the Section of Economics of the Social Sciences Department of RAS. This list was submitted to the RF Government and published in the journal “Economics of contemporary Russia” [17]. It should be supplemented by measures aimed at expanding the opportunities for citizens' participation in the society management, as well as the creation of effective mechanisms ensuring the decision-makers' responsibility for the objective results of the conducted socio-economic policy. Radical changes are also necessary in the state policy in the sphere of education and culture that should focus on the consolidation of Russian society, harmonization of prevailing moral values and landmarks of creative activity.

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