ISEDT RAS

ECONOMIC AND SOCIAL CHANGES:

FACTS, TRENDS, FORECAST

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AGRICULTURAL ECONOMY

NATURE MANAGEMENT ECONOMY

Expectations of the results

Vladimir A.
ILYIN
Doctor of Economics
Professor
Honored Scientist of the RF
Director of ISEDT RAS
ilin@vscc.ac.ru

Since May 7, 2012 the President of the Russian Federation Vladimir Putin has been solving systemic problems of Russia's development, accumulating over two decades, which are quite objectively described in his election papers[1]. This time, as opposed to 2000 and 2004, during the first day after the Inauguration Vladimir Putin signed 13 executive orders[2], which contained the assignments to the Government of the Russian Federation with the concrete terms for organizing, preparing and approving the measures that are necessary to implement the objectives of Russia's development until 2018. These assignments covered almost all directions of electoral program by V. Putin, who had received the support of 64% voters.

President's Executive Order No. 596 on Long-Term State Economic Policy is the most important one among the orders adopted at the beginning of Putin's Presidency.

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[1] Articles by V.V. Putin: Russia muscles up — the challenges we must rise to face. Izvestia. 2012. No. 6. January 17; Russia: The Ethnicity Issue. Nezavisimaya Gazeta. 2012. January 23; Economic tasks. Vedomosti. 2012. No. 15. January 30; Democracy and the quality of government. Kommersant. 2012. No. 20. February 6; Building justice: A social policy for Russia. Komsomolskaya Pravda. 2012. February 12; Being strong: National security guarantees for Russia. Rossiiskaya Gazeta. 2012. No. 35. February 20; Russia and the changing world. Moscow News. 2012. February 27.

[2] **No. 594** Executive Order On the 2012-2014 Presidential Programme for Advanced Training of Engineering Personnel; **No. 595** Executive Order On Lump Sum Payments to Certain Categories of the Russian Federation Citizens on the Occasion of the 67th Anniversary of Victory in the Great Patriotic War of 1941-1945; **No.596** Executive Order On Long-Term State Economic Policy; **No. 597** Executive Order On Measures to Implement State Social Policy; **No. 598** Executive Order On Improving State Policy in Healthcare; **No. 599** Executive Order On Measures to Implement State Policy in Science and Education; **No. 600** Executive Order On Measures to Provide Affordable and Comfortable Housing to the People of the Russian Federation and to Improve the Quality of Housing and Utilities Services; **No. 601** Executive Order On Main Directions of Developing the System of Public Administration; **No. 602** Executive Order On Ensuring Interethnic Unity; **No. 603** Executive Order On Implementing Plans (Programmes) for Building and Developing the Armed Forces of the Russian Federation, Other Troops, Military Units and Agencies, and Modernising the Military-Industrial Complex; **No. 604** Executive Order On Further Improvements to Military Service in the Russian Federation; **No. 605** Executive Order On Measures to Implement the Russian Federation Foreign Policy; **No. 606** Executive Order On Measures to Implement the Demographic Policy of the Russian Federation.

According to the text, the Executive Order aims to step up the rate of stable and consistent economic growth, increase people's real incomes, and make Russia's economy a technological leader.

The necessity to reach the more significant quantitative and qualitative parameters of our country's development is recognized by all branches of Russian society, its production structures and social institutions.

Meanwhile, more and more attention is being paid to the notion that new goals will require comprehensive modernization of organizational, managerial and legal mechanisms. This necessity is increased, on the one hand, by the fact, that the conditions, in which Russian economy functions, are becoming more complicated, and the impact of global economic processes on our country is becoming more profound. On the other hand, Russian society faces a negative trend of recent years, when many of the announced goals haven't been achieved due to a lack of commitment and inconsistency of actions on the part of state authorities. Historic evidence, proving this estimation, is numerous. Here are just some of the examples.

During V.V. Putin's first Presidency, his 2003 Address to the Federal Assembly of the Russian Federation stated the goal: "For the 10-year period we should at least double our country's gross domestic product"[3]. However, by the end of 2011 in comparison with the 2002 level, Russia's GDP has grown only 1.6-fold[4].

Many of the State and Federal target programmes on promoting production growth and quality of consumer goods, development of industrial and social infrastructure haven't been implemented.

Thus, according to the State programme of the country's agricultural development, the overall agricultural production in 2010 should have been increased by 12% as compared to 2007, but it hasn't *(see insert 1)*.

The physical volume of investments in the agrarian sector should have been increased 1.4-fold, but actually it turned out to be 30% lower than it had been before the adoption of the programme.

According to the Federal target programme "Housing" in 2011, the affordability of housing (the indicator is determined by the number of annual wages of an average employee, sufficient for purchasing a one-room apartment) had been planned to be reduced to 3 years. The actual value of this indicator equaled 4.7 years[5].

The implementation of several other Federal target programmes is also lagging behind *(see insert 2)*.

The 2004 RF Government Decree set the goal of reducing the share of population with incomes below the subsistence level to 10% in 2007 already[6].

However, according to Rosstat, in 2011, 18.1 mln people or 12.8% of the country's population had incomes below the subsistence level[7]. According to the calculations of Professor N. Krichevskiy, "the share of the poor in Russia equals 18.8% of the population, or 28.9 million people, nearly one person in five"[8].

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[3] Address of RF President V.V. Putin to the Federal Assembly of the Russian Federation in 2003. Rossiyskaya Gazeta. 2003. May 18.

[4] According to Rosstat data. Available at: http://www.gks.ru/wps/wcm/connect/rosstat/rosstatsite/main/account/#.

[5] Decree of the RF Government dated 17 September, 2001 No. 675 "On the Federal target programme "Housing" for 2002 − 2010". Reference-information system "ConsultantPlus"; calculations according to the data of Statistical Yearbook of Russia. 2011.Rosstat. Moscow, 2011; Housing and consumer services in Russia. 2010. Yearbook.Rosstat. Moscow, 2010.

[6] See: Izvestia. 2004. August 14. P. 3.

[7] Russia:2012. Statistical reference book. Moscow: Rosstat, 2012.

[8] Krichevskiy N. Rich war on poverty. Moskoskiy Komsomolets. 2012. No. 25947. May 25.

Insert 1

The implementation of the State programme for agriculture development and regulation
of agricultural products, raw materials and food market in 2008 – 2012

Main target indicators	Was planned to be achieved in 2010 as compared to the basic year of the program	Level achieved in 2010	Deviation
Index of agricultural production output in farms of all types, %	112.3	99.7	-12.6
Index of physical volume of investments in fixed capital in agriculture, %	140.2	68.1	-72
Application of mineral fertilizers, mln. t in active substance	10.9	8.9	-2.0
Labour productivity index in enterprises of all types, %	115.7	104.5	-11.2
Source: National report "On the progress and results of implementing in 2010 the State programme for agriculture development and regulation of agricultural products, raw materials and food market for 2008 – 2012".Moscow: Ministry of agriculture of Russia, 2011.			

Purchase of the main types of machinery by agricultural organizations in Russia, thsd. pcs.

Types of machinery	1990	2000	2005	2008	2009	2010
Tractors	143.7	1.4	9.3	17.4	18.8	18.0
Lorries	97.6	4.8	4.7	4.8	4.2	5.4
Harvesters:						
combine harvesters	98.0	5.0	5.5	5.9	7.5	7.6
potato harvesters	14.0	1.5	3.5	3.4	3.2	2.5
forage harvesters	13.6	1.4	1.1	1.9	2.1	1.5
Source: Shutkov A. Deformations in the structure of reproduction: ways of overcoming. Economics of Russia's agriculture. 2012. No. 5.						

Production of main types of agricultural products in all categories of farms in Russia

Type of agricultural products	1990	2000	2005	2009	2010	2011	
						abs.	in % to 1990
Grain in weight after processing, mln. t	116.7	59.4	62.7	75.9	61	93.9	80.0
Flax fibre, thsd. t	71.0	51.0	52.8	52.2	35.2	43	60.5
Meat in live weight, mln. t	15.6	7.0	7.7	9.9	10.5	10.8	69.2
Eggs, bln. pcs.	47.5	34.1	37.1	39.4	40.6	41.0	86.3
Wool, thsd. t	226.7	40.3	49.0	54.7	52.5	53.0	23.3
Gross agricultural production in comparable prices, %	100.0	60.7	68.0	80.9	71.8	87.7	x
Source: Shutkov A. Deformations in the structure of reproduction: ways of overcoming. Economics of Russia's agriculture. 2012. No. 5.							

The degree of implementation of some Federal programmes in Russia

Name of the programme and its most important targets	Was planned to be achieved in 2010 as compared to the basic year of a programme	Level achieved in 2010	Degree of implementation (in %)
Programme "Modernization of Russian transport system (2002 – 2010)":			
– introduction of new railway lines, thsd. km	1.7	0.59	34.7
– introduction of additional main railway lines, thsd. km	2.7	0.943	34.9
– construction, reconstruction and modernization of Federal and regional roads, thsd. km	49.8	23.8	47.8
– number of long-range and regional aircraft and helicopters, manufactured in Russia and supplied to airline companies, pcs.	563	270	48.0
Federal target programme "Social development of the village up to 2013":			
– establishment of pre-school educational institutions, thsd. places	11.9	3.53	29.4
– establishment of general educational institutions, thsd. places	186.41	76.48	41.0
– establishment of outpatient and polyclinic institutions, thsd. visits per shift	16.55	10.56	63.8
– putting local water supply systems into operation, thsd. km	34.49	11.84	34.3
Federal target program "Healthy generation" for 2007 – 2010:			
– infant mortality, per 1000 born alive	8.8	7.5	85
– maternal mortality per 100 thsd.	20.5	16.5	78
– mortality of children aged from 0 to 4 years (inclusively) per 1000 newborns of the corresponding year of birth	10.9	9.8	90

Sources: Main results of implementing the Federal target program "Modernization of Russian transport system (2002 – 2010)". Available at: http://www.mintrans.ru/documents/detail.php?ELEMENT_ID=16554; Target indicators and brief reports on implementing the Federal target program "Social development of the village up to 2013". Available at: http://fcp.economy.gov.ru/cgi-bin/cis/fcp.cgi/Fcp/ViewFcp/View/2007/151/; National report of the Ministry of health and social development of the Russian Federation dated November 17, 2011 "On the status of children in the Russian Federation" (2008 – 2009); Demographic Yearbook of Russia. 2009, 2010. Moscow: Rosstat, 2009, 2010; Healthcare in Russia. 2011. Moscow: Rosstat, 2011.

In addition, it should be taken into account, that the subsistence level and the corresponding consumer basket are significantly reduced[9].

The ratio of per capita average income to the subsistence level is the most important indicator of population welfare level. *Table 1* shows that this ratio in the RF increased by 29% in 2003 − 2007 and the situation worsened considerably in 2008 − 2011.

Statistics data on a number of RF subjects, bordering on the Vologda Oblast, confirm, that living standards increase rates among the majority of population have reduced significantly over the last 4 years; as for the Vologda Oblast, the ratio of per capita average income to the subsistence level in 2011 has decreased to 88% of that of 2008.

As many experts point out, in order to implement the tasks set in the Decree "On the long-term state economic policy", a new subsistence level should be approved from 2013, which will be actually close to the value, stimulating extended reproduction of the population, so as at the next stage (2014 − 2015) it would be possible to move on to the regulations of the minimum consumer budget.

Numerous scientific studies[10] prove that our country possesses substantial reserves for increasing its consolidated budget. The use of these reserves will facilitate the transition to the minimum consumer budget taking into account modern approaches in developed countries. Prevention of capital outflow is one of the efficient ways of the country's revenues increase.

Table 1. The ratio of per capita average income to the cost of subsistence level

Territory	Coefficients		Growth rates in 2007 in % to 2003	Coefficients		Growth rates in 2011 in % to 2008
	2003	2007		2008	2011	
Russian Federation	2.4	3.1	129	3.3	3.1	94
Leningrad Oblast	1.4	2.9	207	2.8	2.9	104
Novgorod Oblast	1.7	2.8	165	2.4	2.8	117
Yaroslavl Oblast	2.2	2.7	123	2.7	2.7	100
Arkhangelsk Oblast	2.0	2.7	135	2.7	2.7	100
Kirov Oblast	1.6	2.5	156	2.4	2.5	104
Tver Oblast	1.5	2.5	167	2.5	2.5	100
Kostroma Oblast	1.6	2.4	150	2.3	2.4	104
Republic of Karelia	2.1	2.4	114	2.3	2.4	104
Vologda Oblast	2.2	2.3	105	2.6	2.3	88

Sources: Integrated Inter Agency Information Statistical System. Available at: htpp://www.Fegstat.ru/; Federal State Statistics Service. Available at: htpp://www.gks.ru/freedoc/new.sit. Figures for regions are given since 2003, as most regions didn't fix their subsistence levels in 2000 − 2002.

[9] See e.g. Rimashevskaya N.M. Modernization of Russia: Russians' health and demographic situation. Political education. 2010.; Kokin Yu., Shirokov L. Once more on the subsistence level amd normative consumer budgets in Russian Federation on the whole and in Russia's regions. Social policy and social partnership. 2011. No. 6.; Kostyleva L.V. Inequality of population in Russia: trends, factors, regulation: monography. Ed. By V.A. Ilyin. Vologda: ISEDT RAS, 2011.

[10] Dmitriyeva O. The first year of the first three-year budget plan of the new "political cycle": another demodernizational construction and another alternative development. Russian economic journal. 2011. No. 5.; Ilyin V.A., Povarova A.I., Sychov M.F. The influence of the metallurgical corporation owners' interests on the socio-economic development: preprint. Vologda: ISEDT RAS, 2012; Delyagin M.G. Our twelve words: addition to the issue of a positive opposition programme − of the 2010s, not the 1990s. Available at: http://delyagin.ru/articles/22563.html; Yershov M. Two years after the crisis: the increase of the "second wave" risks. Voprosy economiki. 2011. No. 12.; Petrov Yu. Evolution of Russian fiscal system and the opportunities of using fiscal instruments for stimulation of economic development. Russian economic journal. 2011. No.6.; Lyubimtsev Yu. Financial system and its regulation efficiency. Economist. 2011. No. 3.

After the abolition of the restrictions on international capital movement in 2006[11] the losses of the country's economy have increased. Using the official balance of payments statistics data of the Bank of Russia, Doctor of Economics, MGIMO Professor V.Yu. Katasonov calculated that net capital outflow from Russia for 2006 – 2011 equaled 577.3 billion dollars *(tab. 2)*.

According to Mr. Katasonov, it is transnational banks and corporations that play the most important role in this process and gain most of the profit in this connection; and Russian oligarchs and corrupt officials act as their accomplices and abettors.

ISEDT RAS studies carried out in 2011 – 2012 provide substantial analysis of mechanisms used for achieving the goals of private corporations' owners against the national and regional interests on the example of the Russian largest ferrous metallurgical corporations (OJSC Severstal, OJSC Magnitogorsk Iron and Steel Works and OJSC Novolipetsk Steel)[12].

In the second half of 2008, the volumes of production and realization of products dropped, revenues reduced sharply as well as the number of industrial personnel; however, these enterprises increased administrative expenses, effected payments of substantial benefits to the corporate governance staff, and the fortunes of companies' CEOs were growing steadily *(tab. 3)*.

In order to overcome the increasing social stratification among Russian population, the time is ripe for introducing a progressive income tax scale for individuals.

The adoption in 2001 of a flat rate of personal income tax was motivated by the necessity of incomes legalization and increase of tax revenues in the budget.

However, over the past 10 years, the share of personal income tax revenues in RF GDP hasn't exceeded 4%, while it equals 8 – 10% in the U.S. and Western Europe. Moreover, the use of the flat scale has led to excessive inequality. Today, 1% of the rich in Russia account for about 40% of national income (compare: in the USA – 8%). Nevertheless, oligarchs' incomes are taxed at the rate of 13%, like those of all the rest of the citizens.

According to the data of Rosgosstrakh Center for strategic research, 330 thousand Russian families had an annual income exceeding 30 million rubles in 2008[13].

If these incomes were taxed at the rate of at least 40 – 45% (the maximum rate in England is 40%, in Sweden – 57%, in China – 45%, in Japan – 50%, in Denmark – 59%), the Russian

Table 2. Net capital outflow from the Russian Federation in 2006 – 2011, bln. dollars

Years	Capital inflow	Capital outflow	Net
2006	62.8	-163.5	-100.7
2007	207.9	-375.4	-167.5
2008	100.2	-204.2	-104.0
2009	6.4	-43.1	-36.7
2010	44.4	-115.6	-71.2
2011	86.5	-183.8	-97.3
Total in 2006 – 2011	508.2	-1085.6	-577.4
Source: Katasonov V.Yu. Russia on the eve of the accession to the WTO. Soviet Russia. Insert "Evidence". May 24, 2012. No. 3.			

[11] On introduction of amendments into the Federal law "On currency regulation and currency control: Federal law No. 131-FL dated 26 June, 2006.

[12] See: Ilyin V.A. The influence of the metallurgical corporation owners' interests on the national and regional development. Economic and social changes: facts, trends, forecast. 2011. No.3 (15). P. 14-38; Povarova A.I. The influence of the metallurgical corporation owners' interests on the financial performance of the head enterprise (the case of OJSC Severstal). Economic and social changes: facts, trends, forecast. 2011. No. 5 (17). P. 36-51; Ilyin V.A., Povarova A.I., Sychov M.F. The influence of the metallurgical corporation owners' interests on the socio-economic development: preprint. Vologda: ISEDT RAS, 2012.

[13] More than 300 thousand Russian families have an annual income exceeding $ 1 million. Vluki.biz: business news. Available at: http://vluki.biz/news/19.08.2008/7

budget would annually receive additional 3 — 4.5 trillion rubles. (14 — 20% of the additional revenues of the RF consolidated budget and up to 40% of additional revenues of sub-Federal budgets).

Vladimir Putin, speaking at the Conference of the Russian Union of Industrialists and Entrepreneurs in February, 2012 noted that "the existing attitude toward entrepreneurship and private property has to do with what was going on in Russia in the 1990s, when business back then amounted to nothing more than slicing up the state-owned pie. What we absolutely have to do is ensure public legitimacy and public trust in business, otherwise we will not be able to develop a modern market economy and create a healthy civil society". Vladimir Putin called on expert community to discuss the ways of closing unfair privatization issues and proposed to use a tax maneuver to achieve that task. The essence of this maneuver is that the Government is not going to increase the tax burden on non-commodity sectors of the economy, but it should use the reserves for expanding tax revenues available, first of all, in the taxation of prestigious consumption. Besides, Vladimir Putin emphasized

that "key steps should be taken this year so that next year owners of expensive houses and cars pay more tax"[14].

However, there are no assignments on these tasks in the execute orders issued on May 7, 2012. And the country is unlikely to develop sustainably without any visible decisions on social justice as the most important problem in Russia today.

The President has promptly made a number of organizational decisions over the first months of his work:

• the Council for Economic Modernization and Innovative Development under the President of the Russian Federation has been established in order to ensure the cooperation between the federal and regional authorities, local self-government authorities, non-governmental organizations, scientific institutions, etc.

• The Russian Federation Presidential Commission for Strategic Development of the Fuel and Energy Sector and Environmental Security has been established, and the chairman of Rosneft Igor Sechin has been confirmed as its Executive Secretary. The Commission's decisions adopted within its competence are obliga-

Table 3. Dynamics of performance indices of Russian metallurgical corporations in 2008 – 2010

Index	Severstal			Magnitogorsk Iron and Steel Works			Novolipetsk Steel		
	2008	2009	2010	2008	2009	2010	2008	2009	2010
Average headcount of staff, thsd. pers.	29.5	24.3	22.9	24.1	22.3	21.5	34.2	31.7	30.1
Average wages of employees, thsd. rub. per month	27.9	29.8	33.7	27.8	27.9	34.5	26.0	26.7	30.1
The number of corporate management staff*, pers.	10	10	10	31	20	25	18	18	17
Remuneration** per one manager, mln. rub. per month	10.7	5.8	5.6	2.0	2.1	1.2	0.9	1.1	1.4
Net profit, (loss), bln. rub.	38.6	1.4	(39.6)	10.1	27.4	24.4	71.7	24.0	32.4
CIO wealth , bln. rub.	126.3	299.4	563.9	73.5	296.4	341.4	152.8	477.8	731.5
To 2008, times***		2.4	4.5		4.0	4.6		3.1	4.8

* Corporate Management bodies are as follows: Severstal – Board of Directors; Magnitogorsk Iron and Steel Works – Board of Directors, Collegial Executive body – Management Board, the Sole Executive body – Management Company, Novolipetsk Steel – Board of Directors and Management Board.
** All types of remuneration are included: salary, bonuses, refund of charges, dividends, etc. (excluding payments to the key owners of plants, including dividends).
*** According to The Forbes.

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[14] The speech of Vladimir Putin at the XIX Conference of the Russian Union of Industrialists and Entrepreneurs. Official site of V. Putin. Available at: http://premier.gov.ru/events/news/18052/

tory for federal and regional executive authorities and local self-government authorities.

• The construction management of facilities for 2014 Winter Olympics in Sochi has been strengthened. At the meeting on preparations for the Olympic Games (May 11, 2012) Vladimir Putin stressed that as the Deputy Prime Minister in the Government and responsible for overseeing this work, D.N. Kozak had the right to express the Government's point of view.

• Special attention is paid to strengthening the country's military-industrial complex. The membership of the Military-Industrial Commission of the Russian Federation has been renewed. The Deputy Prime Minister D.O. Rogozin has been confirmed as the chairman of the Commission.

• In spite of 2011 staff re-attestation in the Ministry of Internal Affairs, Vladimir Putin has made significant changes in the personnel of the central apparatus of the Ministry.

• The Federal Law on Amendments to the Russian Federation Code of Administrative Offences and the Federal Law No. 65-FL On Assemblies, Rallies, Demonstrations, Processions and Picketing as of June 8, 2012 have been approved. They are aimed at introducing greater administrative liability for violation of legislation on rallies.

• The Investigative Committee of the Russian Federation has made the organizers responsible for the riots in Moscow on May 6.

• The President of the Russian Federation has represented a sufficiently clear Russia's position on acute international issues at the 2012 G-20 Mexico Summit on June 18 − 19.

It appears that these actions are right.

In conclusion, I would like to pay attention to the fact that there are fundamental questions of development strategy of country's economy which, according to the opinion of reputable experts, should be submitted for President's consideration in the near future. These issues are expounded most clearly in the article by the RAS Academician S.Yu. Glazyev

"Why is Putin?"[15]: "The above-mentioned positive changes in government policy are still very unstable. In order to ensure a strong upward flow of socio-economic development, the Government has to re-learn the tools of the appropriate policy that had been lost over two decades of the Washington Consensus".

The first of them is an independent monetary policy based on the needs of economic growth. Binding ruble emission to the increase in foreign exchange reserves has deprived the state of the ability to manage the economic development. Emitting rubles just for the euro and dollar-buying, the Bank of Russia automatically sends the economy into the mainstream of external demand service and dooms it to be a resource colony and a financial donor of the neighboring countries.

The second tool is a currency exchange regulation, protecting the financial system of the country from the destructive attacks of currency speculators and allowing them to increase internal sources of credit. Its removal made it possible for oligarchs to export capital illegally and keep back their incomes from taxation abroad. The third tool is an income levelling tax policy. Having rejected the progressive scale of income tax, inheritance taxes and gift taxes, the Government followed the oligarchs and corrupt officials' lead and exempted them from the tax burden of over-income legalization including illegal profits.

Vladimir Putin will have to master these well-known policy tools of the modern state. Otherwise, he will not be able to solve his own program objectives of economic modernization and transfer it to an innovative path of development; he won't be able to provide business with long-term loans, ensure the growth in labor productivity, support economic and creative activity of the population, reduce a poverty rate and social inequality, as well as he will not be able to improve the competitiveness of the national economy".

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[15] Glazyev S.Yu. Why is Putin? Zavtra. 2012. No. 9.

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As in the previous issues, we publish the results of the recent public opinion monitoring of the state of the Russian society*.

The following tables show the dynamics of some parameters of social well-being and socio-political sentiments in the Vologda Oblast for the period from April 2011 to April 2012.

Estimation of power activity (How do you assess the current activity of..?)

Vertical power structure	Approval in % to the total number of respondents								Dynamics indices, Apr. 2012 to 8 months 2008	Dynamics indices, Apr. 2012 to Feb. 2012
	8 mnth. 2008	Apr. 2011	June 2011	Aug. 2011	Oct. 2011	Dec. 2011	Feb. 2012	Apr. 2012		
The President of the RF	75.0	61.9	62.7	62.1	56.6	51.7	47.3	50.3	0.67	1.06
The Chairman of the Government of the RF	76.4	64.3	60.3	60.4	59.1	52.9	52.6	51.7	0.68	0.98
The Governor of the Vologda Oblast	57.8	46.1	46.7	49.5	47.7	41.9	37.7	37.7	0.65	1.00

Vertical power structure	Disapproval in % to the total number of respondents								Dynamics indices, Apr. 2012 to 8 months 2008	Dynamics indices, Apr. 2012 to Feb. 2012
	8 mnth. 2008	Apr. 2011	June 2011	Aug. 2011	Oct. 2011	Dec. 2011	Feb. 2012	Apr. 2012		
The President of the RF	9.3	23.5	22.1	19.7	29.0	35.7	35.7	33.3	3.58	0.93
The Chairman of the Government of the RF	10.4	22.3	24.3	21.4	24.7	32.7	32.0	33.1	3.18	1.03
The Governor of the Vologda Oblast	19.9	31.1	29.5	24.4	32.1	36.1	33.8	32.6	1.64	0.96

What party expresses your interests?

Party	8 mnth. 2008	Apr. 2011	June 2011	Aug. 2011	Oct. 2011	Dec. 2011	Feb. 2012	Apr. 2012	Dynamics indices, Apr. 2012 to 8 months 2008	Dynamics indices, Apr. 2012 to Feb. 2012
United Russia	40.5	35.9	34.0	33.7	29.8	26.1	26.0	28.3	0.70	1.09
KPRF	6.8	9.7	8.2	10.0	12.1	13.4	10.1	11.4	1.68	1.13
LDPR	7.7	7.5	6.9	7.5	9.1	9.2	9.1	9.5	1.23	1.04
A Just Russia	5.0	3.2	5.7	2.7	5.6	13.9	10.2	8.2	1.64	0.80
Other	1.4	1.7	1.1	2.4	3.1	4.6	3.1	3.2	2.29	1.03
No party	20.1	28.8	30.4	28.9	28.1	23.9	25.7	28.6	1.42	1.11
It's difficult to answer	13.7	13.1	13.7	14.8	12.2	9.0	15.8	10.8	0.79	0.68

* The polls are held six times a year in Vologda, Cherepovets, and in eight districts of the region (Babayevsky District, Velikoustyugsky District, Vozhegodsky District, Gryazovetsky District, Kirillovsky District, Nikolsky District, Tarnogsky District, Sheksninsky District). The method of the survey is a questionnaire poll by place of residence of respondents. The volume of a sample population is 1500 people aged from 18 and older. The sample is purposeful and quoted. Representativeness of the sample is ensured by the observance of the proportions between the urban and rural populations, the proportions between the inhabitants of settlements of various types (rural communities, small and medium-sized city), age and sex structure of the adult population of the region. Sampling error does not exceed 3%.

The results of the ISEDT RAS polls are available at www.vscc.ac.ru

Estimation of social condition

In % to the total number of respondents								Dynamics indices, Apr. 2012 to 8 months 2008		Dynamics indices, Apr. 2012 to Feb. 2012	
8 mnth 2008	Apr. 2011	June 2011	Aug.2011	Oct. 2011	Dec. 2011	Feb. 2012	Apr. 2012				
What would you say about your mood in the last days?											
Usual condition, good mood											
70.2	64.0	64.5	66.7	64.7	64.2	62.9	63.4	**0.90**			**1.01**
Feeling stress, anger, fear, depression											
22.1	28.1	29.4	24.1	29.4	30.2	33.5	30.2		**1.37**	**0.90**	
What statement, in your opinion, suits the current occasion best of all?											
Everything is not so bad; it's difficult to live, but it's possible to stand it											
81.0	76.1	78.0	73.2	73.9	78.6	74.9	76.5	**0.94**			**1.02**
It's impossible to bear such plight											
10.9	16.1	15.9	11.3	15.8	14.1	18.1	16.8		**1.54**	**0.93**	
Consumer Sentiment Index											
107.5	90.1	86.1	92.9	88.5	85.6	89.8	90.1	**0.84**			**1.00**
What category do you belong to?											
The share of people who consider themselves to be poor and beggars											
39.8	46.8	43.9	40.8	44.6	41.9	43.2	43.6		**1.10**		**1.01**
The share of people who consider themselves to have average income											
50.7	42.4	46.1	46.2	41.8	42.2	44.9	46.5	**0.92**			**1.04**

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As in the previous issue, in this one we publish the journal articles rating.

The first ten articles according to the frequency of their viewing for the recent 12 months (June 2011 – May 2012)

Rating	Article	Total time of reading, minutes for the recent 12 months	Total time of reading, minutes for the whole period*	Number of views for the whole period	Number of views for the recent 12 months	Number of views for the recent 3 months	Average time of viewing (minutes) for the whole accounting period*	Issue	Release date	Authors
1	Modernization of the russian economy as the imperative of the country's prospective innovative development	4927	4927	174	174	126	28	No.16	August 2011	Kondakov Igor Anatolyevich
2	Fiscal federalism and inter-budget relations in the Russian Federation	1921	2491	180	137	59	14	No.13	March 2011	Avetisyan Ishkhan Artashovich
3	Threats to the region's economic security and the ways to overcome them	1907	2458	130	94	28	19	No.14	April 2011	Uskova Tamara Vitalyevna Kondakov Igor Anatolyevich
4	Methodology of the comparative estimation of the scientific and technical potential of the region	1301	2900	162	77	22	18	No.12	December 2010	Zadumkin Konstantin Alekseyevich Kondakov Igor Anatolyevich
5	The post-crisis economic development and prospects of innovation activity in the Tomsk Oblast	1170	1170	40	40	29	29	No.15	June 2011	Myakota Ekaterina Aleksandrovna Vorobyov Aleksandr Grigoryevich Putilov Aleksandr Valentinovich Zhiganov Aleksandr Nikolayevich
6	Agriculture on the European North: All-Russian agricultural census results	1035	2032	131	80	26	16	No.11	September 2010	Ivanov Valentin Aleksandrovich Ivanova Elena Valentinovna
7	Intellectual resources as the factor of the innovational development	759	3153	161	49	16	20	No.11	September 2010	Ilyin Vladimir Aleksandrovich Gulin Konstantin Anatolyevich Uskova Tamara Vitalyevna
8	Demographic problems of the Republic of Belarus and their solutions	701	701	49	49	26	14	No.16	August 2011	Shakhotko Lyudmila Petrovna
9	Migratory processes as mirrored by the transformations: border regions in Russia	621	768	32	22	12	24	No.14	April 2011	Mikhel Egor Aleksandrovich Krutova Oksana Sergeyevna
10	Foreign economic activity of the NWFD regions and the Republic of Belarus: conditions and methodological aspects of modelling	594	938	59	27	6	16	No.12	December 2010	Uskova Tamara Vitalyevna Asanovich Valeriy Yakovlevich Dedkov Sergey Maratovich Selimenkov Roman Yuryevich

* Account of the site's viewing has been carried out since 2009, December, 12.

Collapse of the global pyramid

Sergey Yu. GLAZYEV
Academician of RAS, the Director of D.S. Lvov Institute of the New Economy of the State University of Management
glazievs@mail.ru

Aleksandr NAGORNY. Mr. Glazyev, not long ago, the international economic forum was held in Astana, where the recommendations to the upcoming Mexico G20 summit worked out under your supervision were acknowledged as the best. Could you tell us about the advantages of these recommendations as compared to other approaches already known.

Sergey GLAZYEV. The main advantage of the recommendations worked out by our team (S. Bayzakov, M. Yershov, D. Mityayev, G. Fetisov and myself) is their systemic character. In our study, the issue of transition from today's recessionary and unstable state of global economy to its sustainable development is considered in the unity of macroeconomic, technological and institutional aspects, taking into account the interrelations between different areas of regulation and patterns of the long-term economic development. In this respect, the ongoing global economic crisis is viewed as resulting from the combination of several factors: monetary and financial imbalance, misalignments in financial markets and institutions, large-scale technological shifts, structural disparities. Thus, overcoming the crisis and beginning the new wave of sustainable economic growth is possible if the following measures: financial stabilization, improving the efficiency of financial market, banking, financial and investment institutions regulation, encouraging the development of the new technological wave and progressive structural changes, formation of new institutions — are implemented simultaneously.

At the same time, the basic causes of the global crisis should be eliminated and the following of them are most important:

➤ uncontrolled emission of global reserve currencies by some world community members, which leads to the issuers' abuse of their monopolistic position by increasing disparities and destructive trends in the global financial and economic system;

➤ inability of existing mechanisms, regulating the banking and financial institutions' activities, to ensure protection against excessive risks and emergence of financial bubbles;

➤ reaching the limit of the dominating technological mode development and the lack of prerequisites for establishing the new one, including the shortage of investments for large-scale introduction of fundamental technologies that form its basis.

Our proposals to reform the global monetary-financial system are linked to the tasks of structural transformation of an economy on the basis of a new technological mode and attraction of the necessary long-term and solid investments. This approach provides a profound insight into the roots of the global financial crisis, explains the modern economy reproduction mechanism, and allows to develop the complex of measures aimed at creating the necessary conditions for its sustainable development.

A.N. As far as I understand, broadening the context of crisis bailout measures corresponds with the tendency observed at the G20 summits. The subject of "green growth" will become the key issue at the Mexico session. Can this fact be interpreted as the desire of Washington to divert G20 from discussing the reform of the global currency and financial system, an issue which is a sore point for the U.S.?

S.G. It might be, though, in our proposals it is a top priority issue. A broader context of its consideration is needed for creating scenarios of future development.

Overcoming the crisis turbulence and entering the path of sustainable development requires large-scale investments into the new technological mode productions development and modernization of the economy on its basis. When the capital, remaining after the collapse of financial bubbles, flows into the development of new technological patterns, the economy will experience an upswing, and the current volatile situation will change for sustainable economic growth on the basis of a new technological mode.

At the same time, it is essential to understand that that this process will affect different countries in different ways. The issuers of the world's reserve currencies tend to restrain the rest countries from attempts to change the existing system of international monetary and financial relations, allowing the former to finance their balance of payments and state budget deficit at the expense of the latter, and also to dominate the world capital market. This inequality of the international monetary and financial exchange enables the world currency issuers to overcome the crisis by the appropriation of other countries' resources and assets.

A.N. That's exactly what I mean. If at the first G20 meetings the questions concerning the necessity of cardinal reform of the global monetary and financial system were raised, and the speeches of our leaders were of radical nature, at present, peaceful mood prevails there. They speak no more about the inequality of international monetary and financial exchange, injustice of the existing system, necessity of its restructuring on fundamentally different principles…

S.G. This is exactly what was discussed at the Astana forum. Our proposals are aimed at creating stable conditions for the global financial market functioning and investment movements, international monetary and financial exchange on a mutually beneficial basis, development of international industrial cooperation, world trade in goods and technologies.

These conditions should enable national monetary authorities to organize loan services for the development of new technological mode productions and modernization of the economy on its basis, the promotion of innovative and business activity in the promising areas of economic growth. In order to achieve this goal, the issuers of the world's reserve currencies should guarantee their stability by maintaining certain restrictions concerning the amount of public debt and the deficit of payment and trade balances.

Besides, they should observe the appropriate requirements of providing the transparency of their mechanisms ensuring the issue of their currency, granting the opportunity of their easy exchange for all the assets traded on their territory, including new technologies, as well as providing the national regime of refinancing to foreign non-government banks, complying with the criteria of reliability and transparency. Observance of the rules of fair competition and non-discriminatory access to their financial markets should become an important requirement for the issuers of the world's reserve currencies. At the same time, the rest of the countries bound by the similar restrictions should be granted the opportunities of using their national currencies as a tool of foreign trade and monetary exchange including their use as reserve currencies by other partner countries.

A.N. But these issues are not included into the G20 present agenda…

S.G. So, it means they should be, as they remain unsettled. The U.S., EU and Japan that emit world currencies have imposed on the other G20 members the mutual obligations aimed at abandoning protectionist measures and maintaining the open foreign economic regime, all this is necessary for preserving the existing system. All G20 statements declare protectionism to be unacceptable and contain the idea of ensuring freedom of action of market forces in the international currency, capital and commodity markets. The talks about the unequal impact of these forces and

unjust distribution of outcoming profit and losses have almost stopped. Though, in these circumstances, our economy annually loses tens of billions of dollars due to the illegal outflow of capital, and suffers even greater losses from legalized financial speculations. The talks on reforming international financial institutions, without which we can't make progress in changing the global financial architecture, have also receded into the background.

A.N. Even those cosmetic measures aimed at minor changes of the national shares in the International Monetary Fund and the World Bank, that Washington accepted, are postponed to the mid-decade. What are your proposals in this area?

S.G. It is essential to carry out a profound reform of international financial institutions including IMF, the World Bank, and the Basel Committee in order to ensure equitable representation of the member states according to the objective criterion based on a number of characteristics like a country's share in global production, trade, finances, environmental assets and population. The same criterion can be used to form a currency basket for creating SDR, in relation to which the rates of all national currencies including global reserve ones can be determined. At the initial stage, this basket can comprise the currencies of those G20 states which will agree to comply with the above-mentioned requirements. The reform of the international financial institutions on the principles of fair representation and consensus-based decision-making by the countries willing to promote the implementation of the global monetary-financial system alteration projects will give these institutions a number of powers on fulfilling the supranational functions of a global regulator. In particular, IMF could be entrusted with the following functions: monitoring of complying with the requirements to the issuers of world currencies and their attribution to a certain category, establishing standards of financial risks assessment and activity of world rating agencies and audit companies.

A.N. Is it possible in the framework of the existing system of international law? In fact, what you propose is the creation of supranational global regulators. Will the sovereign states agree to compromise on their national sovereignty in this area?

S.G. Objectively speaking, they have already agreed by recognizing a number of foreign currencies as reserve ones and take them into account while issuing their own money in accordance with the foreign agencies' ratings and foreign audit companies' estimates. The problem is that the functions of global regulators and emission centres have been de-facto appropriated by private entities controlled by the international financial oligarchy and regulated by the national law of the United States.

After deciding to open our economy a couple of decades ago, we became a part of the global market which is regulated in the private interests of large international capital on the basis of foreign legal norms upon which we have no influence at all. We function as the U.S. and, partly, the EU donor by providing them with cheap capital and raw materials in exchange for the currencies emitted by these states in the conditions of increasing inflation. We are forced to dance their dance, and this role is completely unprofitable for us as well as for other countries which are not members of the Freely Convertible Currency club.

Due to this non-equivalent exchange, we annually lose 20 up to 100 billion dollars, transferring abroad more than a trillion dollars of the capital after the collapse of the Soviet Union. At the same time, leading Western countries that gain multi-billion dollar profit from the emission of world currencies (e.g. the European Central Bank has printed twice as much money as Russia received from oil export for the period of 10 years) are limiting access to their own markets of assets, technology and labour, introducing more and more restrictions.

We suggest linking the right to emit the world trade and reserve currencies with observing the issuers' obligations to ensure the transparency of their commodity, services, labour and capital markets, free regime of technology and capital transfer. In order to increase the reserve currencies issuers' responsibility, the rest G20 issuers should be given the right to carry out currency swap transactions with them. This will allow the issuers of the rest of the currencies to gain access to the necessary volume of "cheap liquidity", aligning the cost of capital and eliminating the negative impact of the credit dumping on the part of the issuers, who retained negative real interest rates for a long time.

The implementation of such large-scale reforms requires an appropriate legal and institutional support. This can be done if the G20 decisions will be given the status of international obligations of the countries interested in their implementing, as well as the support from the UN institutions and other international organizations. Simultaneously, the new opportunities for stabilization of the world monetary-financial system and solution of global problems will open up. In particular, in order to reduce turbulence in the global financial market, it is expedient to impose restrictions on financial transactions with offshore companies, as well as the tax on foreign exchange transactions and financial speculation. The tax revenues could be allocated for solving problems of poverty and illiteracy, preventing epidemics of socially dangerous diseases, overcoming the consequences of natural and technological disasters. In the context of structural reorganization of global economy on the basis of the new technological mode, of special importance for the employment is the creation of international education network source consisting of the world leading universities for the purpose of educating the citizens from developing and underdeveloped countries as well as implementing the programs of retraining the unemployed in developed countries.

A.N. Washington will hardly agree to this…

S.G. Then we will have to be prepared for a scenario of the global financial system's self-destruction. Today, the U.S., EU and Japanese financial authorities choose the simplest way of handling the insolvency problem (accumulated public and private debts) by pumping cash liquidity. Thus, the balance of the U.S. Federal Reserve System, have almost tripled since 2008, the balance of the European Central Bank has grown more than 2.5-fold, the balance of the Bank of Japan almost doubled over the past two years only. Consequently, the exponential growth of the financial pyramid of the G7 public debt is maintained, masking their inability to solve the structural problems (including the urgent technological restructuring of the economy). This policy is accompanied by the export of inflation to the rest of the world which is expressed in a sharp rise in prices on energy carriers, raw materials and foodstuffs, in the preservation and growth of the global disproportions of payment and trade balances.

Due to a policy of constant delay of the global financial system reform and its infinite "restoration" according to the old rules, a consistent increase of the system-wide risk is taking place, which can be measured in the ratio of off-balance sheet liabilities of the largest, first of all, American banks to the size of their balance sheets, that increased from 30-fold up to 50-fold as compared to the beginning of the crisis.

Consequently, the strategic instability (latent system-wide risks) of the global financial system is just increasing, a number of the leading state financial systems (USA, Japan, PIIGS countries in Europe) function mainly at the expense of emission. In fact, the issuers of the world's reserve currencies act according to the "pyramidal" principle of increasing public debt, which dooms the whole global financial system as well as national systems of state finances, social, medical and pension provision of the developed countries to self-destruction already in the foreseeable future.

A.N. Do you think that the measures that you propose will be sufficient for the stabilization of the global financial and economic system?

S.G. So far we were talking only about the monetary policy of the world currencies issuers. Our proposals also include measures of global and national financial regulation that have countercyclical features. The main condition of stabilization is the limitation of financial leverage. In the present two-sector financial and economic system, only the banking sector is regulated by the state. Other business entities may have a leverage amounting to a few hundred (the problem of "shadow financial system"). In these circumstances, debts are increasing immensely. What we need is the elaboration of uniform principles of financial accounting (on the basis of International Financial Reporting Standards and Basel) and auditing for all participants of economic activity and not only for banks; to fulfill this task it is necessary to adopt the appropriate G20 recommendations for national regulators. Currency risks should also be reduced — like banks, all economic entities should commit themselves to maintaining an open currency position and limit it on a percentage basis to the amount of equity capital.

An important part of our proposals concerns the national macroeconomic policy. They should have a system of safety mechanisms ("moderators") for financial transactions and movement of capital flows, in case of the necessity to protect the monetary and financial systems against speculative attacks and suppress the related turbulence. In particular, a) reservation institute for currency transactions of capital flows; b) income tax on the sales of assets by non-residents, the rate of which depends on the asset ownership period; c) the above mentioned Tobin tax (on transactions with foreign currencies) can serve as such "moderators". The rates (ratios) of all these instruments can be temporarily reduced to a minimum in a favourable situation, and raised in case of increasing

financial turbulence, in order to slow down the capital inflow (or outflow). Central banks should be assigned the task of promoting economic growth and employment, which can be achieved by using modern mechanisms aimed at refinancing the requirements for the development of national economies.

A.N. Although your proposals sound most convincingly, I still can't imagine that the U.S. oligarchy will accept them. What can you suggest in this case?

S.G. We suggest a comprehensive expansion and deepening of the regional integration structures that could become supportive pillars of foreign economic exchange in case of self-destruction of the global monetary-financial system. We speak, first of all, about expanding the sphere of national currencies usage in mutual trade and development of regional financial institutions.

Actually, the most far-sighted countries have already entered this path and create their own "islands of stability". Recently, Japan and China declared their switching to transactions in national currencies. In recent years, the latter has established a large-scale international network of transactions effected in yuan through currency swaps. We successfully completed the formation of the Customs Union of Russia, Belarus and Kazakhstan, now we are creating the single economic space within the Eurasian Economic Community and moving towards establishing the Eurasian Economic Union. There has been a speed up in regional economic integration processes in South America – within the framework of MERCOSUR the plans for transition to the economic and monetary union are being discussed.

These are the right steps that we should undertake in any case. Even if we consolidate our efforts and manage to avoid the collapse of existing American-centric monetary-financial system, it will inevitably evolve in the direction of a more balanced and fair multi-currency system regulated on the basis of international law. This will cause competition among various international and intergovernmental emission centres for a share in world seigniorage. In this connection, we possess serious competitive advantages: low debt, substantial foreign exchange reserves, significant production, natural resources, scientific-technical and intellectual potential. They can be considerably increased with the formation of the common position of BRICS states and the global financial-economic system reorganisation in the common interest, on the basis of efficiency and justice.

Development of the economic space of Russia's regions on the basis of cluster principles

Aleksandr I. TATARKIN

RAS Academician, Director of the Institute of Economics of the Ural Branch of RAS
tatarkin_ai@mail.ru

Nowadays, when most part of the world's livable surface has been developed, the economic space of the Russian Federation is becoming the factor that can, on the one hand, play a profoundly positive role in Russia's socio-economic development, on the other hand, it can be deeply negative, if used formally or in no way at all.

That is why it is considered necessary to state, that scientifically grounded management of economic space, including the understanding of what economic space is, the constant analysis of its development trends, a comprehensive study of the theoretical, methodological and methodical aspects of its controlled development, is not only becoming an acute issue in Russia, but also acquires increasing geopolitical importance.

At present it is possible to point out a few trends in the development of the Russian Federation economic space: 1) a distinct process of its narrowing is taking place; 2) the level of economic space centralization is increasing; 3) the economic space disintegration and fragmentation is increasing, and it should be noted, that the factor, hampering the unity of Russia's spatial development, is the backward transport infrastructure; 4) the spatial development management of the country's economy lacks consistency, etc.

The trends stated above, as well as the analysis of the Russian Federation main strategic documents indicate that a powerful spatial factor has not become the decisive factor for our country concerning its economic growth, socio-economic development and modernization of the society.

The underestimation of this fact may cause large-scale economic losses whereas it could be turned into a unique competitive advantage of Russia on the world arena.

In our opinion, the solution of this problem lies in the formation and application of **a systematic approach to economic space management.** This approach has been successfully developed and implemented on the basis of long-term researches of scientists from the Institute of Economics of the Ural Branch of RAS, the Institute of Economics and Industrial Engineering of the Siberian Branch of RAS, The Economic Research Institute of the Far Eastern Branch of RAS, the Council for the Study of Productive Forces of RAS, the Institute of Systems Analysis of RAS and other regional institutions.

The systemic transformation of the economic space is based on the theory of polycentrism, which states the necessity of transforming the centralized economic space into the polycentric network.

Therefore, the essence of the new model of the Russian economy's spatial development and management consists, on the one hand, in the creation of a framework of regional (republican, oblast, krai, district) and local (city, neighbourhood) centres of economic growth concentration. These centres should be capable of creating and transferring the innovative impulses of economic development to the neighbouring subjects.

On the other hand, this model includes systemic management of these processes with the support from market-based institutions that make it possible for remote and outlying districts and territories to embark on the course of accelerated development. The main directions of systemic moder-nization in the economic space management are as follows:

• creation of the polycentric spatial structure of the Russian economy by supporting the processes of urban agglomerations formation and development throughout the country;

• in addition to differentiation and maintenance of the centres, it is necessary to search for new territorial sources of competitiveness increase (remote, suburban and rural areas);

• driving force of the Russian economy and society should be based on the processes of self-development and autonomous management of all levels of regional and territorial social-economic systems;

• human-oriented paradigm of institutional development aimed at speeding up the entire range of investments in the human potential development, mainly, its innovative components, should be the cornerstone of a new regional policy;

• creation of new forms of economy's spatial organization through the establishment of business-territories within the borders of a region and/or municipalities as one of the real institutions of territorial-production self-development;

• creation, introduction and improvement of various development institutions, related to the state's direct action (Fund for reforming housing and communal services, etc.); to the innovative territorial development stimulation (Special Economic Zones (SEZ), innograds (innovation centres), etc.); to the change in regional planning and management technology; to the promotion of horizontal interaction between business, authorities, scientific and educational community, also through the cluster forms of business development, public-private partnership (PPP), etc.;

• spatial development management should face the transition to a programme-project approach as it is the market institution of Federal and territorial development that meets the present-day requirements of globalizing economy.

The implementation of these trends is connected with the necessity to create the following conditions on the Federal level:

1. Today the largest cities play the leading role in the investment, innovative, social processes, and their development strategy mainly determines the growth rate of the country's economy. The mechanisms of the region's potential effective usage and conditions for economic growth can be formed at the level of the largest municipalities that bear full responsibility for the territorial socio-economic problems solution.

Active *inter-municipal cooperation* as a form of urban agglomerations development management is essential for the development of *urban agglomerations* as established systems of inter-related human settlements.

The situation in this sphere still requires much attention and improvement. The present goal is to propose the model mechanisms of forming the urban agglomerations system regulation, after studying the most successful domestic and foreign practices.

In general, the steps towards the formation of inter-municipal cooperation may be as follows:

1) at the first stage, the establishment of areas, territories (zones) of the common interests, connected by the balanced development of social, environmental, transport, information and other types of infrastructure;

2) development of mechanisms of economic, urban, etc. development, facilitating the formation of a single agglomerative space; adoption of coherent and economically grounded legal decisions;

3) accelerated development of transport and communication infrastructures, creation of common logistics centers, the introduction of affordable high-speed public transport which links the cores of agglomeration and satellite towns;

4) implementation of projects, aimed at the expansion of «bottlenecks» in the provision of agglomerations with resources: electricity, water, building materials, etc.

Choice of the agglomeration management model (contractual or one-/two-level management structure) objectively depends, on the one hand, on the regional authorities' political will, on the other hand — on the nature of inter-municipal cooperation in the region.

2. Besides the increased attention towards urban agglomerations in Russia, as new major centers of innovative development, it is necessary to stimulate *the development of territories that are capable of becoming the new centers of generating competitiveness:*

— *border territories* as representatives and translators of geopolitical interests of Russia;

— *remote territories and small towns* as the necessary participants of the cluster projects and solutions, created in large centers, which contributes to the transformation of these territories into the centers of economic development on the regional scale;

— *rural areas* as new centers of competitiveness emerging on the basis of a diversified economy.

New opportunities concerning the use of renewable energy sources, the improvement of efficiency and fundamental change of technologies in agriculture contribute to the growth of competitiveness of these territories, as well as the cities.

The experience of European regional policy convincingly shows the importance of relations in the context of small and medium-sized towns, as well as the role of local centres in rural areas. The role of medium-sized towns lies in creating a link between large cities, small towns and remote rural areas; medium sized towns also play an important role in promoting integration, relations and economy due to their scale; besides, they curb the rural areas depopulation.

These territories in Russia may become a new source of competitiveness of the country, as important as big cities. The new regional policy should be aimed at the realization of these territories' potential and strengthening of their relation with the cities.

3. Today, the notion that **socially and economically motivated, professional and politically active human potential** is the decisive and the only active and future-oriented factor of successful implementation of the Russian Federation resource capacities has become an axiom. The qualitative characteristics of the population, its active innovation-oriented attitude can become the dominant factor determining the framework of the country's future development.

One of the most important problems concerning the sustainable development of the regional economy is a lack of and/or decrease in the efficiency of the motivation component of highly productive labour. This especially concerns the remote regions with large agricultural areas and the territories traditionally used by indigenous small-numbered peoples.

That is why in the framework of the updated regional policy, it is expedient to discuss the possibility of expanding its effect by **improving the motivation of labour activity** in such key areas as:

— formation of the standards of decent and productive labour in the regions and municipalities;

— development of the corporate culture of relations between the administration and employees, the population of cities and settlements;

— use of stimulating capacity of the social technologies that are implemented in the legal and economic framework on the basis of compliance with the principles of validity, justice and information awareness;

— enhancing the capacity of workers who are oriented towards the initiative and creative work.

4. Reliance on the processes of self-development and autonomous management of all levels of regional and territorial socio-economic systems requires defining the mechanisms and instruments of choice of the most effective territorial development priorities, as well as concerning the problematic territoties, aimed at improving their sustainable functioning on the basis of self-organization, self-repayment and self-government.

Unfortunately, existing macroeconomic conditions do not contribute to the self-development of territories. The last few years (from 1999) are characterized by rapid centralization of tax revenues in the Federal budget. This leads to a decrease in motivation aims for regional and municipal authorities to increase budget revenues by broadening the tax base and increasing the collection of its own taxes, hampers their initiative and entrepreneurship, creating dependency and irresponsibility. A rising share of non-repayable sources of the regions and municipalities' budget revenues becomes the ground for the preservation and develop-

ment of negative processes — dependency, abuse, administrative extortion from the population and business, etc.

In order to eliminate the negative processes, stimulate initiative and self-sufficiency, it is extremely necessary to liberalize the RF fiscal policy in favor of regions and municipal entities. The following should be done:

— revive the Soviet government attempt to expand the initiative of the regions and municipalities through the Institute of self-repayment and self-development;

— gradually improve the macroeconomic conditions (political, legislative, tax, budget, etc.) in order to encourage the regions and municipalities towards the initiative and effective work in the interests of their socio-economic development;

— carry out the specific policy aimed at strengthening and developing the regions and municipalities' material-technical base through the expansion of their powers of land disposal (for instance, formation of the regional and/or municipal market of land leases), property and resources management;

— improve the research intensity of socio-economic development management at all managerial levels;

— create a positive attitude of the population towards the initiatives of the Federal and regional authorities by means of:

• continuous scientific examination of administrative decisions and the possible consequences of their implementation;

• publicity of their discussion and consideration of public opinion while improving and implementing the management initiatives;

• establishing a constant dialogue with the society on the problems of RF, its regions and problem areas' social development.

5. One of the regional economic policy priorities, that had positive impact in developed countries, is the establishment of new forms of spatial organization of the economy through **the creation of business territories**

within the borders of the region and/or municipalities as one of the real institutions of territorial production self-development.

Typical examples of business territories, that have been tested and approved in the world and domestic practice and science, are technopolises, science and technology parks, special economic zones, industrial parks, transport and logistics centers, specialized logistic compounds, etc. Business territories can be formed in any place of a region or a municipality, if the appropriate objective and subjective conditions have been or are being created there. Given everything into account, *the business territory establishment is considered to be the most promising within the borders of a municipal unit (city, district) that can systematically and comprehensively develop the territorial potential* in the interests of its inhabitants and on self-repayment and self-development principles.

For single-industry towns, for example, the creation of business territories is the means of economy diversification and creation of new manufactures and services. For depressed regions and cities it is primarily the means of rebranding, changing the image, and attracting new companies and manufactures. Land (in the first place old industrial zones) redevelopment, associated with the comprehensive transformation of real estate objects, plays a great role in the establishment of business territories in these areas.

In the near future, redevelopment may become a very popular and relevant instrument of regional policy, since up to 85% of Russian cities grew around or on the basis of large industrial enterprises, the potential of which wasn't used in the conditions of a market economy, but which still possess enormous territorial and infrastructural resources. Redevelopment can level such a drawback of creating business territories "from scratch", as the significant financial costs, especially for the construction of necessary infrastructure and communications.

6. The state policy of economic space development and strengthening should be based on **the active use of market institutions of spatial development,** the most common of which are **clusters.** At present, clusters may become the driving force of the economy's innovative development, the centres of investment and intellectual resources concentration.

The practice of cluster projects implementation shows that their development is hampered by the lack of balanced regional cluster policy and lack of coordination in the exercising of powers in the certain tasks solution in this sphere. Absence of formalized industrial policy, both on the Federal and regional levels has a negative impact on the cluster initiatives realization.

A detailed analysis of 27 cluster initiatives showed, for example, that in the Sverdlovsk Oblast, and in other regions, there are no clusters, which possess all the features typical for this form of business self-organization. A relatively small part of clusters development projects are at the stage of practical implementation.

Thereby, the state authorities should create the conditions for clusters formation and development and promote on this basis the modernization and diversification of the economic structure of Russian regions.

The realization of these conditions is possible in the framework of the regional cluster policy tasks that emphasize:

➢ creation of favourable general organisational, informational and legal conditions for cluster development in a region;

➢ identification of clusters; assessment of clusters and directions of their development; formation of a cluster initiatives portfolio in a region; ranking of clusters according to their priority in a regional development;

➢ finding the initiator organisation or groups of leaders and promotion of their efforts aimed at cluster formation; institutionalization of the cluster initiative (elaboration of the cluster development concept and

programme, creation of the cluster development body); assistance in formation of the common spheres and competence centres of the cluster participants;

➢ support of already functioning (developing) clusters including: organizational and information assistance in the coordination of the cluster participants' efforts; support of infrastructure creation and development; promotion of personnel training and education; introduction of tax and other benefits for cluster participants.

The improvement of the RF Budget Code from the viewpoint of establishing a budget of development, which is aimed at promoting the innovative technologies implementation and development and management in the conditions of economy clusterization, can be considered as back-up measures on the federal level.

7. The regional policy implementation, territorial development and management of these processes should be based on the **programme-project approach,** as it is the institution of federal and territorial development which meets the present-day needs of the globalizing market economy.

The mechanism of the regional policy implementation is connected with defining its strategic priorities; therefore, there is an urgent need for the development and approval of *the concept (main directions) of the Russian Federation regional policy* as an integral part of the Strategy of the socio-economic development of the Russian Federation up to 2030.

Programmes covering the most comprehensive problems of regions development should be worked out on the basis of the regional policy strategic priorities (no more than 4-5). Achievement of specific goals should be based exclusively on the *programme-project approach*.

The relevance of the programme-project approach in market conditions is seen not only in innovative participation of the population in the strategic plans development and constant public control over the programme priorities implementation. This is its most important, but not the only, advantage.

The program-project approach allows, *on the one hand,* to combine in a single document the possibilities to use planning, administrative and market initiatives, the administrative resource and entrepreneurship, consistently meet the city (regional) needs through the integration of power, science, business and public opinion for the benefit of development.

On the other hand, it allows to distribute the programs and projects financing between the city (regional) budget, business and population, which not only significantly reduces the total costs and increases the effect from the business projects realization, but also reduces the load on the regional and Federal budgets.

Application of programme-project management methods allows for a well-grounded setting of the goals and optimal planning of innovative, investment and other regional and territorial spheres of activity, including the territories of the new economic development.

Project management provides the opportunity to consider project risks more profoundly, to optimize the use of available resources and to avoid conflict situations, to control the execution of the developed plan, to analyze actual performance indicators and to make timely adjustments in the course of works, to accumulate, analyze and use the experience of successfully implemented projects.

The use of project management of the territory facilitated the implementation of the result-oriented management model, which ensures the development and provides an opportunity to:

◆ *obtain measurable results* of each objective, service and activity realization;

◆ when setting a goal: to estimate *the number and quality of activities and services* that will be provided to the regional (territorial) population;

◆ *assess the influence of the budget change* (increase or decrease) on the change in the plan's indicators;

◆ obtain *socially important results* from the provision of specific services;

◆ evaluate the effectiveness of agencies and institutions' activity by analyzing their expenditures in relation to the obtained results;

◆ determine, for each goal of territorial socio-economic development, *the real value of its achievement, tools of its implementation and persons responsible for the execution.*

At the regional and municipal levels the project approach application requires the observance of two conditions.

Firstly, the projects should be built into the complex of strategic planning documents of the country and territories and be the logical continuation of the goals and objectives set by the strategic plan (strategy) of the development of the Russian Federation, its regions and municipal entities. In other words, these projects, in their essence, should become strategic projects, integrated into the logical chain of the overall Federal strategic management *(figure)*.

Secondly, within the framework of this approach, strategic projects are transformed into actual mechanisms (institutions) of the strategic developmental programs implementation not only for a municipality, but also for a region as a whole.

Their elaboration, as well as the elaboration of the documents from which they derive, is carried out on the basis of interaction between all participants of the territorial community:

Program-project approach implementation in the strategic management of spatial development
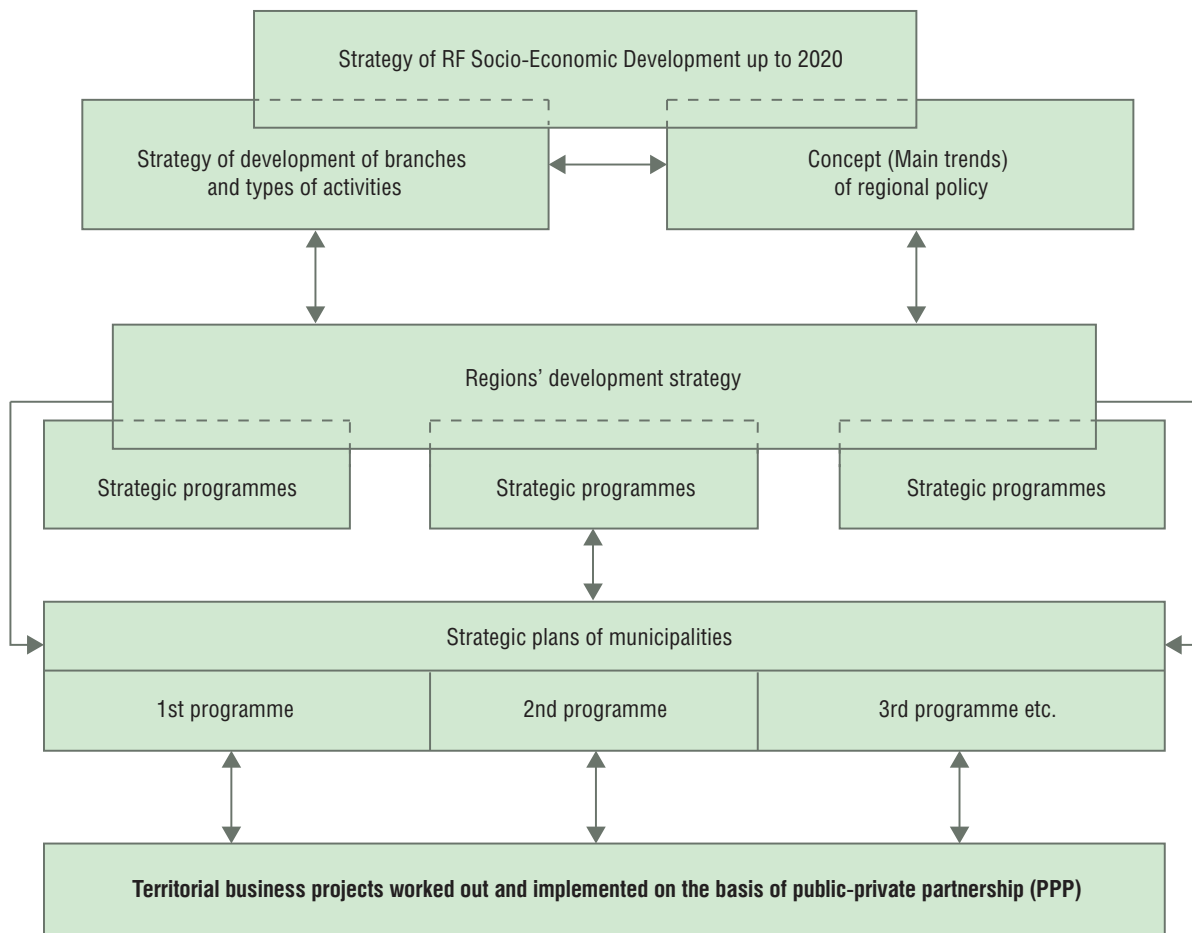
private business, bodies and authorities of all administrative levels, science, education, representatives of the public, experienced in the field of the project implementation. Business plans of the development of private business, including on the PPP principles, are becoming the basis for the strategic projects.

The proposed approach allows directing the projects towards the effective cooperation between all of the project designers; and their further refinement and adjustment can be carried out on the basis of the precise planning of specific activities, their funding sources for each of the participants.

Only in this case the spatial development of the Russian Federation through plans, programmes and projects is based on *the documents of the public consent,* and in their realization not only their initiators and participants are interested, but also all the population of municipalities, regions and the Russian Federation as a whole.

Due to a science-based spatial development management, the Russian Federation can become an economically powerful country thanks to the efforts of the Federal authorities, sustainable development of the regions and activity of the population.

The North and the Arctic in the new paradigm of global development: current problems

**Vladimir V.
DIDYK**
Ph.D. in Economics, Deputy Director on Science, the Institute of Economic Problems of Kola Science Centre of RAS
iep@iep.kolasc.net.ru

VI International Scientific and Practical Conference "The North and the Arctic in the new paradigm of global development. Luzin Readings – 2012" was held in Apatity, 12 – 14 April 2012.

The conferences within the scope of Luzin Readings have been regularly held on initiative of G.P. Luzin Institute of Economic Problems of Kola Science Centre of RAS (once every two years) since 2001. Traditionally, the co-organizers of the conference are Apatity branch of the Saint Petersburg State University of Engineering and Economics, the Government of the Murmansk Oblast and other organizations. This year the conference have been supported by the Nordic Centre for Spatial Development "Nordregio" (Sweden), the Murmansk State Technical University, the Russian Foundation for Humanities (RFH grant № 12-12-51500) and mining-and-processing integrated works JSC Kovdorskiy GOK.

The conference was attended by 152 people; they were the representatives of scientific and educational institutions, government bodies and enterprises. There were scientists from Finland, Norway and Sweden at the conference. According to the program of the conference, there was a plenary session where ten reports were presented.

Seven thematic sections worked in the following areas:

I.   Global processes and problems of the Arctic under the conditions of rising economic instability.

II.   Rational nature management economy and environmental protection.

III. Social development of the Northern and the Arctic regions: challenges and strategic priorities.

IV. Innovative development of the North economy.

V.   Regions and municipalities of Russia's North: trends, strategies and prospects of socio-economic development.

VI. Trends in public and corporate financial policy under the current economic conditions.

VII. Actual problems of the North through the eyes of young researchers.

"School for Young Researchers" was held in the scope of the seventh section. Russian and foreign scientists gave their lectures here; sixteen reports of young researchers were discussed.

The conferees noted in their plenary presentations and discussions at the thematic sections that in modern conditions the importance of the North and the Arctic as a zone of strategic interests of Russia and other Arctic states increases.

These interests are caused by the unique geopolitical, natural, resource and socio-economic potential of this macro-region. The factors of increased strategic importance of the Russian North and the Arctic are the intensification of globalization processes, sharpened battle for the Arctic resources and the need to embed Russia into a new geo-economic model of the world development as a full-fledged global player, who can make a significant contribution to the pioneering research, development and arrangement of the Arctic areas.

The strategic importance of the North and the Arctic zone of Russia puts the question of the need to organize all kinds of socio-economic activities in this area, including the development of human potential, effective management of natural resources, achieving maxi-mum environmental safety, development of transport, service industries and information service.

Natural conditions in the Arctic and subarctic regions of our country are so severe and the reserves of minerals and biological resources are so huge that it is necessary to have an extensive international cooperation with the mobilization of Russian scientific and technological potential and the establishment of the order protecting the legitimate interests of our country. It is reasonable to consider the experience of foreign countries in support to the regions of the North and the Arctic, including the use of tax credits and incentives for the enterprises operating in these areas.

The unique resources of hydrocarbons, that have been developed on the Arctic shelf recently, fundamentally alter the position, prospects and developmental trends of fuel and energy complex and all other sectors in the global economy. Therefore, it is necessary to reconsider the current priorities and form a new concept of efficient, environmental and socially attractive subsurface use in this region.

The "Principles of State Policy of the Russian Federation in the Arctic for the period till 2020 and beyond" adopted in September 2009 proved that the Government had recognized the growing strategic importance of the Arctic areas in our country's development. However, the implementation of some important statements of these Principles is delayed. Such basic documents as the laws on Russia's Arctic Zone and the Northern Sea Route, the Strategy for the Development of the Arctic Zone and the State Programme for the Social and Economic Development of Russia's Arctic Zone haven't been approved so far.

The system of effective functioning and using science, technology and innovation potential hasn't been practically formed. Nevertheless, they could become the essential prerequisites for the innovative industrial development of the North and Arctic regions in the medium and long term.

The institutional environment of the northern territories is not adapted to the challenges of a new economy. There is a lack of institutions that are necessary for the development of partnership relations between government, business and society. At the same time, the availability of these institutions is one of the main conditions for the sustainable spatial development of northern territories.

Inefficient management of resource and socio-economic development in the Russian North and Arctic areas are shown in the continuing growth of social problems, which include the reduction in quantitative and qualitative characteristics of human potential in most regions of the North, outflow of the most active working-age population, poor public health, high mortality rate, low standard and quality of life, significant reduction in the economic attractiveness of the North, lack of young professionals including specialists in innovations, discrepancy between the

social infrastructure of the North and modern standards, totality of specific northern problems relating to such exposed social groups as pensioners and indigenous peoples of the North.

The nonhomogeneous space of the Russian North is revealed in various differences (natural, economic, demographic, ethnic, cultural, etc.) not only at the regional level, but at the municipal level mostly. The current municipal policy, which is implemented by the federal authorities, leads to the predominance of centralization and management unification trends and strengthening of various forms of state control over the local authorities, without regard to the specific of municipalities. This doesn't contribute to the development of self-regulation, which is the basis of social stability and economic space.

Social problems of the regions and municipalities of the North and the Arctic require a new developmental paradigm of the North, which should eliminate the colonial character of using northern territories and their resources. It is necessary to take the direction to make the North habitable and create favorable conditions for the population of the North and habitat conservancy.

The new person-oriented paradigm of development requires the responsible attitude of federal, regional and municipal authorities to social policy in the North and the Arctic. The high spontaneity degree of social transformations in Russia, which causes a lot of negative effects, raises the question of the need to harmonize the actions of the federal, regional and municipal authorities, business and civil society in order to achieve positive social results.

As a result of their work, VI International Scientific and Practical Conference adopted the Resolution on the ways that allow overcoming the identified negative trends and addressing the problems of socio-economic development of the North.

The conferees considered that the scientific community should take active part in carrying out researches and developing practice guidelines on their base in the following areas:

Forming a new northern policy of the state that is adequate to modern global challenges and national interests, taking into account the interests of the people, who live in the North and the Arctic area of Russia, and that includes a system of the following measures:

a) at the Federal level:

— *regulating the legislation of the North* and adopting a package of socially-oriented political, legal and strategic documents (first of all, the Law on Russia's Arctic Zone, the Law on the Northern Sea Route, the Strategy for the Development of Russia's Arctic Zone, the State Programme for the Social and Economic Development of Russia's North and Arctic Zone);

— *developing and implementing the tax and non-tax mechanisms* of equitable distribution of the northern natural resource rent, its redistribution in favour of the northern regions, indigenous ethnic groups and local communities;

— *ensuring the institutional harmonization* of the current distribution system of administrative authorities, their financial security resources and responsibility for their implementation;

— *implementing a subsidiarity principle in the inter-budgetary relations* that provides for the decentralization of financial flows and solves the problems of territorial development at the lowest level, where their implementation is possible and effective;

— *developing the mechanisms for promoting and realizing the social responsibility of business*, including large resource corporations, the development of various forms of public-private partnership;

— *addressing the problem of citizens' mobility*, who wish to leave the northern regions, including the aspects of housing; creating conditions for labour spatial mobility of young and middle aged people in the North;

— *developing innovation processes*, including technological and social innovations, large-scale support for diversification programmes of municipalities, especially the northern one-company towns;

— *creating the specific mechanisms of the northern state policy* concerning different types of local northern communities (cities, one-company towns, national villages, agro-trade villages); implementing the measures aimed at encouraging the self-development of northern regions and municipalities, at the support for local communities' initiatives and the development of civil society and social capital of the North;

— *supporting the development of social services* (health care, education, housing and communal services, physical culture and sports, etc.), development of social and transport infrastructure, implementation of special large-scale northern projects aimed at the rapid modernization of social infrastructure in the North and ensuring the standards for its accessibility and quality, which are comparable to the standards achieved in the developed regions of the foreign North;

b) measures at the regional and municipal levels aimed at:

— developing human potential in the northern regions: overcoming the trends of migration and natural population loss, increasing a level of public health and education in the North, including the training of professionals with northern specialization;

— *rise in the standard of living and economic attractiveness of the North*: increase in minimum salary up to the level that isn't lower than two values of the regional living cost; reducing the wage gap between the government sector and manufacturing industries; increase in business responsibility for ensuring northern guarantees and compensations (including the return of the relevant article in the legislation); providing the maximum employment of able-bodied population;

— *improving the economic status and the situation on the labour markets:* active diversification of northern economies, primarily, of one-company towns, on the base of small and medium-sized business development, including the service of state-financed resource sectors and industries, tourism (especially eco-tourism and ethno-tourism), agriculture; the development of science and education, including their specific directions for the North; reducing unemployment rate down to its natural level;

— *attracting and assigning of young professionals, including the specialists in innovations*: improving northern youth policy; material support to young families; social infrastructure development; improving comfort living environment; forming public-private partnership for the harmonization between supply and demand on regional labour markets; attracting employers to form training directions in professional education; promoting the participation of resource corporations to employ young specialists for innovation development of the North;

— modernization of social infrastructure in the North: ensuring its conformity to the highest standards and the specifics of the northern regions, new aims of some people, who live in the North and choose a settled way of life in the multigenerational family in the North, as well as to disabled population development; increasing the availability and quality of services; promoting social programmes that are implemented by corporations and aimed at the development of local communities; creating conditions for forming the new mechanisms of interaction between large companies and local communities in the development of social infrastructure;

— *creating conditions for population mobility in the North*: improving the efficiency of government programmes and developing regional and local (involving business, insurance companies) support mechanisms for disabled northerners, who want to leave the North, as well as the labour spatial mobility of young and middle aged population of the North;

— *increasing the involvement of municipalities in the process of strategic planning*, training of

municipal management employees; promoting self-development of the northern municipalities, supporting initiatives of local communities, developing civil society and social capital of local communities in the Russian North and the Arctic.

2. Implementing a complex of legal, organizational and economic measures within the scope of the national development strategy of the North and Arctic Russia that are aimed at the rational, ecologically balanced natural resource development, innovation development of macro-region's economy, including:

– intensifying industrial modernization, promoting the renewal of enterprise's fixed capital assets, developing and launching environmental and innovative resource-saving technologies;

– creating favorable institutional environment for establishing territorial and industrial clusters, small and medium-sized mining enterprises;

– improving the scientific and methodological support of the integrated use of mineral resources, strengthening the interdependence between research organizations and enterprises' needs;

– creating conditions for the rise in mining enterprises' competitiveness, increasing their investment in technological modernization that is based on the best technologies minimizing the negative impact on the environment;

– developing innovation infrastructure; promoting industrial parks, business incubators of innovation, research and consulting organizations, service and venture inculcation companies;

– establishing funds that finance innovation companies; increasing assignments for financing of research and educational organizations in the northern regions;

– encouraging more efficient use of renewable biological resources, in particular through the increased integration of ocean fishing organizations, fishing fleet renovation, development of innovative technologies of advanced processing of biological materials.

3. Implementing complex measures aimed at the elimination of the backlog in the country's development of the Arctic shelf and strengthening national positions in this strategic region, including:

– system analysis and preparing the development forecast for global markets of energy resources in order to work out the Strategies of the Arctic Oil and Gas Fields Development that takes into account the energy-saving programme, formed by the European Union, and intensify shale gas production in North America;

– working out the Strategy on the Development of the Arctic Shelf (up to 2030) taking into account the proposed disposal facilities in the petroleum sector and increasing the level of reserves no less than in 15 years;

– integrated assessment of innovation opportunities and economic conditions of the Arctic shelf and defining recoupment parameters of various courses of events on the world markets;

– creating a system of tax and legal support to the development of the Arctic shelf through the use of licensing mechanism and production sharing agreements; at the same time it is necessary to pay greater attention to the consideration of regional interests in mining;

– working out the Concept for the development of the Northern Sea Route as a basic element of oil and gas production and transportation , reflecting Northern Sea Route's transit opportunities in ensuring national priorities and national security.

The conferees ask the Government of the Russian Federation, the Federal Assembly of the Russian Federation, the Russian Academy of Sciences, administrations of the northern regions, business associations, trade unions and associations, civil society and experts to continue the dialogue on key issues of the development of the Russian North and the Arctic within preparing for 54 European Congress of the International Regional Science Association in St. Petersburg in 2014.

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Regional budget of 2012 − 2014: stability is delayed

The article presents the new results of ongoing research carried out in ISEDT RAS on regional budgeting of the Vologda Oblast in the medium term[1]. Judging by the main budget parameters, the situation in the budget sphere will become aggravated in foreseeable future. According to forecasts, the deterioration of financial conditions of metal manufacture, the basic industry in the region, will not allow the regional budget to restore its pre-crisis level of revenues in 2012. They will be below the level of 2011. The reduction of federal financial support creates additional dangers for the regional budget burdened with debts. The public debt of the Vologda Oblast, which has reached a critical level, increases the risk of providing the investment with financial resources, which are necessary to modernize the regional economy. However, despite this dramatic situation, there are the reserves to ensure social security in the region.

Regional budget, revenues, expenditures, deficit, public debt, reserves for increase in revenue potential.

Anna I.
POVAROVA
Scientific Associate of ISEDT RAS
aip150663@yandex.ru

The Vologda Oblast, as most regions of the Russian Federation, has been planning the budget for three years since 2011. However, the transition to the medium-term budgetary planning has missed fire yet. The actual performance of the regional budget in 2011 was far from the scenary conditions. Certainly, the decline in own revenues and overall macroeconomic uncertainty had a bad influence on it. At the same time, the ignoring of the fundamental principles of budgeting, assigned by the Budget Code, has played an important part. For example, the principle of the unity of budgetary system involves a single procedure to calculate expected rates throughout the Russian Federation, ensuring their feasibility. In fact, there is no such consistency, so the regional budgets are formed on the basis of the current methodology irrelatively of the integral connection with the federal budget. It forces the regional authorities to adjust constantly the approved budgetary parameters. Thus, the Legislative Assembly of the Vologda Oblast introduced 11 amendments to the Law on the Budget and increased its revenue by 7.6 billion rubles in 2011. In this case the main factor of changes was the financial grant from the federal centre amounted to 10.6 billion rubles, which wasn't distributed at the time of regional budgeting. Own tax and nontax revenues were increased by only 1.1 billion rubles. Changes in regional budget revenues increased budget expenditures by 11.6 billion

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See: Povarova A.I. The three-year budget: should we wait for stability? Economical and social changes: facts, trends, forecast. 2011. No. 2 (14). P. 20-36.

rubles, which, in turn, entailed a double deficit. The public debt of the Vologda Oblast also did not meet the guidelines announced by the Government. It increased by 5.4 billion rubles *(tab. 1)*.

Of course, these amendments could not influence the 2012 Budget, as far as a part of the expenditure commitments adopted additionally in 2011 moved to the expenditures of the next budget cycle. Therefore, the main forecast parameters for 2012 prescribed in the Law on Budget for 2012 − 2014 differ significantly from the forecast parameters for 2011 − 2013 approved by the Legislative Assembly of the Vologda Oblast a year ago. In order to ensure the fulfillment of obligations at the level of 2011, it was necessary to increase the expenditure part of the regional budget by almost 9 billion rubles. As a result, there will be a budget deficit at the rate of 4.4 billion rubles instead of the expected budget surplus in 2012.

Thus, the development of medium-term budget projections at this stage can't increase the validity of the decisions taken in this area;

it's impossible to assess in detail their long-term effects. Probably, this prediction is just a way to sequence the funds in years based on the indexation of the trends for the previous years.

Macroeconomic forecasts in the medium-term perspective prove the fact that functioning of the budgetary system in the Russian Federation will take place in the difficult economic situation both in the world and in the country.

Public debt crisis in the U.S. and EU countries can lock down their governments to reduce budget deficits and, as a result, it can urge the global economy on to the next recession. The dependence of the Russian economy on the global trends makes it vulnerable to banking, stock and raw shocks.

According to the forecast of the Ministry of Economic Development of the Russian Federation, the country's economic growth rates won't accelerate until 2015 *(tab. 2)*. Consequently, the amount of federal budget revenues will not reach a pre-crisis level that can increase the risks of the regional budget performance combined with a substantial deficit.

Table 1. Changes in the basic parameters of the regional budget of the Vologda Oblast in 2011 – 2012

Indicators	2011				2012			
	Law on Budget for 2011 – 2013	Assessment	Changes		Law on Budget for 2011 – 2013	Law on Budget for 2012 – 2014	Changes	
			bln. rub.	%			bln. rub.	%
Revenues	32.0	39.6	+7.6	23.8	34.2	36.0	+1.8	5.5
Tax and non-tax revenues	27.8	28.9	+1.1	4.0	30.7	31.1	+0.4	1.1
Grants	4.2	10.6	+6.4	252.4	3.4	5.0	+1.6	45.0
Expenditures	36.0	47.6	+11.6	32.2	31.8	40.5	+8.7	27.2
Deficit (-), surplus (+)	-4.0	-8.1	+4.1	202.5	+2.3	-4.4		
Public debt	21.5	26.9	+5.4	25.1	17.3	28.7	+11.4	65.9

Table 2. The main macroeconomic measures of the Russian Federation

Measures	In fact			2011, assessment	Forecast		
	2008	2009	2010		2012	2013	2014
GDP, % to the previous year in comparable prices	105.2	92.2	104.0	104.2	103.5	104.2	104.6
Index of industrial production, %	100.6	90.7	108.2	105.4	103.6	104.0	104.2
Federal budget revenues in real terms, % to the level of 2008	100.0	72.7	75.6	88.1	85.7	89.4	92.1
Federal budgeted deficit, bln. rub.	0	2322.0	1812.0	719.1	1570.5	1744.3	1684.4
Sources: data of the Ministry of Economic Development of the Russian Federation; the Ministry of Finance of the Russian Federation.							

Having regard to the trends in the global and Russian economy, the Government of the Vologda Oblast proceeded from the minimization of expenditures and deficit in budgeting for 2012 and the planning period from 2013 till 2014. The parameters of the regional budget are calculated on the base of the conservative forecast of the key macroeconomic measures *(tab. 3)*.

The considerable economic growth is not expected in the Vologda Oblast as in the whole country. The GRP growth at current prices will be lower than it was in 2008 and in 2010. The significant improvement in industrial production isn't expected too.

There are three key factors limiting the development of regional economy in the period from 2012 till 2014:

1. Minimum growth rate of prices for ferrous metals amounting to 1.8 −10% in the export market and 0.5 − 10% in the internal market due to falling demand for steel, especially in the developed countries in Europe, the USA and China. The dependence of the regional budget of the Vologda Oblast on the metallurgical industry increases the potential financial risks and doesn't ensure the stability of the budget at the forming stage.

2. The rise in prices and tariffs of natural monopolies outpaces an inflation rate (there will be an annual increase in gas prices by 15%, prices for electricity by 10 − 13% and rail transport tariffs by 5 − 7% at the approximate growth rate of consumer price by 4 − 5%).

3. The high rate of insurance contributions to the off-budget funds is established at the rate of 30% (in comparison with the U.S. − 10%, Japan − 15%, Germany − 22%). According to the Department of Finance of the Vologda Oblast, the budget losses amounted to 800 million rubles because of increasing rates of insurance contributions in 2011.

Retail trade dynamics will acquire a steady increasing character and exceed the growth of gross regional product, which indicates the essential significance of consumer demand in the regional economy.

Actual population's incomes show the growth after their reduction in 2011, but in 2015 they will be comparable with the level of 2010 − 5% by an average growth by 12% per year in the pre-crisis period. That doesn't allow us to rely on the substantial increase in income tax.

Anticipating the consideration of the basic characteristics of the regional budget for a period from 2012 till 2014, we emphasize again

Table 3. The key macroeconomic measures for regional budget projecting
in the Vologda Oblast for the period from 2012 till 2014

Measures	In fact			2011, assessment	Forecast		
	2008	2009	2010		2012	2013	2014
Prices for ferrous metals							
- export, dollar/ t	806	409	556	750	764	780	858
- internal, thsd. rub./ t	17.6	15.6	20.7	23.5	23.6	24.5	26.9
GRP growth rates at current prices, %	21.2	-27.8	21.6	19.0	2.8	14.6	7.0
Industrial Production Index, %	95.8	87.5	108.5	106.0	103.0	104.0	104.5
Rate of increase in retail trade, %	36.3	-10.5	10.8	25.5	8.0	10.4	10.4
Profitable enterprises' income, billion rubles	99.5	37.7	43.8	53.0	42.1	68.3	72.1
Rate of increase, %	31.3	-62.1	16.2	21.0	-20.5	62.0	5.6
Rate of increase in remuneration of labor fund, %	24.5	-4.9	5.8	6.6	20.7	8.6	8.6
Actual population's cash incomes,%	98.7	89.9	105.0	100.0	102.0	104.7	105.0
Average wages, thsd. rub. per month	16.1	16.6	18.5	20.6	22.3	24.2	26.2
Russian Federation	*17.3*	*18.6*	*21.2*	*23.9*	*26.5*	*29.3*	*32.3*
Inflation, average rate per year, %	113.3	108.8	108.8	107.0	105.5	105.0	104.5

that the impact of the crisis on the economy and fiscal system of the Vologda Oblast is so deep that the recovery of its own revenue base and, first of all, its main component such as corporate income tax is much slower than it is in the regions of Russia *(tab. 4)*. This should be interpreted as an evidence of a lesser ability of mono-profile economy to resist the pressure of crisis factors.

According to the results of 11 months of 2011, the Vologda Oblast is among nine subjects of the Russian Federation that have the budget deficit. The region ranks third after the Republics of Mordovia and Khakassia by the level of deficit equal to almost 10% of the total own revenues. Deficient regions of the North-West Federal District include the Arkhangelsk Oblast along with the Vologda Oblast, but the level of budget deficit is much lower in the Arkhangelsk Oblast. It is only 0.7% there.

The main parameters of a new three-year budget prove that it will be impossible to enter the path of the pre-crisis level of aggregate and own revenues in 2012 *(tab. 5)*.

Tax payments will remain the key catalysts for the regional budget revenues over the next three years, but the structural changes of the tax base will not happen. Two-thirds of tax revenues will be provided through corporate and individual income taxes, as in previous years. Crisis decline in profits and, accordingly, income tax revenues will not be recovered in 2012 − 2014. Even in 2014, corporate income tax revenues will be significantly lower in comparison with 2008 *(fig. 1)*.

According to the forecast of the regional government, large and medium-sized profitable enterprises' income will be reduced by 11 billion rubles in 2012 related to its volume in 2011. However, planning profit with the decrease by 20.5% seems too pessimistic along with the expected growth of industrial production by 3% in 2012 and decrease in the rates of compulsory insurance premiums from 34 to 30%.

Of course, a number of parameters describing the results of industrial and financial activities of the main taxpayer in the Vologda Oblast − Cherepovets Metallurgical Plant of OJSC Severstal (CHMF), don't give grounds for the expectation of improvements soon. Thus, despite the increase in prices for steel, according to the results over 9 months of 2011, indus-

Table 4. The growth rates of own revenues in the regional budgets of the Federal Subjects of Russia, January – November, 2011 to January – November, 2010, %

Federal Subject	Tax and non-tax revenues	Enterprises' profit tax	Individual income tax
Russian Federation	120.0	130.3	111.0
North-West Federal District	114.5	118.9	110.8
Belgorod Oblast*	151.0	196.3	110.7
Lipetsk Oblast*	116.2	121.4	105.6
Chelyabinsk Oblast*	114.4	112.7	112.4
Vologda Oblast	111.5	112.9	110.2
* The regions specializing in the steel industry have been selected to be compared with the Vologda Oblast.			

Table 5. The main parameters of the regional budget of the Vologda Oblast, bln. rub.

Parameters	In fact			2011, assessment	Forecast		
	2008	2009	2010		2012	2013	2014
Total revenues	39.5	31.2	36.1	39,6	36.0	42.0	44.6
Including tax and non-tax revenues	34.4	19.0	25.8	28.9	31.1	39.1	41.9
Expenditures	39.1	37.7	43.1	47.6	40.5	37.2	39.6
Deficit (-), surplus (+)	+0.4	-6.5	-7.0	-8,0	-4.4	+4.8	+5.0
in % to own revenues	+1.2	-34.1	-27.3	-27.7	-14.1	+12.3	+11.9

Figure 1. Profitable enterprises' income and income tax in 2008 – 2014, bln. rub.
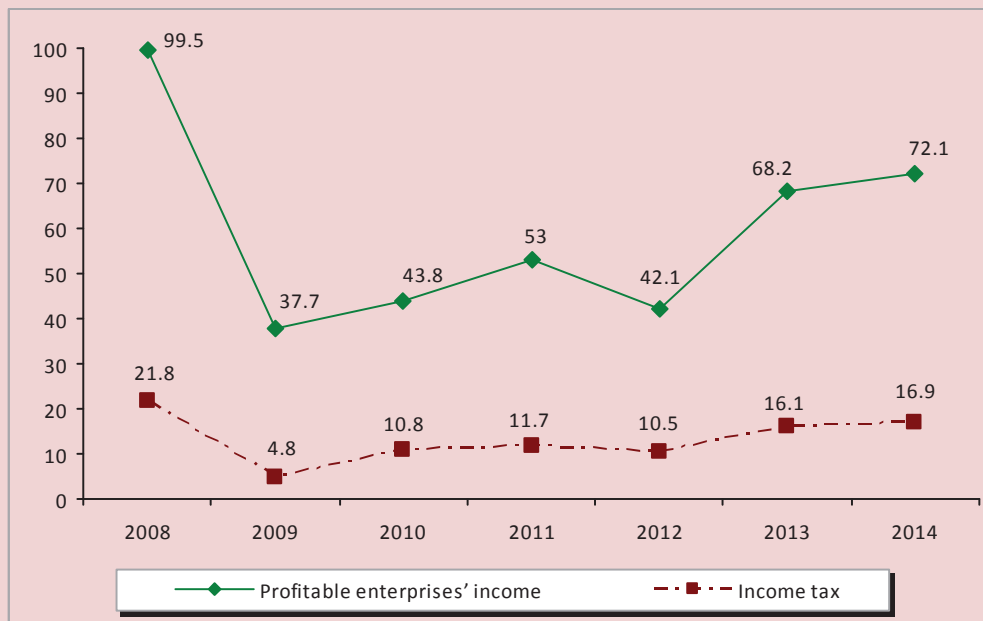
Table 6. The main operating rates of OJSC Cherepovets Metallurgical Plant over 9 months of 2011

Rates	9 months, 2010	9 months 2011	Changes, %
Prices for ferrous metals			
- export, dollar/ t	528	739	140,0
- internal, thsd. rub./ t	20.5	23.9	116.6
Industrial Production Index, %	115.3	108.9	-6.4 p.p.
Sales profit, bln. rub.	24.1	14.7	61.0
Profit (+), loss (-) of the difference in exchange, bln. rub.	1.6	-8.7	
Sources: data of the Economy Department of the Vologda Oblast; annual reports of OJSC Severstal for the period from 2010 till 2011.			

trial production index at the plant was 108.9% against 115.3% during the same period in the previous year. The profit was decreased by 1.6 times *(tab. 6)*.

The problems of the company are aggravated by a high debt, which is much higher than the debt of two other industrial counterparts of Cherepovets Metallurgical Plant – Novolipetsk Steel (NLMK) and Magnitogorsk Iron and Steel Works (MMK) *(fig. 2)*.

Financial performances of Cherepovets Metallurgical Plant are undermined by not only the growing debts, but also by the loss from their price rise. The fact of the matter is that the most part of corporate debt is nominated in foreign currency, so currency fluctuations have

a significant impact on taxable income. Until 2018 Cherepovets Metallurgical Plant will be burdened with debt of 180 billion rubles caused by the debt growth in 2008 – 2010.

Thus, the strained financial situation in Severstal cannot allow them to expect the rapid growth of income tax revenues to the regional budget as in the pre-crisis period. On the contrary, they will be halved in 2012. And if they had been compensated in 2009 – 2010 by loans, it would have been impossible to do it in a new budget cycle, because the debt of the Vologda Oblast is close to a critical value. The increase in income tax revenues is expected to be only in the branches of natural monopolies and large banks *(fig. 3)*.

Figure 2. Credit and loan debts of metallurgical enterprises on 01.10.2011, bln. rub.
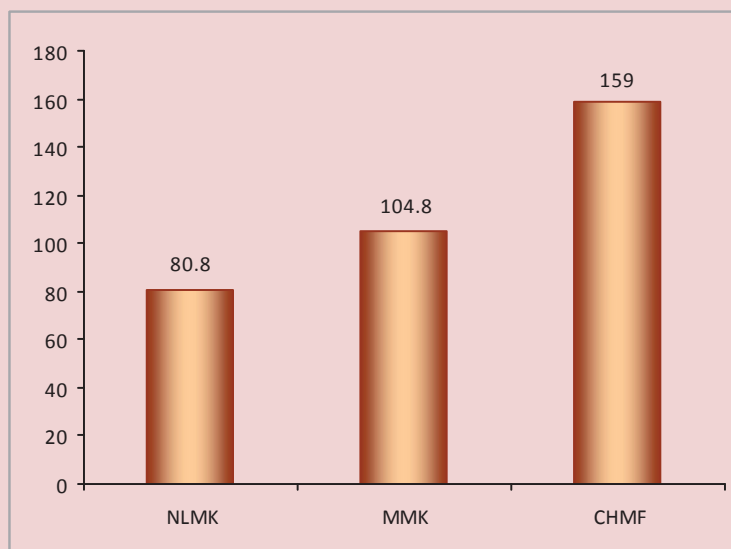
Figure 3. Enterprises' income tax revenues, bln. rub.

Cherepovets Metallurgical Plant of OJSC Severstal
Natural monopolies and banks branches
Local enterprises
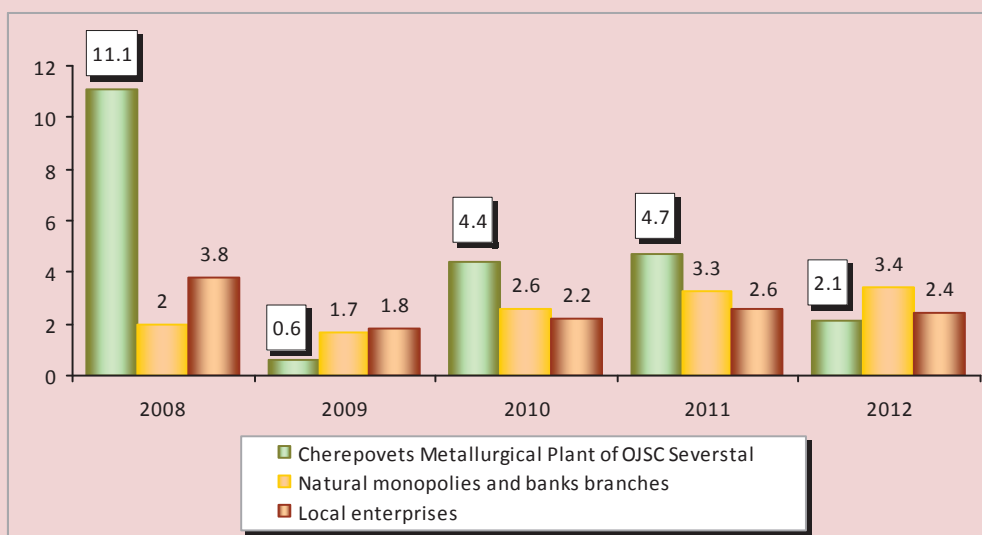
Despite the projected decline in tax revenues of the steel industry, the tax base of the regional budget in the planning period will continue to be linked to two major industries − steel and chemical *(fig. 4)*. Although their share in the formation of income tax will be reduced to 57.4% in 2012 versus 73.4% in 2008, it isn't caused by the increased diversification of the tax base, but it is linked to the projected slowdown in production[2].

Unfortunately, the forecast of the socio-economic development of the Vologda Oblast in the period from 2012 till 2014 contains no parameters, which can be used to assess the role of metallurgy and chemistry in the industrial production. However, the structure of the main income source of the budget seems to indicate that such main strategic objective of the region in the coming period as mono-structure economy overcoming will not be solved.

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[2] According to the forecast of the Government of the Vologda Oblast, a steel production index will be 101,5% in 2012; 102.5% in 2013; 103.5% in 2014 (109.8% in 2006; 104.7% in 2007); 105%, 104% and 103% in the chemical industry, respectively.

It should be noted that other regions specializing in the steel industry are going to improve the financial performances of their business entities and increase income tax revenues in 2012 *(tab. 7)*.

The new regional budget of the Vologda Oblast does not provide for the significant changes in the dynamics of individual income tax (IIT), which will generate nearly a third of the regional treasury's revenues *(fig. 5)*.

Table 7. Corporate income tax in 2008 – 2012, profit forecast in the regions
of the Russian Federation for 2012, bln. rub.

Region	Income tax, bln. rub.						Profit forecast (2012 to 2011, %)
	In fact				Forecast		
	2008	2009	2010	2011	2012	2012 to 2011, %	
Chelyabinsk Oblast	29.5	4.9	19.1	24.6	31.1	126.4	113.8
Belgorod Oblast	18.3	6.0	13.8	25.6	28.1	109.8	112.3
Lipetsk Oblast	15.8	4.7	9.5	10.8	10.8	100.0	105.0
Vologda Oblast	21.8	4.8	10.8	11.7	10.5	89.7	79.4

Figure 4. Industrial structure of income tax revenues to the regional budget
of the Vologda Oblast in 2008 – 2012, %
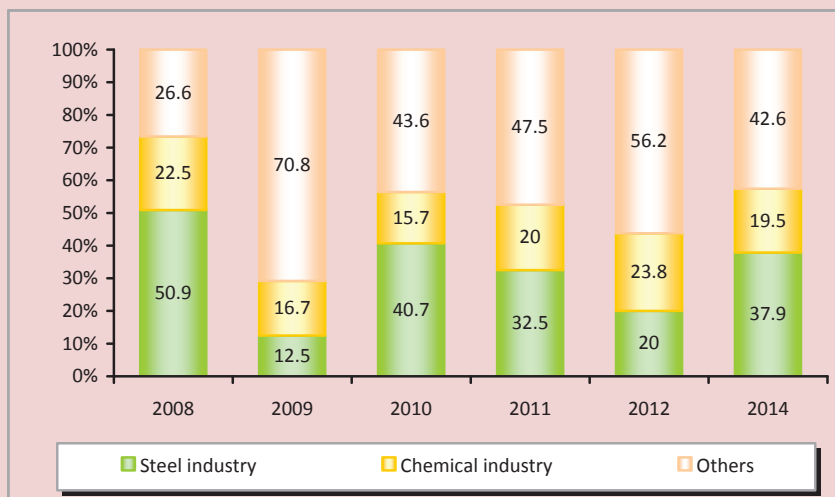
Figure 5. The dynamics of individual income tax revenues to the regional budget
of the Vologda Oblast in 2008 – 2014
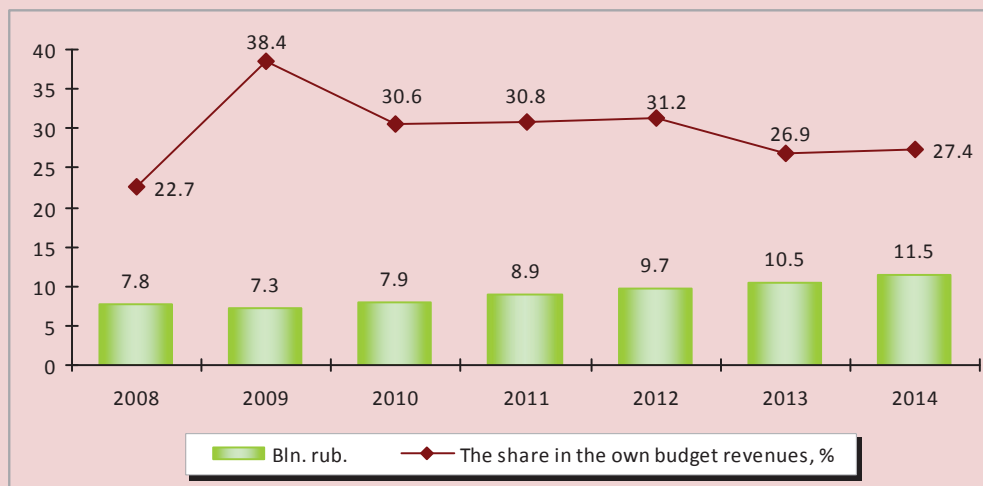
The low growth rates of individual income tax (less than 10% per year) should be linked to a progressive regional lag in terms of average wages. A gap between wage levels in the Vologda Oblast and in the whole country will increase to 6.1 thousand rubles in 2014 versus 1.2 thousand rubles in 2008 *(tab. 8)*.

The Law on the Regional Budget for the period from 2012 till 2014 reflects the proposals by the researchers from the ISEDT RAS on the revision of regional stimulating tax policy. Even in the crisis the Government of the Vologda Oblast, on the basis of the approaches and instruments applied previ-

ously, continued to grant property tax incentives, which amount was almost equivalent to the volume of these payments. Such policy was pro-cyclical. It created the preconditions for the current problems of the regional budget, which revenues had been declined. So, the regional authorities assumed the serious measures to abolish most of corporate property tax incentives in 2011. They kept those incentives only for farmers and investment program participants. The effect of tax preferences abolition is estimated in the additional annual property tax revenues amounted to about 2.2 billion rubles *(fig. 6)*.

Table 8. Dynamics of nominal average gross wages in 2008 – 2014, thousand rubles per an employee

Indicators	In fact			2011, assessment	Forecast		
	2008	2009	2010		2012	2013	2014
Vologda Oblast	16.1	16.6	18.5	20.6	22.3	24.2	26.2
Russian Federation	17.3	18.6	21.2	23.9	26.5	29.3	32.3
A gap between wage levels in the Vologda Oblast and in the RF:							
thousand rubles	1.2	2.0	2.7	3.3	4.2	5.1	6.1
%	6.9	10.8	12.7	13.8	15.8	17.4	18.9

Figure 6. Dynamics of corporate property tax in 2008 – 2012
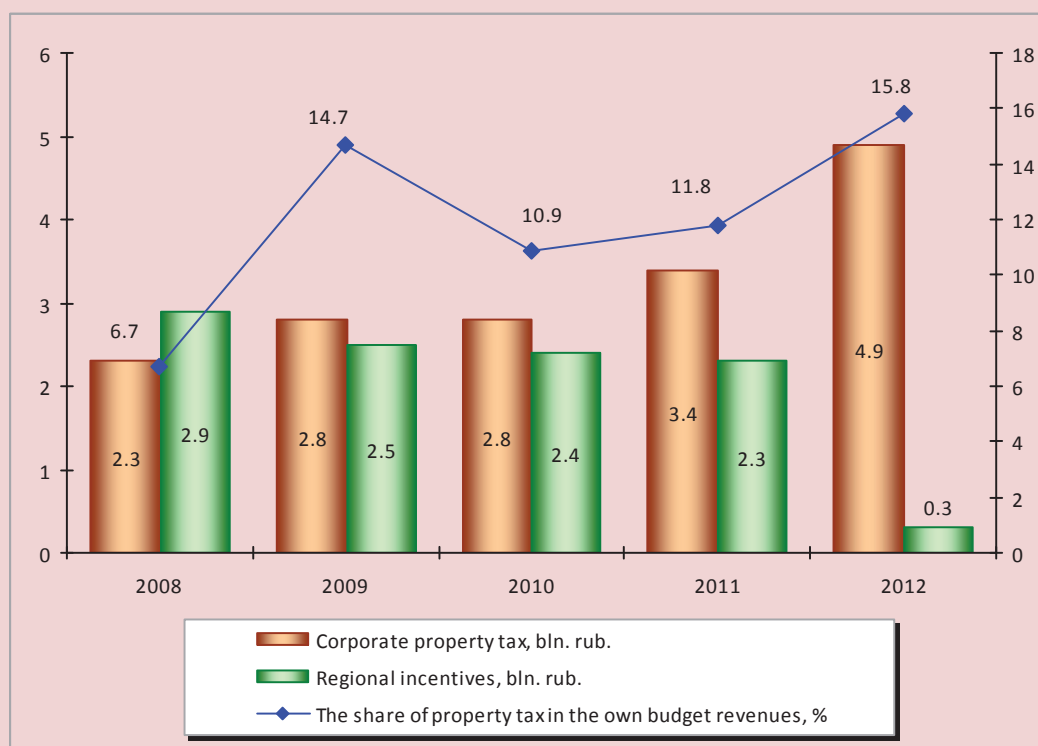
Withdrawal of preferences will increase significantly the role of regional taxes. They will already form 16% of the regional budget's own revenues in 2012 versus 7% in 2008. The dynamics of non-tax revenues seems to indicate that such task of the regional policy as the effective management of regional assets will be unsolved in the medium term. Non-tax revenues from the use of state and municipal ownership, which fiscal function is low, will be reduced by 300 million rubles or by 1.5 times to the level of 2011 *(fig. 7)*.

Population's budgetary income security in the Vologda Oblast will be below the national average level of 12.3 thousand rubles or by 20% *(tab. 9)* next three years. So, the region will receive leveling subsidies.

There is a task to decentralize effectively the authority of public entities in the Budget Message of the President of the Russian Federation. However, it is carried out backwards. Federal legislation is going to implement the fiscal priority of the central government with the subordinate status of the Federal subjects

Figure 7. Dynamics of non-tax revenues of the Vologda Oblast's regional budget in 2008 – 2014
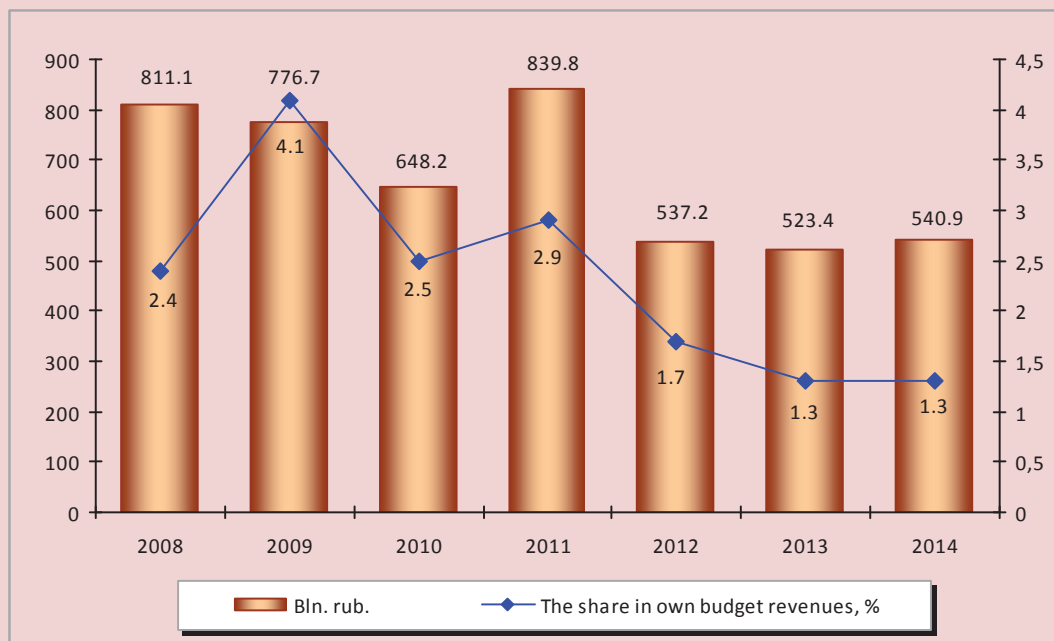
Table 9. Population's budgetary income security, thousand rubles per a person

Indicators	In fact			2011, assessment	Forecast		
	2008	2009	2010		2012	2013	2014
Vologda Oblast	41.7	33.1	38.4	39.0	43.0	46.6	49.3
Russian Federation	43.7	41.7	45.7	45.5	53.8	56.9	61.6
A gap between the levels of budgetary security in the Vologda Oblast and in the RF							
thousand rubles	2.0	8.6	7.3	6,5	10.8	10.3	12.3
%	4.6	79.4	84.0	85.7	79.9	81.9	80.0
Subsidies to the alignment of budgetary security, bln. rub.	0	0	0	737.9	1332.5	449.5	229.0

and fix the centralized budget management in 2012. Withdrawal of 90 billion rubles of excise taxes and state tax revenues from the regional budgets to the federal one is envisaged with the reduction of non-repayable financial support to the Federal subjects of Russia in the amount of 154 billion rubles. As a result, the share of subnational budgets in the total revenues of the budget system in the country will be reduced to 30% in 2012 vs. 40% in 2008. The falling budgetary revenues in the Vologda Oblast will amount to 1.3 billion rubles. Meanwhile, these sources could fund one-third of the regional budget deficit in 2012.

Simultaneously, additional financial powers to support secondary professional educational institutions and promote employment and social support for individuals will be transferred to the sub-national level. So, the deficit budget of the Vologda Oblast will require more than 420 million rubles of additional costs.

The RF President's directive on the inventory of federal incentives for state and local taxes remains unrealized today. As a result, consolidated regional budgets lost more than a third of the territorial tax revenues, and the budget of the Vologda Oblast − two-thirds *(tab. 10)*. At the same time, natural monopolies with the most stable financial standing get more than 90% of federal incentives.

It is clear that a lack of federal support and the desire to achieve a balanced federal budget through the withdrawal of the regional tax potential are the main external threats to the territorial budgetary systems not only in the Vologda Oblast, but in all regions of the Russian Federation.

The regional authorities will continue to limit mushy budgetary policy and decrease government spending in 2012 − 2014. It is generated by not only a lack of financial support from the federal budget, but the necessity to use a part of own revenues to ensure the repayment of borrowed funds raised to cover the regional budget deficit in previous years. The regional budget expenditures will have been reduced by 8 billion rubles or by 1.2 times to their volume in 2011 by 2015.

How do the authorities intend to dispose of the regional treasury? It is possible to judge the priorities of a new cycle of fiscal policy by *figure 8* that illustrates the aggregate structure of the regional budget expenditure.

The bulk of budgetary resources will be spent on traditional functions. The social sphere will remain the most large-scale item of expenditure. Two-thirds of funding will be used to ensure the fulfillment of social obligations to the population, taking into account intergovernmental transfers. From this point of view, the three-year budget retains the status of social-oriented.

The structure of social expenditure remains the priority of different types of social support to needy groups of citizens. So, more than 9 billion rubles are planned to be send annually for this purpose *(fig. 9)*.

The next functional items of expenditures are education and health. Their annual funding will require about 15 billion rubles from the budget. The remaining allocations of 1 − 2 billion rubles will be used to finance mass media, cultural activities and sports.

Table 10. Federal incentives for regional and local taxes

Indicators	Russian Federation			Vologda Oblast		
	2008	2009	2010	2008	2009	2010
The volume of federal incentives, bln. rub.	153.4	181.9	201.7	1.5	3.0	3.6
In % to the volume of regional and local taxes	*31.1*	*31.9*	*32.1*	*40.6*	*66.7*	*73.6*
Sources: Federal Tax Service, the Treasury of Russia; calculations by ISEDT RAS.						

Figure 8. The structure of the regional budget expenditure of the Vologda Oblast in 2011 – 2014, %
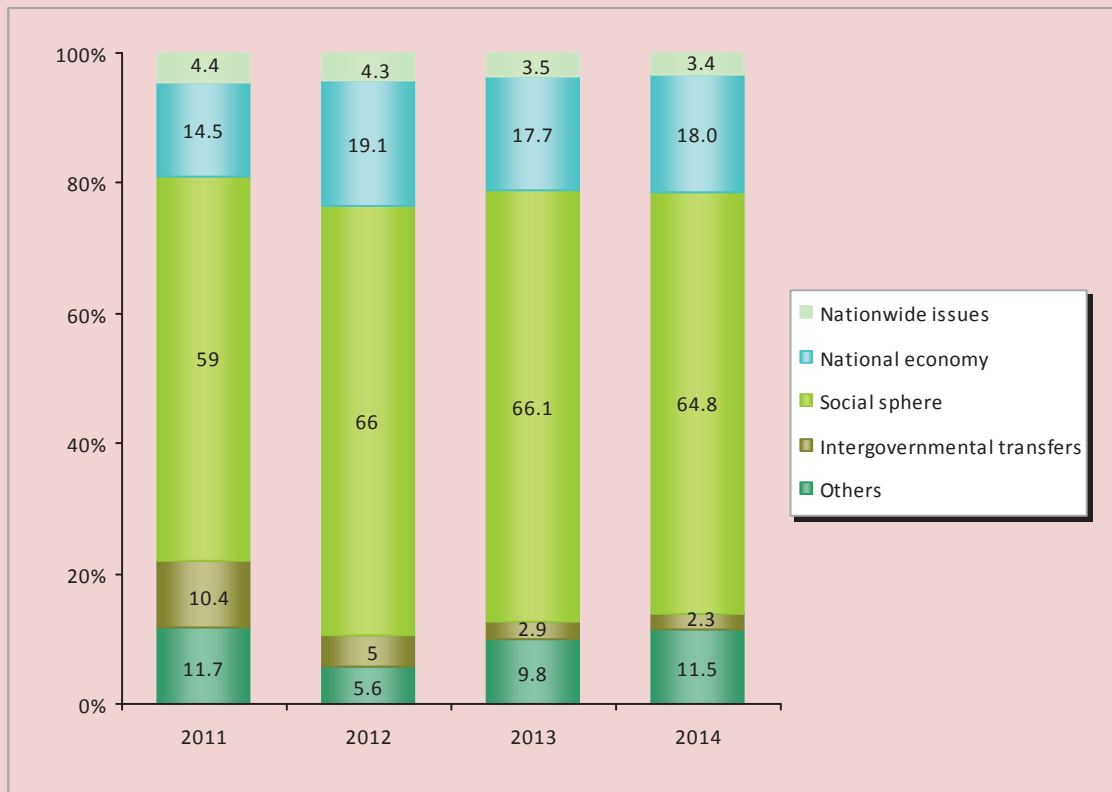
Figure 9. Regional budget expenditure of the Vologda Oblast
on the social sphere financing in 2011 – 2014, bln. rub.
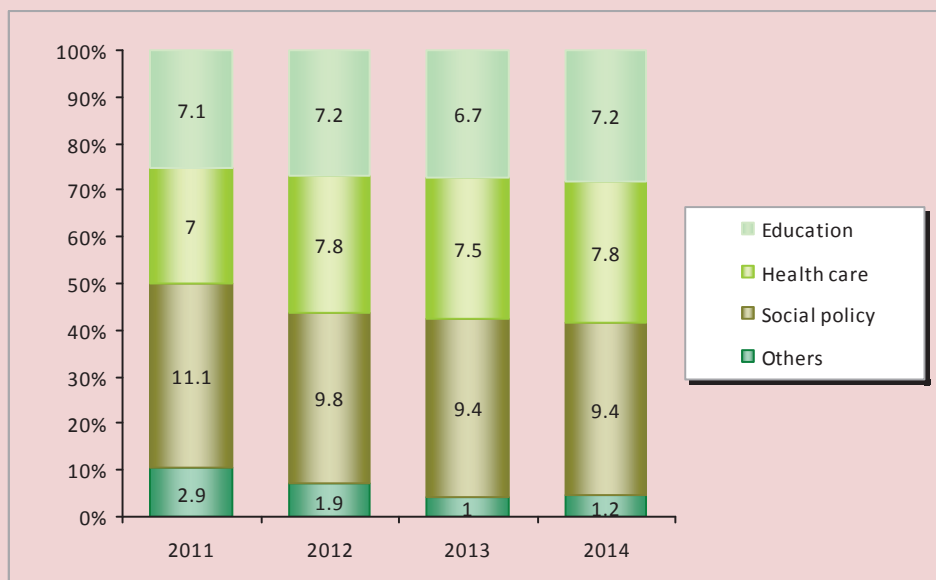
At the same time, the addressed social problem-solving as a task of fiscal policy in the medium term appears to reduce the allocations for a number of important social dimensions *(tab. 11)*.

As you can see, the double decline in financing of sport events has been approved. The regional budget's support to the mass media will be reduced by half.

Primary professional education expenditures have been cut by a third when there is a lack of skilled workers and low labour productivity in the economy.

The absolute reduction of budget allocations to all types of medical care has been planned.

However, the largest reduction of state support will affect housing and communal services. Funding for this sector will be declined by almost eight times. Meanwhile, the Vologda Oblast is characterized by a high level of housing stock and communal infrastructure wear which needs a huge investment in housing.

The fact is that the establishment of the Road Fund forced the regional authorities to reallocate the budget appropriations, including at the expense of certain types of social and housing expenditures.

The system of regional road funds will change seriously a financing structure of the national economy *(tab. 12)*.

On average, two-thirds of the budget allocations within the sector "National Economy" will be set aside for the road infrastructure financing within the framework of the Road Fund. Institutional arrangements of the Fund have several advantages over budget financing, because the order of their establishment is based on the links between expenditures and revenues. Of course, the launch of Road Funds will provide us with additional resources, but their operation will require a strict control over the targeted use of these funds[3].

Table 11. Allotment of the regional budget allocations in the Vologda Oblast to the certain functional sections and subsections in the period from 2011 till 2014, bln. rub.

Section, subsection	2011	2012	2013	2014	2014 to 2011, %
Housing and communal services	2107.0	594.3	488.3	267.3	12.7
Primary professional education	351.2	283.7	220.0	255.3	72.7
Youth policy	155.4	149.2	132.3	131.7	84.7
Culture	882.7	853.8	575.6	753.3	85.3
Hospital medical care	889.4	762.6	584.2	641.5	72.1
Ambulatory care	197.2	146.7	127.5	135.4	68.7
Emergency	152.9	87.0	75.9	81.7	53.4
Physical training and sports	782.8	744.8	292.5	360.8	46.1
Mass media	219.8	120.1	117.1	117.2	53.3

Table 12. The structure of the regional budget expenditures of the Vologda Oblast in the sector "National Economy" in 2011 – 2014, bln. rub.

The name of the subsection	2011, assessment		Forecast						2014 to 2011, %
			2012		2013		2014		
	bln. rub.	%	bln. rub.	%	bln. rub.	%	bln. rub.	%	
Total expenditure	6896.6	100.0	7745.7	100.0	6595.7	100.0	7128.6	100.0	103.4
Agriculture	1553.8	22.5	762.9	9.8	503.9	7.6	507.2	7.1	32.6
Forestry	778.9	11.3	497.1	6.4	497.4	7.5	502.3	7.0	64.5
Road sector	*1284.6*	*18.6*	*4747.2*	*61.3*	*4707.8*	*71.4*	*4999.4*	*70.1*	*389.2*
Other expenses	3279.3	47.5	1738.5	22.5	886.6	13.5	1119.7	15.8	34.1

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[3] According to experts of the National Anti-Corruption Committee, about 50% of the budgetary funds are embezzled in the road building. It exceeds the indicators of other industries.

Budget support to agriculture and forestry is founded without federal transfers, so we should expect its increase, as it usually happens in the budget process.

Unfortunately, the regional budget cuts its involvement in housing problem-solving. Meager investments for this purpose will have been already decreased by half in 2012, and it has been planned to spend only 101 million rubles on providing housing to the population by the end of 2014 due to the expiration of most housing programmes *(tab. 13)*.

The new budget law is characterized by substantial changes in the system of inter-budgetary relations aimed at strengthening the fiscal autonomy of local self-governments.

Since 2012, 25% of corporate property tax revenues will be transferred to the municipal budgets according to the additional allocation standards, and 25% of simplified taxation system revenues will be allocated to the budgets of settlements. In addition, the differentiated allocation standards of individual income tax will be introduced as a substitution for the grants in order to reduce by half the amount of leveling subsidies allocated to municipalities from the regional budget. As a result of these innovations, the regional and settled municipalities will additionally receive 1.5 billion rubles in 2012, and the cumulative effect of their own revenue base of consolidated municipal budgets will be doubled *(fig. 10)*.

Table 13. Regional budget expenditure of the Vologda Oblast
on providing housing to the population, mill. rub.

Name of the program	2011, assessment	Forecast		
		2012	2013	2014
Providing housing to young families in 2012 – 2015	30.0	30.0	30.0	30.0
Affordable housing in 2009 – 2013	419.4	112.4	86.4	0
Social development of rural areas in 2009 – 2012	78.4	40.0	0	0
Housing for orphans in 2011 – 2013	200.0	100.2	160.2	0
Dwelling house making for veterans in Molochnoye	60.0	50.0	0	0
Providing housing to the citizens discharged from military service	30.0	30.0	30.0	30.2
Providing housing to veterans and disabled people in accordance with the Federal laws	43.2	40.3	40.7	40.7
Total expenses on housing	861.0	402.9	347.3	100.9
Share in total budget expenditures, %	1.8	1.0	0.9	0.3

Figure 10. Own revenues of consolidated municipal budgets in the Vologda Oblast, bln. rub.
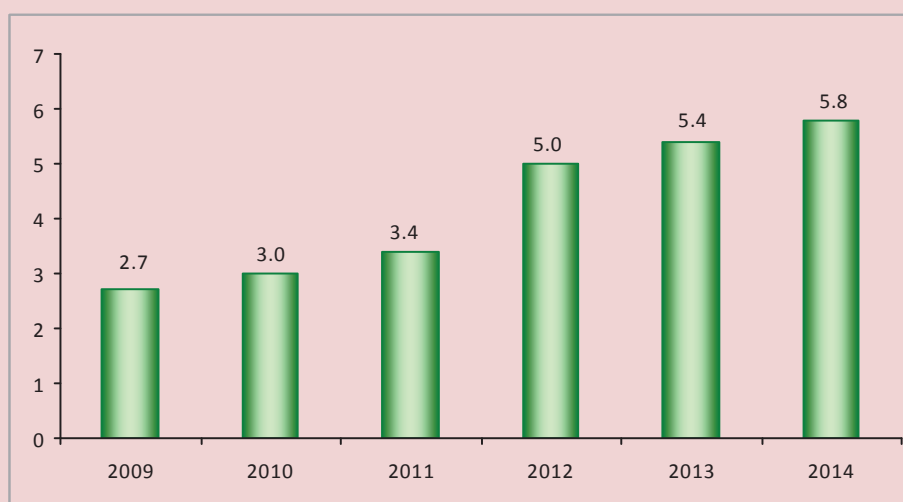
The social orientation of budget expenditures and limited revenue potential, especially in the situation of increase in prices for services of natural monopolies, as well as the economic downturn, block the possibility of the development budget formation and transition to the proactive investment in key projects.

For the first time the regional budget has minimized the selection of capital appropriations so drastically. Crisis collapse of tax revenues in 2009 − 2010 has forced the local authorities to balance the regional budget at the expense of the regional capital expenditure that had a negative impact on their dynamics in the medium term: with limited financial resources, the level of social expenditure should be maintained, so capital investments have become a balancing item again. The volume of public investments will have already been decreased by 3.1 billion rubles in 2012, that is more than by three times, and their share in the budget expenditures will have not reached even 5% until 2015 (fig. 11).

The unprecedented reduction in capital investments indicates that a period of the rapid growth of budget revenues in 2000 − 2008 has not been used by the regional authorities to form the relevant reserves and implement the counter-cyclical fiscal policy during the crisis. Therefore, it was necessary to reformat the budget primarily due to reduced investment in the development of regional economy in order to ensure the necessary volume of social obligations.

However, the decrease in the regional budget tax revenues was so high that there was a lack of resources to finance the chosen level of spending even by optimizing costs and increasing financial support from the federal budget to the region. Progressive budget deficit has caused the need to attract the bank credit resources and the federal budget; the total amount of them was an enormous sum of 23 billion rubles in 2009 − 2011 that corresponded to one third of own revenues of the regional budget. It is expected to reduce borrowing in the planning period, but loan servicing will require the diversion of about 1 billion rubles from the regional budget that could be used to finance the important dimensions of socio-economic development of the region (fig. 12).

Figure 11. Capital investments of the regional budget of the Vologda Oblast in 2008 – 2014
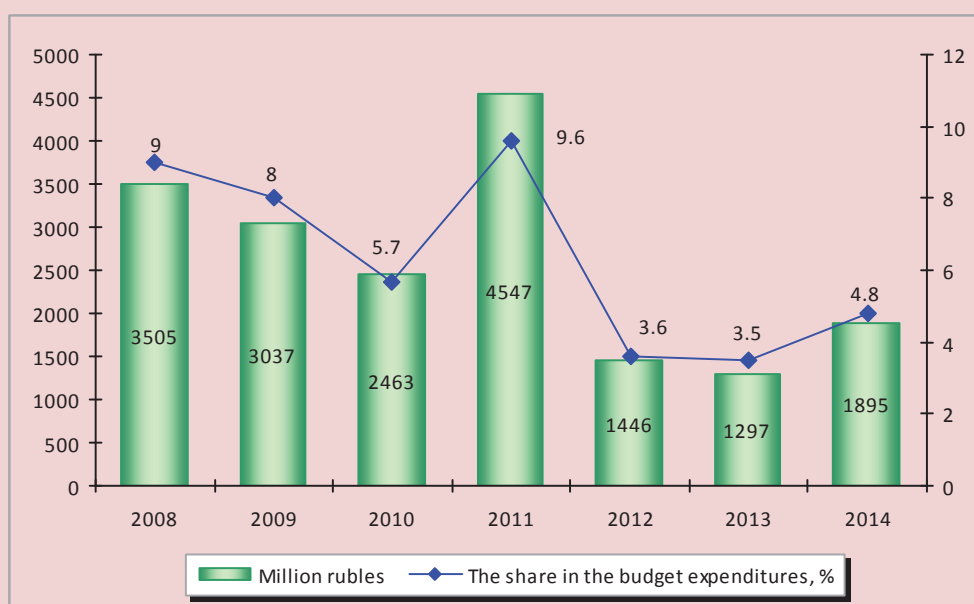
Figure 12. Attracted credit resources and interest revenues of the regional budget of the Vologda Oblast in 2009 – 2014, mln. rub.
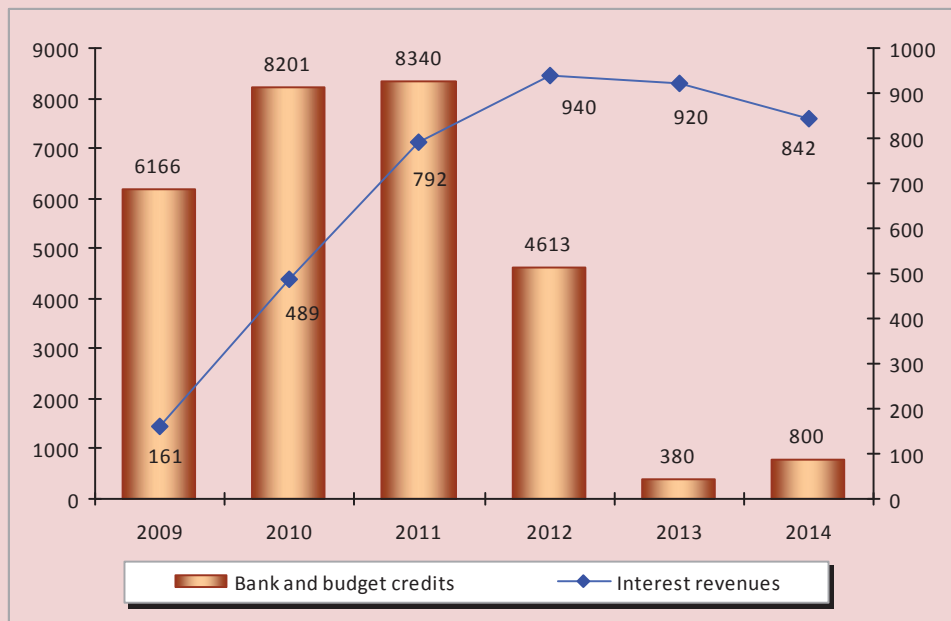
Table 14. The dynamics of public debt in the Vologda Oblast in 2008 – 2014

Indicators	In fact			2011, assessment	Forecast		
	2008	2009	2010 г.		2012	2013	2014
Amount of debt, mln. rub.	1752.5	10374.7	18498.1	26921.2	28746.1	22476.2	16697.4
The share to own revenues, %	5.1	54.5	71.6	93.0	92.5	57.4	40.0

The result of the borrowing escalation was a critical level of public debt of the Vologda Oblast. In 2011 − 2012 it will be 93% of the total own budget revenues within the statutory limit of 100%. The absolute amount of regional debt will be significant even in 2013 − 2014 *(tab. 14)*.

Debt pressure in the field of public finance will be the most serious risk for the economic security of the region.

Of course, in the short term many budget problems of not only the Vologda Oblast, but also other subjects of the North-West of the Russian Federation will be determined by scarcity and a strong trend to increase debt load *(tab. 15)*. This will require for a coherent fiscal policy adequate to the risks of the ongoing global crisis.

Completing the analysis of the main financial document of the region for the period from 2012 till 2014, we can conclude that the new Law on Budget doesn't contain the newest ideas. In fact, budgetary policy, which was turned to the survival standards last year, has received only the clarification for the coming period.

Understanding this difficult situation, however, it is impossible to consider that the Vologda Oblast hasn't the reserves to increase revenue and optimize expenditures in future. The most important of them should be considered the following:

1. Rise of the level of taxes and dues collection. In our opinion, this regional treasury reserve is not used in full. In spite of some measures aimed at working with defaulters, the

Table 15. The regional budgets deficit and public debt of the subjects of the North-West Federal District

Federal Subject	Budget deficit				Public debt			
	2011, assessment		2011, forecast		2011, assessment		2012, forecast	
	bln. rub.	%*	bln. rub.	%*	bln. rub.	%*	bln. rub.	%*
Leningrad Oblast	4.4	10.1	3.2	6.1	8.0	18.3	7.3	13.8
St. Petersburg	51.3	16.5	29.6	8.8	37.1	11.9	65.4	19.3
Komi Republic	7.1	21.3	4.3	10.3	10.0	30.0	11.5	27.6
Murmansk Oblast	4.7	14.6	5.4	16.2	6.6	20.5	10.7	32.0
Pskov Oblast	2.8	27.5	3.3	27.7	3.1	30.7	4.6	38.7
Karelia Republic	3.0	19.2	2.6	15.0	9.5	60.9	10.7	61.8
Novgorod Oblast	2.9	19.2	1.3	7.5	11.1	73.5	11.1	64.2
Kaliningrad Oblast	5.7	29.3	5.4	25.3	17.5	89.8	15.7	73.5
Arkhangelsk Oblast	7.6	27.2	9.2	26.6	19.1	68.5	27.5	79.5
Vologda Oblast	8.1	29.7	4.4	14.3	26.9	93.0	28.7	92.5
* The share to own revenues, %.								

significant reduction in debt is not observed. Thus, according to tax accounts, tax and due debt to the regional budget has been increased by 51.1 million rubles as of January 1, 2012 in comparison with its amount at the beginning of 2011 when it amounted to 1.6 billion rubles that was commensurate with the budget deficit of 20%.

2. Further systematic work on revenue legalization. The increase in insurance fees creates the potential base for the shadow business. According to the Division of Federal Tax Service in the Vologda Oblast, income tax arrears of the shadow wages, which are not fixed officially and thus escape taxation, will increase to 1.0 billion rubles in 2014 vs. 0.2 billion rubles in 2010, i.e. about 10% of individual income tax will evade the budget. In this regard, the purpose to legalize incomes has been highlighted in particular by establishing administrative control over the transfer of individual income tax to the budget in the settlements and regions.

3. Increasing mobilizing function of non-tax revenue by the implementation of administrative measures for their regulation. In our opinion, it is reasonable to make an inventory of standard acts in the sphere of state property management and develop the objective me-thods to calculate rent rates, because it is not a secret that the regional authorities often establish arbitrarily rental fees. It is also necessary to stop the disposal of regional property for free use by federal agencies. Available reserves to increase non-tax revenues are shown by meager incomes of the organizations which have the regional share in their authorized capitals (for example, the payments of this category to the budget will amount to 500 thousand rubles in 2012. Of course, this sum is comparable with the use of budget in the business development.

4. Recovery of investment demand. The implementation of a number of investment projects manifested in the forecast of the socio-economic development of the Vologda Oblast should be regarded as one of the key generators of the budgetary revenue growth. In this context, it is reasonable to think about the population's savings, which are not used for productive accumulation (according to statistics by the Bank of Russia, the volume of individual deposits in the Vologda Oblast amounted to 67.4 billion rubles as of 01.01.2012 that exceeded by half the regional budget revenues).

5. Quality improvement of public expenditure management. The current structure of

Table 16. The regional budget expenditure on management personnel in the Vologda Oblast *

Indicators	In fact			2011, assessment	2012, forecast
	2008	2009	2010		
Volume of expenditures, mln. rub.	887.1	815.7	851.4	1123.6	840.0
The share to total budget revenues, %	2.6	3.2	2.6	3.0	2.4
* Expenditure on the Legislative Assembly, the Government of the Vologda Oblast, the judiciary, the Department of Finance, the Control and Accounting Chamber, the Election Commission.					

the regional budget expenditure, which is aimed at financing social areas, is combined with their low efficiency. The reduction of ineffective expenditures will cover 1.8 billion rubles of the budget deficit in 2012[4].

Further limitation of public administration expenditure should also be considered as a reserve of saving budgetary resources. In spite of a significant decline in the number of legislative and executive authorities carried out in 2009 − 2010, the sum of the regional budget expenditure on its support isn't decreased; it exceeds the funding of forestry, transport, culture, and ecology spheres *(table 16)*.

The task to improve the quality of expenditure and budget management can't be achieved without the implementation of measures to optimize the public debt, providing for its restructuring by bond issue, as well as the decrease in provision of state guarantees and nonstop debt management aimed at the quick adjustment of its volume.

Many of the potential reserves of the balanced regional budgets cannot be developed without special changes in the federal laws.

This applies to the immediate cancellation of the territorial federal tax remissions, whose amount in the Vologda Oblast is 70% of the consolidated budget deficit. It is necessary to reconsider the system of the VAT[5] refunding to largest export companies; to establish the responsibilities of sectoral ministries of the RF for the distribution of budget transfers before the beginning of territorial budgeting; to reconsider the return order of target subsidy remnants to the federal budget.

Thus, the quality of budget planning should be improved. This problem has become primary in the system of budget management because its actual implementation is far from the forecast parameters. It will be difficult to go to the programmed budget and tie it up with the strategic objectives of territorial development without a significant improvement in the quality of budget planning.

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Management of the implementation of strategic documents of territorial development

The article deals with the application of stakeholder management concept in the territorial subsystems functioning and development management on the subregional level in order to ensure the balance of interests between the major territorial subjects. The notion of a subregion and its stakeholders is specified, their main groups are defined. The article describes the organizational-role management mechanism of strategic documents implementation which enables interfunctional and informational interaction between the main stakeholders of a subregion and determines their project roles and functions.

Subregion, subregion stakeholders, process model of territorial socio-economic development, organizational-role management mechanism of strategic documents implementation.

Ilshat A.
TAZHITDINOV
Ph.D. in Economics, Associate Professor, Deputy Prime Minister
of the Government of the Republic of Bashkortostan,
Head of the Government Apparatus of the Republic of Bashkortostan
letters@bashkortostan.ru

Ilnur D.
ZAKIROV
Ph.D. in Economics, Scientific Associate of the Economic Security Sector
of the Institute of Social and Economic Research of Ufa Science Centre of RAS
zid_zid@rabler.ru

At present, various strategic documents, such as concepts, strategies (strategic plans), complex programs of socio-economic development, that differ, first of all, in their content and planning time-frame, are being implemented on the regional and municipal levels. The tools of territorial strategic planning are being elaborated and improved; the strategic documents of the regional and municipal levels are being published in the form available for discussion; the main trends of territorial strategic planning within the framework of strategic management theories are being outlined.

However, in practice, in most cases, the strategic documents of territorial systems (in particular, municipalities) development are not built into the budgetary process and are not linked with the forecasts concerning the financial position of the management object, they have a declarative character and represent a set of scattered, uncoordinated program activities. There are no mechanisms implementing the territorial systems socio-economic development strategies.

Besides, the strategic planning of territorial subsystems development, regardless of their

scale [1, 3, 4], differs from the usual planning not only in the object peculiarities but also in the necessity to coordinate the interests of the key territorial subjects – state and municipal authorities, population and business entities. That's why significant attention should be paid not only to the traditional, substantial tasks of planning and management, but also to the active involvement of territorial subjects into strategic processes. Therefore, a new approach to the territorial development management, in addition to planning and management should include the third component, aimed at solving the problem of involving the territorial subjects in these processes. This third direction have already been defined in the strategic management as the strategic thinking, i.e. understanding one's own destination, future and the necessity to participate in the management activity [7].

The article considers this aspect from the position of the stakeholder theory: a stakeholder is any group or individual that can exert influence on or are influenced by the achievement of an organization's objectives [2, 8]. At present, the Russian Managers Association defines stakeholders as individuals, organizations or communities who are interested in a company's activity and have a direct or indirect relation to its activities [9], and the international standard ISO/OPMS 26000:2010 (Guidance on social responsibility) defines the stakeholder as an individual or group that has an identifiable interest in any activities or decisions of an organization [10].

Since the territorial system of any level is the focus of interests not only on the part of governmental levels (federal – regional – municipal) but also all territorial subjects, the adequate mechanism of stakeholder management concept implementation can well provide the balance of their interests in the elaboration and implementation of strategic decisions concerning the territorial socio-economic development.

It is proposed to apply this concept to the functioning and development management of the territorial subsystems of subregional level. The authors define the subregional unit or subregion as the territorial socio-economic subsystem of a region (group of municipal units), possessing integrity and distinguished according to certain common economic, geographical, administrative, environmental and other interrelated features. Defining the territory of the subregional level allows consolidating the efforts and resources of state and municipal authorities, population, and businesses and directing them towards territorial development, as well as implementing the common socio-economic policy of the region [5].

Thus, the authors define the subregion stakeholder as any subject (legal and/or natural person, state and municipal authorities), resident or non-resident of this territory, whose interests and resources can directly or indirectly affect its socio-economic development. The following main groups of stakeholders can be distinguished:

– internal: local population, economic entities (residents), the subregion administrative bodies, local self-government bodies, local public organisations and local mass media;

– external: the governmental authorities of a Federal subject of Russia, the governmental authorities of Russia, public organizations (regional, federal, and international), investors, population (non-residents – migrants), economic entities (non-residents), mass media (regional, federal, and international).

The existing relations between the region's stakeholders can be based on partnership as well as competitiveness (conflict).

The process of establishing partnership relations in the stakeholder management is called **bridging** (strategic partnership or balance of interests). The establishment of such a partnership is possible for a subregion only within the framework of the strategic development planning when the interests of all parties are fully taken into account.

Therefore, in order to increase the subregion development strategy efficiency, the stages of its elaboration and implementation should be considered as processes and their balanced flow should be ensured *(fig. 1).*

In the process of coordination of interests between all the participants, the analysis of the current situation (identification of problems and development prospects) is carried out, the balance of interests and mutually profitable economic relations is ensured [6].

As a result, the territorial development concept project is formed, within the framework of which the mission and priority guidelines are determined (the process of conceptualization). Further on, the details of the conception are worked out: the strategic choice and territorial development objectives (the result of strategizing), development programs (the result of programming), program activities, necessary

for their achievement, with defining the main executors (the result of projecting). In the course of development and monitoring strategy implementation, the assessment of its success, adjustment of the interests, missions, goals, objectives, activities and funding is carried out.

At present, the lack of the effective mechanism for the strategic documents implementation and monitoring on the regional and municipal levels is one of the main problems of the strategic territorial development management.

It is necessary to form a system of control over the actions of the authorities, business and population, aimed at the achievement of strategic and tactical goals of the regional territorial subsystems development, and including the following elements that ensure the strategic documents implementation: organizational, information-analytical, normative-regulatory, investment and risk management *(fig. 2).*

Figure 1. Process model of the socio-economic development of a territory
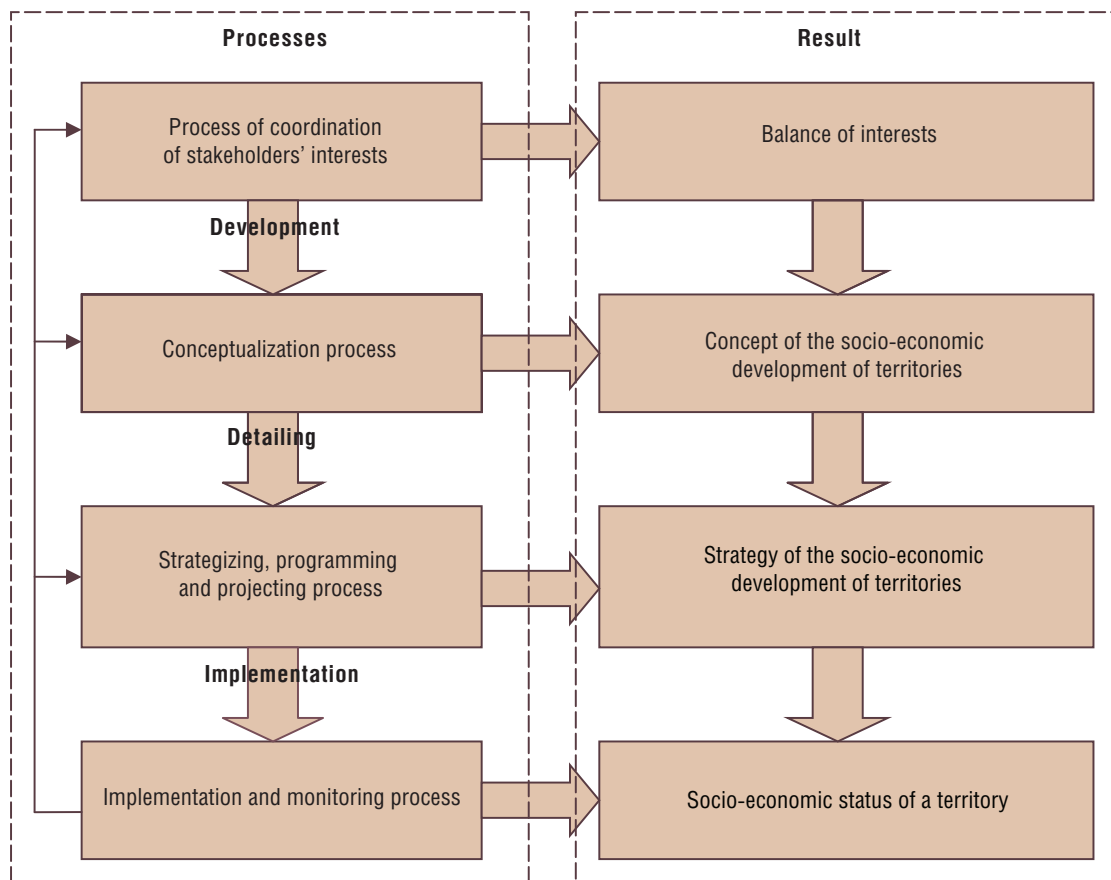
Figure 2. Structure of the management system of implementing
the strategic documents of territorial development
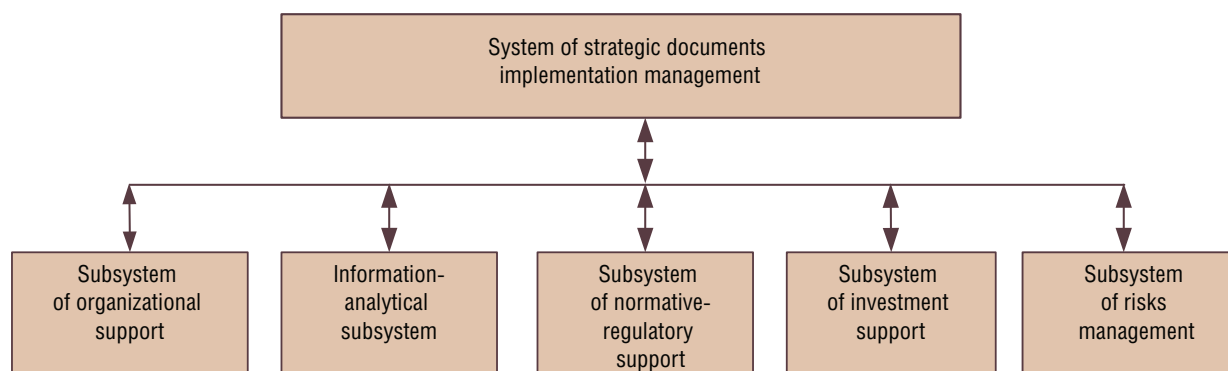
In the **subsystem of organizational support** of territorial development documents implementing, the special place is occupied by the issues concerning the division of responsibilities and powers between the main participants of the strategic management process. For handling this issue, the organizational-role structure aimed at the management of territorial development (of a subregion and municipal units constituting it) strategic documents implementation is proposed *(fig. 3)*.

In the framework of this structure, the cross-functional and informational cooperation not only between the state and municipal authorities but also between other stakeholders (population, businesses, public organizations) is carried out.

This structure also allows to create the list of officials and organizations (main participants of the strategic management process), determine their project roles, managerial levels of the Project of strategic document of territorial development and the functions of the main Project participants.

The following managerial levels can be distinguished:

1. The managerial level of the Customer and the Coordinating Council on strategic planning:

— control over the achievement of target indicators' planned values of the strategic document in the reporting and final periods;

— decision-making concerning the adjustment of the document: the changes in the target indicators' planned values and the amount of required resources.

2. The managerial level of the executive coordinator on the direction of the Project:

— control over the achievement of target indicators' planned values according to the Project guidelines in the reporting and final periods;

— control over the achievement of planned results concerning the fixed direction activities;

— decision-making concerning the adjustment of the works in the framework of the activities without changing the target indicators' planned values and the amount of resources for the i-th direction.

3. The managerial level of the Main executor of the Project activities

— control over the fixed Project activities implementation in the reporting periods (observance of deadlines, expenditure of financial assets).

The project roles of the officials, authorities and organizations, involved in the strategic document management, are shown in *table 1,* and their functions are described below.

In the framework of this mechanism, one of the main roles belongs to the Project Director (a person chosen in accordance with the decision of the executive powers of the Federal subject), who is able to ensure the integration

Figure 3. Organizational-role mechanism of strategic documents implementation management
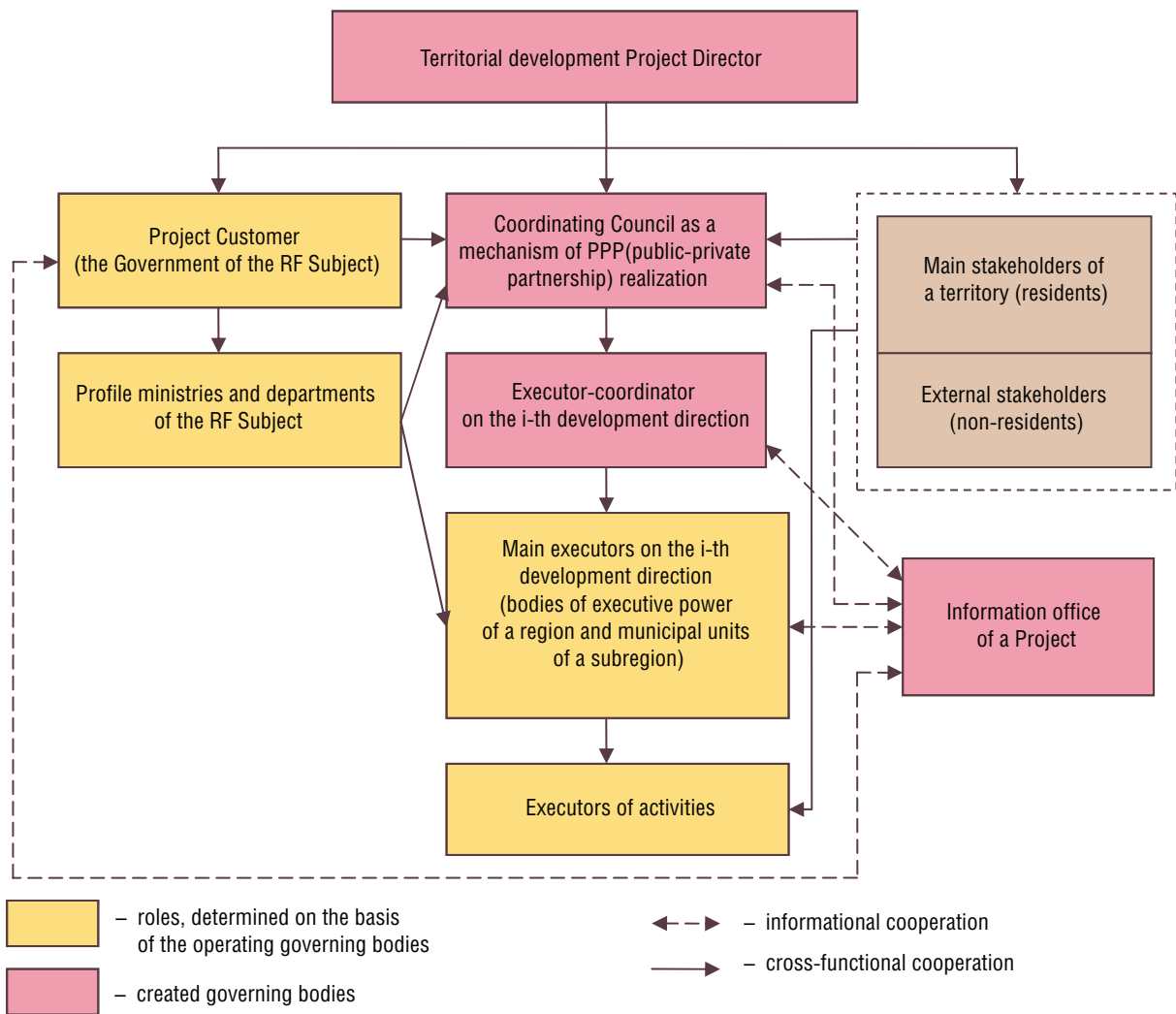
Table 1. The Project roles of officials, authorities and organizations,
involved in the strategic document management

Project role	Official, body, organization
Project Director	Project Director is chosen in accordance with the decision of the state executive power of the Federal subject
Project Customer	the state executive power of the Federal subject
Main executors of Project activities	the state executive powers of the Federal subject, the administrative bodies of municipal units of the Federal subject
Coordination council on strategic planning	Advisory, expert, consultative body, established by the Project Customer-coordinator with the involvement of key external and internal stakeholders of a territory
Project information office	Body, established by the Project Customer for solving the problems of Project administration, management and monitoring processes
Executor-coordinator on the Project direction	State authorities of the subject of Federation, that coordinate the Project implementation within the framework of determined guidelines
Executor of Project activities	the state executive powers of the Federal subject, the administrative bodies of municipal units of the Federal subject, business entities, investors

of all the structural components and unity of all the project participants. The main functions of the Project Manager include: Project management; control over the Project implementation processes; benchmarking; holding of meetings to assess the implementation of the Project at the managerial level of the Customer and the Coordinating Council on strategic planning.

Besides, the Director is immediately involved into work on the project and supervises over it from the beginning to the end. The coordination between the functional units (ministries, departments, authorities of the subject of federation and municipal units) and cross-functional interaction, provided by the Director and his/her assistants, also plays an important role.

The Director constantly communicates with all project participants, i.e. an exchange of information takes place, in the course of which the project can be altered in the early stages already (losses reduction). Communication between the functional units' specialists and saving the information on data carriers leads to the creation of new knowledge that can be used in future for solving the similar tasks or in the course of teaching.

The main functions of the Project Customer should include the following:

1) drafting of laws, normative legal acts, necessary for the Project implementation;

2) development and adoption within its competence of the normative legal acts, necessary for the Project implementation;

3) approval of the financial plan of Project activities;

4) quarterly (annual) preparation of reporting materials on the Project implementation;

5) organization, in cooperation with main Project executors, of expert inspections of the Project implementation progress (if necessary);

6) annual specification and adjustment of target indicators, costs of activities, composition of participants;

7) submission, in the established order, of the proposals concerning the Project adjustment, extension of its implementation period or its termination (if necessary);

8) expert inspection of Project implementation;

9) organization of the independent assessment of performance and efficiency indicators of the Project activities, their compliance with the target indicators.

The Coordinating council on strategic planning is a consultative, expert and advisory body. It is created by the Customer with the purpose of carrying out the coordination and interaction between state executive powers of the Russian Federation, local self-governing bodies, territorial bodies of Federal authorities, economic entities (both residents and non-residents of the territory), scientific-research, educational and other organizations for the elaboration of coordinated decisions on the Project implementation.

The main functions of the Council:

1) ensuring the implementation of activities;

2) elaboration of proposals on improving the Project management process;

3) preparation of proposals on development by the customers of the annual departmental plans of organizational measures aimed at the Project implementation and control over their execution;

4) annual approval of the reports concerning the execution of the activities implementation plans, submitted by their main executors;

5) monitoring of the Project implementation and preparation of annual and quarterly reports for their submission to the Customer.

Executor-coordinator on the Project direction is a corresponding executive body of the state authority of the federal subject, in some cases — the organizations stated in the Project.

The main functions of the Coordinative executor include:

1) the main executives' work coordination on the activities directions;

2) organization of work aimed at achieving the target indicators' planned values of the Project implementation according to the certain direction;

3) control over the implementation of measures aimed at achieving the target indicators' planned values of the Project implementation in the reporting and final periods;

4) development of decisions on the Project adjustments in case of deviations of actual results from the planned ones.

The main executors of Project activities are the state executive powers of the Federal subject and the municipal administrations. The main executors are responsible for the timely and high-quality implementation of Project activities.

The functions of the main executors:

1) control over the execution of assigned activities in the framework of the reporting periods; over the compliance with the timing of work execution; over the expenditure of funds, over the obtaining of planned results according to certain directions;

2) development of annual departmental plans for implementation of activities and proposals for their refinement;

3) selection on the competitive basis of executors of works (services) and suppliers of the products according to the activities and conclusion of state (municipal) contracts (agreements) with them;

4) provision of the targeted and efficient use of budget funds allocated for the implementation of activities;

5) organization of reporting on the Project implementation.

The executors of Project activities are regional and municipal executive bodies as well as organizations, involved in the Project implementation.

The main functions of the activities executor include: achievement of the Project targets; participation in the planning and monitoring processes of activities implementation; analysis of the results of the Project implementation and development of solutions for adjustment in case of deviations of actual results from the planned ones.

The Project information office supports the Project implementation planning and monitoring processes: collection, analysis of factual data on the Project from the main executors of activities and executors-coordinators according to the directions; making reports for submission to all levels of the Project management; information support of the Project participants on implementation of management processes.

The information-analytical subsystem includes two main elements: the planning of the Project management processes and monitoring of its implementation. In the framework of the processes of Project management planning it is necessary to develop the following plans: the policy plan for the activities implementation on the basis of the annual departmental plans for activities implementation; the coordination plan for the activities implementation; departmental plans for activities implementation; the plan for individual activities implementation. To increase the effectiveness of plans development, the appropriate responsibility matrix should be created *(tab. 2)*.

Planning of the Project management process is carried out on the basis of regional normative-regulatory acts, planned values of control and target indicators presented directly in the Project, plans for the implementation of Project activities, received from its individual participants.

The plans should be refined and worked out in greater detail as far as the Project is implemented according to the principle of "running horizon" with the gradual increase of volume and detailing of information. At the same time, the activities, volumes of funding and Project

Table 2. Matrix of the responsibility for the plans development and coordination

Management level	Plans			
	Directive	Coordination	Departmental	Working
Customer	D/A*	C	-	-
Executor-coordinator for a direction	C	D/A	C	-
Main executors of activities	E	E	D/A	C
Executors of activities	E	E	E	D/A, E
Note. D/A – Development and approval of a plan, C- coordination of a plan, E – execution of a plan. * Development of a plan is carried out by the Monitoring Office (project office).				

implementation target indicators are subject to annual adjustment taking into account the regional budget potential and the amount of funds attracted from other sources.

The following tasks are solved within the framework of the Project implementation monitoring:

— receipt of the accurate, timely and complete information on the course of implementation with regard to individual activities and objects as well as to the Project on the whole;

— detection of deviations in the course of activities implementation and achievement of the target indicators' planned values and control indicators of the Project implementation;

— formation of deviation estimates in the target and control indicators achievement, resource provision and planned activities implementation, identification of persons responsible for arising deviations;

— preparation of the information necessary for decision-making on the appropriate level of control, for introducing amendments in the Project;

— analysis and forecasting of the target and control indicators achievement, proactive control according to the results of the Project implementation.

As in the management processes planning, the responsibility matrix for the submission of reports *(tab. 3)* should be formed in order to increase the Project implementation monitoring efficiency.

The subsystem of normative-regulatory support includes the following elements:

1. The regulations of the calendar planning and reporting, that should contain the description of the following processes: making calendar plans on different managerial levels, making reports concerning the activities implementation and the course of the Project realization; as well as alterations management, plans updating (adjustment) on the basis of the quarterly monitoring of activities implementation. Accordingly, the description of each process should include the description of the input and the resulting information, the executors and responsible persons, the timing of execution.

2. The regulations on the Project management system should include a description of the role structure of Project management, its relationship with the Customer-coordinator, state executive powers of the Federal subject, municipal units' administrations and different organizations involved in the Project, as well as the corresponding provisions concerning the elements of the organizational-role structure.

3. Methodological recommendations — recommendations for the implementation of individual procedures of Project management, which are developed in order to provide a more detailed description of the basic approaches and principles of the Project management system.

4. Templates and forms of documents of the Program management system.

Table 3. Matrix of the responsibility for the submission of reports

Management level	Report on the implementation of activities			
	of the directive plan	of the coordinating plan	of the departmental plans	of the working plans
Customer	A	-	-	-
Coordination council on strategic planning	C	A	-	-
Executor-coordinator for the direction	D	C	A	-
Main executors of the activities	-	D	D	A
Executors of the activities	-	-	-	D
Note. A – approves, D – develops, C- coordinates.				

The subsystem of investment support of the Project implementation envisages a complex of measures, implemented by the Customer-coordinator in cooperation with the other Project participants, in the following areas:

— elaboration of unified procedures and criteria for the selection of uniform projects of business-plans according to the main developmental directions;

— determination of the state support measures, provided for the investment projects implementation, and the conditions of their co-financing;

— creating the list of priority investment projects on the main directions of the territorial development, that claim to receive state support, and their further maintenance.

In order to organize effective investment support, it is necessary to form a register of the Project tools in the financial (state guarantees on loans, subsiding interest rates on loans; optimization of the property and land taxation, etc.), informational (consulting and information support, exhibition and fair activities, training, etc.), project (target programs, investment plans and projects, etc.) and organizational (legal, infrastructure support, etc.) spheres.

The subsystem of risks management of the Project implementation is to maximize the positive and minimize the negative effects of risk events in the course of the program activities implementation.

The main tasks of risks management in the Program implementation are:

— risks management planning — choosing the approaches and planning the activities of the Project risks management;

— risks identification — the identification of risks that might affect the program activities implementation, and documenting their characteristics;

— qualitative assessment of risks — the qualitative analysis of risks and the conditions of their emergence in order to determine their impact on the success of the implementation of the program activities and the Project as a whole;

— quantitative assessment — the quantitative analysis of the risks emergence probability and the impact of the risks consequences on the results of program activities implementation;

— planning the response to risks — the definition of procedures and methods to mitigate the negative consequences of risk events and the use of potential advantages.

Thus, the proposed mechanism of the territorial development strategic processes management provides the strategic documents realization by increasing the efficiency of cross-functional interaction between the main participants of territorial development along with the definition of their project roles and areas of responsibility, consolidation of required resources and establishing the efficient system of activities implementation assessment monitoring.

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Megaprojecting as a tool of strategical and territorial management *

Modern territorial strategic management needs upgraded tools. Today megaprojects are the actual but ambiguous strategical management tools of territorial development along with the federal target-oriented programs. There are both positive and negative examples of territorial megaprojecting in history. The article divulges the reasons for the development of territorial megaprojects; it describes their distinctive features and risks. The conditions for the effective practical application of territorial megaprojects in the sphere of strategic territorial management are substantiated in the article.

Macroregion, development, strategy, target-oriented approach, megaproject, risk.

Inna V.
MITROFANOVA
Doctor of Economics, the Chief Scientific Associate of the Institute of Socio-Economic and Humanitarian Research of Southern Science Centre of RAS
mitrofanova@volsu.ru, mitrofanovaia@rambler.ru

Alexander N.
ZHUKOV
lecturer of the Volgograd Institute of Business
labser@volsu.ru

Megaprojecting is a new tool of strategical and territorial management on the global and macroeconomic scale. The state has the right to consider that the reform is successful if it allows the country to have capital-intensive projects. Megaprojects implementation is the modern manifestation of the institutional, organizational and information transformations of the economic space of the global economic system [3, p. 15].

Megaprojects are extremely large-scale and global investment projects (more than $ 1 billion; regardless of spatial implementation level) *(table)*.

Large-scale investment project may achieve the status of a megaproject, if it is a long-term capital-intensive project, characterized by complexity, high cost, systemic nature and target significance [3, p. 15].

In authors' opinion, modern territorial megaprojects are large-scale projects, which have the characteristic mentioned above and which are included, as a rule, in the federal, district, regional strategy or program. On the other hand, these megaprojects can be integral target front-pendulum or focal programs of inter-regional, macro-economic and global scale, which involve many interrelated projects that are united by the common purpose, dedicated resources and defined implementation period [17, p . 13].

In addition, megaproject can also be selected as a separate format for the development of a territorial strategy [2, 8, 15, 20].

Only those projects, which change the economic landscape of modernizing economic space in terms of the given strategic direction, can be called megaprojects [3, p. 15, 12, p. 17-19, 24, p. 40-42].

The territorial nature is a priori characteristic of any program or project, because they are implemented in a certain space, and the facilities of program and project arrangements and resources are located in a particular area [22, p. 262]. The nature of socio-economic program needs is determined by the composition and structure of the territory's population; it is influenced by geographic, climatic, cultural, historical and other conditions of a particular territory. However, despite the fact that in a broad sense territoriality inheres in all the strategic initiatives, including the strategies and target developmental programs for the Federal subjects of Russia and their investment projects, there is a necessity to separate a class of territorial megaprojects with the following specific features: firstly, the objectives, problems and scope of megaprojects cover a large-scale ter-

The classification of investment projects [23, p. 90]

Classification feature	The type of project				
Project level	Project	Program		System	
Scale (size) of the project	Small	Medium		**MEGAPROJECT**	
Complexity	Simple	Organizationally complex	Technically complex	Resource complex	Multilaterally complex
Implementation period	Short-term		Medium-term	Long-term	
Quality perspective and the ways to improve it	Free of defects		Module	Standard	
Resource limitations	Multiproject		Monoproject		
Type of project according to the level of participants	International (joint)		Domestic (national, district, interregional, regional, local)		
The purpose of investing	Anti-recessionary		Modernization/ Reformation/ Restructing		
	Marketing		Innovation		
	Educational		Extraordinary		
The object of investment	Financial		Real		
The main cause of a project	Opening possibilities	The necessity of structural and functional reforms	Modernization		
			Integration		
			Diversification		
			Reorganization		
			Restructing		
	Extraordinary situation		Re-engineering		

ritory (country, region, the group of regions, etc.); secondly, the targets of megaprojects are associated with the solution of systemic problems aimed at the sustainable, competitive, safe and balanced development of social, nature and economic systems of one or another hierarchical level [22, p. 263].

There are the following features of such projects:

— territorial megaprojects improve existing and form new territorial proportions and effective integration inter-regional relations, which define the long-term common interests of regional systems; this fact improves the possibility to use rationally the advantages of each of them in order to achieve common objectives and increase the total efficiency of social and economic complex of a macroregion on the whole;

— they cause a diversion of significant capital investments, material and labour resources in the long lag of expected results; it can lead to long-term trends in the distribution of capital investment and utilization of productive potential of macroregional subjects;

— these projects become the sources of centrifugal forces correcting the interests of industries and territorial entities, which can provoke a chain reaction affecting the numerous allied industries that take part in project implementation;

— they contribute to the creation of powerful strategic (district and federal) infrastructure projects, which become a condition for the inclusion of new resources into the economic turnover and the creation of major centers of economic and social development;

— they need the resource accumulation by a single fund holder;

— they impose entirely new requirements for assessing target usability of territorial resource combinations and conditions for the benefit of macroregional community;

these projects involve the organizations of different departmental subordination;

— they are based on the combination of sectoral, territorial and program planning;

— they should reflect all the stages of the triad "economy (manufacturing) — nature — population", beginning with the theoretical and methodological prerequisites for the pre-planning researches and developments and concluding with real investment and production processes;

— they stimulate the development of a mechanism for the complex non-departmental expertise of major inter-related projects that form a megaproject;

— these projects are characterized by unique temporal and spatial boundaries, and the problems of territories' development that have "programmed nature" can be solved within the scope of them [12; 24].

Management experience based on the program-oriented approach to the development of territories of different levels, which was accumulated in Russia, allow us to point out a number of conditions requiring the use of such a tool as megaprojects to solve territorial problems.

First, the objective need for territorial megaprojecting occurs when there are complex and multi-target problems, but the traditional methods of sectoral and territorial management and planning are insufficient to make reasonable decisions due to the difficult situation generated by the tangle of diverse interests and relationships within the territorial community.

Second, the time interval, which is required to identify and resolve problems, does not fit in with the medium term. Meanwhile, it is reasonable to consider the whole history of each problem in time and define the most important stages of its growth. Each territorial problem has its own temporal logic of development.

Third, megaprojects are required when the distribution area of territorial problems does not coincide with the grids of economic and administrative zoning.

The territorial boundaries of any social and economic objectives depend both on the potential resource capacity and the scale of production factors actually involved in the economic turnover considering the radius of influence of program activities.

There are at least two most widespread decision boundaries of territorial problems. In the first case, these problems integrate several administrative units, which are related by single concept solutions. In the second case, "problem" territory covers only a part of oblast, region or district. The situation is also possible when a territory with its own distinctive problem matches the boundaries of an administrative entity.

Fourth, territorial megaprojects are reasonable in the case, when there is a necessity to use fully cross-sectoral and multipurpose natural resources. Strengthening the inter-sectoral importance of natural resources imposes new requirements for assessing opportunities of multipurpose use of each resource for the benefit of many territorial stakeholders and various organizations. This leads to the changes in traditional approaches, according to which every interested department approaches the subjective prospecting and use of resources (to solve their own problems) and the requirements for their qualitative and quantitative characteristics.

As a result, the same resource can be studied independently by many organizations, leading to work duplication and increased cost of works. In addition, conflicting interests are inevitable in the resource assessment in terms of the development of various spheres of national economy due to their scantiness. Complex use of natural, raw material and intellectual resources requires an interdisciplinary approach, which allows us to create a highly efficient structure of territory's economy, to form a unified production and social infrastructure, promoting more rational use of natural resources.

Fifth, territorial megaprojecting is necessary in the case when the existing forms and methods of control can't combine a number of sectoral and interdisciplinary projects, which are united by the same goals and objectives. Meanwhile, such a linkage is necessary only because of the fact that jointing of sectoral interests causes a chain of internal contradictions. Thus, each sectoral project is aimed at the implementation of specific industrial and economic objectives, so the terms and order of its implementation is determined in accordance with the resource capabilities. The target orientation of the industry is a criterion to determine the temporal parameters of the project. However, sometimes the optimal sectoral terms of project implementation don't coincide with the whole problem implementation, or they can fail to comply with its temporal logic. It is clear that it is very difficult to make a network schedule, which is single and obligatory for all ministries and departments, even in the scope of long-term, strategic planning. It is possible to solve the issues, which are related to the formation of the most appropriate relationships between production and non-production capital investments, various infrastructural branches, construction industry rates and investment, only in the developmental process of territorial target-oriented and target-implementing project.

Sixth, megaprojecting is effective if there is a need for the complex economic development of new territories, especially problematic areas and regions difficult to access. It is possible to develop efficiently the resources of such territories only through the complex solution of socio-economic, scientific and technical issues of their development. The main problems among them are the following: 1) conducting comprehensive researches aimed at the study of environmental components' behavior given under various regimes of natural resources usage; 2) the analysis of usability of technological systems and production means, ensuring

human labour-saving and reducing the impact of complex natural and climatic conditions for production activities, daily life of people, as well as promoting the effective economic development of the territory's raw materials [1; 5; 13; 14; 15].

R.I. Schnieper, A.S. Marshalov and A.S. Novoselov point out the fact that territorial megaprojects include "the implementation zones of territorial problems that deal with the significant shifts in the distribution of productive forces, economic development of new territories, radical re-specialization and intensified use of the economic potential of regional development and formation of program-target territorial and production complexes" [12, p. 7].

There are the following conditions of the necessity to develop territorial megaprojects: a significant change in the spatial strategy and breaking the current economic structures and territorial proportions; the economic development of new territories in the extreme conditions; inter-regional and intra-regional interindustrial cooperation that is aimed at the complex use of multi-aspect resources and establishing new territorial and production complexes, clusters; implementing long-term projects, which have large-scale economic, social and environmental impacts; the complex use of all intensification and modernization reserves lying in the field of sectoral and territorial development; the use of specific institutional, organizational, economic and managerial levers to solve territorial problems [12, p. 8].

The starting methodological points that should be assumed as the basis of territorial megaprojecting are:

1) the marked interdisciplinary and systemic character of pre-studies, which integrate theoretical and applied problems; as a result, it is possible to develop a unified system of concepts and quantitative assessments, which allow using obtained particular results to make complex conclusions and generalizations;

2) the importance of pre-planning and project studies with the participation of scientific and design organizations, which are kept in the development of specific practical decisions at the stage of megaproject implementation;

3) the polyvariant character of the study of the territorial megaproject's various aspects for different environmental conditions, when the most heterogeneous activities that are planned to be implemented must be linked and coordinated to ensure the project's integrity; project's variability, which extends the use of its maneuvering characteristics;

4) the need for the comprehensive solution of the problem related to ensuring the harmonious interaction of the elements of the territory's productive forces with its natural environment; it is necessary to use such technological schemes and the means of production, which wouldn't infringe the allowable norms of people and their production invasion into natural environment [10; 11; 16; 21].

There are three interrelated territories which are influenced by the implementation of a territorial megaproject. First, they are the territories whose socio-economic development is affected directly by megaproject implementation.

The size of the territory varies depending on the location of explored reserves and the possibility to involve them into the economic turnover in the next 5 — 15 years, as well as on the scale of the resources involved into the turnover which were explored before but which are still laid up. In this zone one will continue increasing raw material potential and establishing on this base transport, industrial, territorial and production complexes, clusters, industrial centres, urban settlements, constructing production and social infrastructure, developing non-production sphere, etc.

Second, there are the territories that are adjacent to the zone of megaproject implementation; they are the resting bases of construction

works, staffing, trade, material and technical support for construction. These territories are the main suppliers of the population with agricultural products, they distribute repair facilities, etc.

Third, there are territories, districts and regions, which are involved in scientific training, design, constructing industrial, social and infrastructure facilities, forming financial and material resources, which are necessary to implement a territorial megaproject [11, p. 110; 20].

During the process of megaprojecting it is necessary to consider the interests of many sectors, which take part in the program implementation or perform contiguous functions.

To achieve the general and local objectives of a megaproject the industries should:

✓ give arguments for the feasibility of ministries and agencies' participation in a particular project at the various stages of its implementation; take into account the interests of the industries associated with the use of natural resources;

✓ take into account temporal, production, material and technical constraints in determining the structure and scale of production, as well as the relation between direct and embodied labour; choose the technological systems that meet the requirements of innovations, climatic conditions and mineral resources, which will involve the development of the production sectors of the economy;

✓ keep on the project network schedules; predict and plan the arrangements ensuring the compliance with ministries and agencies' project commitments, in which they participate;

✓ implement program requirements in planning their activities, taking into account not only the efficiency of the industry, but also the need for achieving megaproject's objectives when time and resources are minimized; prepare project documents, considering territorial specifics and the scope of territorial subjects which are included in the project;

✓ place orders in the manufacturing companies for future businesses in advance; coordinate technical characteristics of machinery and equipment with the relevant control elements, as well as their ability to save direct labour and minimize negative impacts on the environment;

✓ create trusted construction industry in accordance with the project size, deploying it in time and in accordance with the volume, structure and capital investment at every stage of the project;

✓ geographically place the necessary objects of the construction industry in accordance with the approved forms of spatial organization of the territorial megaproject; develop and modernize transport infrastructure of the territory where the project is implemented, taking into account the forming sequence of regional clusters; create conditions for forming stable intra-and inter-regional transport economic ties.

Every industry subordinates its own interests to the general interests of the project, therefore, the implementation of the principle of feedback requires the consideration of the industry's interests:

◆ the need to cater for short-range and long-term interests of the industry in determining the temporal sequence of megaproject development and the network schedule of its implementation; providing the future sectoral enterprises with local resources with the right of their preferable exploitation; the development of inter-industry production to provide the megaproject's participants with repair and other services;

◆ the creation of a reliable power base; forming an integrated transport system to serve the needs of the project, which will take into account the size and structure of transport and economic interests of the territorial subjects and each participant of the project;

◆ early identifying the position of the project leadership towards the sectoral proposals

of the territorial organization of the economy; architectural and planning decisions, the principles of settlement and material support; taking into account the interests of a sector in defining the territorial policy of forming the balance of labour resources, general project technical and technological strategies, etc. [1, 18, 19].

Russia has considerable historical experience in megaprojecting, both positive (Trans-Siberian Railway) and negative (The Baikal-Amur Mainline). Today the Government of Russia has emphasized clearly its strategic goals and formed the complete system of institutions to implement them. It has become a powerful impetus for forming a network of megaprojects in Russia. The project base of megaprojecting, which had been developed by 2010, was the result of private initiative and the effect of a new public economic policy.

World experience shows that megaprojects traditionally involve infrastructure investment projects, including the projects aimed at the construction of large units: transport infrastructure (aerospace, air, rail, motor traffic, oil and gas transit, international transport corridors); the infrastructure of national and regional innovation systems including infrastructure facilities of the federal and regional nanotechnology network, for example, mega-science centers — large research centers aimed at the collaboration of a number of countries in order to develop and produce new nanoproducts and nanomaterials, as well as to train new specialists for nanotechnology [3, p. 15-16].

World megaprojects generate the development of adjacent sectors, high redivision economy, services and knowledge; they are the core of modern clusters; they are the customers and suppliers of a huge amount of goods and services, the inter-regional centers of economic development.

Over 1000 investment projects had been planned to be implemented in Russia by the beginning of 2010; the investments of about 130 of them exceeded $ 1 billion.

The total amount of investments for these projects exceeded 12 trillion rubles. It is possible to point out megaprojects among them, which were supported by the budget assignments of the Investment Fund of Russia. The total number of such projects amounted to 26. It was planned to invest 3.3 trillion rubles, of which 2.1 trillion rubles should be invested by private investors and 1.2 trillion rubles should be invested by the Government. Most of these projects were based on the integrated approach, which implies overcoming of socio-economic constraints in the development of the regions through forming industrial area on the base of new industrial enterprises and infrastructure construction [4].

The problem of Russian megaprojects is their high emphasis on those industries which reproduce the current industrial and raw material model of the country's development. Fuel and energy complex, metallurgy, infrastructure industries dominate in terms of investments among planned megaprojects. However, the development of infrastructure and industry for most regions, where these projects are planned to be implemented, is the first step towards the realization of higher redivision and higher added value projects.

Today, most Russian megaprojects are focused on the new economy branch. As a rule, they include chemical industry, timber industry, tourism, innovation, as well as large development projects.

According to experts, planned territorial megaprojects (Industrial Urals – Polar Urals, BELKOMUR, Integrated Development of the Lower Angara River Region, Integrated Development of South Yakutia), the first three of which are being implemented now, are aimed at the transformation of the economic space of the eastern part of Russia. Ural, Siberia and the Far East are macro-regions, where capital-intensive economic growth, which is based on the coordination between government and business in implementing major investment

projects, will dominate in the nearest 15 − 20 years. However, in spite of all the predicted positive effects for the subjects of these macroregions, such spatial concentration of megaprojects can not increase asynchrony, asymmetry and differentiation of Russia's spatial development.

There is a need to work out a strategy for the development of the Southern macroregion in the scope of megaprojects, which will be a new type of strategic planning in the macroeconomic and global dimensions. Its purpose is the development of the South macroregion (consisting of the Southern Federal District and North Caucasian Federal District) as a megaregion in the global economic space.

Strategic directions, developing a meaningful concept of a megaproject include: the creation of new and the development of existing international transport corridors and road networks, modernization of sea and river ports, airports, rail terminals, rationalization of energy infrastructure, expansion of recreational facilities infrastructure, investment support for the unique nature reserves of the North Caucasus.

However, their successful implementation requires the systemic involvement of strategic programming in all subjects of the Southern macroregion, and it is impossible without the support of the Federal Government. Only a combination of the directed state development with the initiative of subjects which are at the different levels of spatial hierarchy will effectively realize the competitive advantages of the southern regions in the country and increase their importance in the global and national economic space.

The concept of the priority megaproject "Development of the South of Russia" needs further improvement to meet the main task of mobilizing resources for the effective development and modernization of the social, nature and economic system of the Southern macroregion and considering the global trends and

interests, as well as the creation of a portal for the international movement of goods, services and capital in the Southern Federal District and North Caucasian Federal District [15; 16].

The implementation of megaprojects is related to organizational, legal, administrative, managerial, macroeconomic, financial, engineering, political and other risks. Thus, organizational and legal risks are caused by the implementation of Russian megaprojects in the constantly changing legal environment. The legal framework of the Investment Fund of the Russian Federation, the Law on Concessions, the Law on Special Economic Zones, the regulatory framework of functioning of public companies and corporations are amended infinitely.

As for administrative and managerial risks, unfortunately, megaprojects and especially the most difficult of them, which are being implemented in Russia today, suffer from nonoptimal control and the multiplicity of responsible executors. The principal of "a single window" is necessary because investors need one responsible executor representing the state and business.

World experience shows that the risks of routine and low-quality engineering solutions are one of the most important for any megaprojects, which are implemented in the situation when there are significant problems in the domestic engineering industry. Despite the emergence in Russia of a number of major international engineering and construction mega-companies [9], the quality of engineering and construction services in Russia is poor after a long pause in the implementation of major projects [4].

New businesses and infrastructures have not been established over the last 20 years in Russia, leading to the serious degradation of engineering. It is necessary to restore engineering sector over again and create a network of sectoral project organizations, using the mechanism of public-private partnership (PPP).

However, it should be done in close cooperation with the leaders of world engineering, which requires the liberalization of technical regulation and urban policy, because technical town-planning requirements, adopted in Russia, are tangled and largely conservative, they are constantly complicated. They demand more agreements, expertises, etc. It is necessary to bring national engineering standards closer to international standards in order to achieve progress in this important sector.

We need transparent instruments of state support to create housing and municipal infrastructure, a special procedure of land and mineral resources disposal in the scope of the complex megaprojects of territorial development.

Conclusion

Insufficient experience in functioning of developmental institutions in Russia has demonstrated a significant deficit of culture and experience in the territorial megaprojecting risk analysis and management. The important characteristic of a megaproject is its publicity and high public response.

The conceptual strategic thinking requires the renunciation of a strict "utilitarian approach", when working out strategies and programs for the development of territories. In our opinion, it is a value approach that characterizes a new level in the development of strategic territorial management. And megaprojects are designed to be the key points of territorial development bifurcation, opening the possibility to make an alternative choice.

According to the value approach, an important condition for the choice of a megaproject includes values matching (integration into the system of environmental values) and management scale matching. It is necessary to include the territory into the zone of macro- and middle-spatial global changes in order to involve territory's assets into the global exchange.

Therefore, the strategic target of the megaproject should, in particular, reflect the desire of a country, a district or a region to expand its participation in the global exchanges and enhance its value (through capitalization) in this system, increasing the value of their assets, especially human capital and environmental quality of life activity in a society.

Under present-day conditions the sense of the districts and regions development strategies in Russia is changing, while the development of regional megaprojects is a fairly new practical task, which is not only the prerogative of the Federal Center, because it "runs counter to the interests and approval principles of constitutional economy and civil society" [6, p. 6-7; 7].

These are just the social, nature and economic systems of the middle level — regions and macro-regions, which should actively organize the systemic reproduction of resources today, they should integrate the systems, which are at the lower hierarchical levels, as the spaces of interaction of territorial systems. An important condition for such integration is improving the tools of territorial development strategic management.

The grounds for the development of territorial megaproject may include: paradigmatic change in the national spatial strategy; the transformation of current economic structures and territorial proportions; the economic development of territories that are in the extreme conditions; ensuring inter-sectoral collaboration in the use of various resources and in the formation of new territorial and industrial complexes, clusters; the implementation of long-term projects that have significant economic, social and environmental impacts, social pronounced effect; the integrated use of all intensification and modernization reserves, lying in the sphere of sectoral and spatial development; the application of specific institutional and organizational arrangements in order to solve the territorial program problems.

Territorial megaprojects, as opposed to financial investments, focused on a concrete material result that should have a significant prolong impact on the transformation of economic space, and the processes of their development and implementation require extensive pre-planning research, implementing competency, effective development institutions, the convergence of public and private interests, publicity and high public response. They catalyze the development of the adjacent sectors, high value-added economy, services and knowledge, clusters and inter-regional cooperation. Innovative strategic territorial management in the regions and districts of Russia is associated with the development of the concept of territorial mega-projecting and the modernization of technology for its implementation.

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On assessing the contribution of an innovation factor to the results of the regional economic development

Nowadays, innovations are regarded as the main factor of economic growth in the region that is recognized by both public authorities and scientific community. In this regard, one of the major scientific challenges is to assess the contribution of an innovation factor to the results of the regional economic development. The researches of this problem presented in the literature are based on the use of production functions apparatus – Cobb – Douglas model, Solow growth model. The author suggests assessing the contribution of an innovation factor to the results of the regional economic development basing on the assessment of various aspects of effective innovation activity – the efficiency of innovation projects, innovation activity of enterprises in the region, management efficiency of innovation processes in the region. Integrated assessment proposes to compare in dynamics the growth of gross regional product and regional innovation cost.

Innovation factor, innovation activity of an enterprise, assessment of innovation management efficiency.

Sergey S. NEUSTROYEV
Ph.D. in Economics, Doctoral Candidate, the Institute of Problems of Regional Economy of RAS
info@iresras.ru

Under present-day conditions the economic development of a region should be based on the extensive use of innovation and formation of innovation economy, because the forced consumption of natural resources and subsidies from the federal budget, which is typical for the recent years, can not provide the long-term sustainable development of regions.

The necessity of innovation economy is recognized by both the state and scientific community. This way is called the strategic direction of our country's development in the first half of the XXI century [4]. Foreign scientists (F. Fukuyama, A. Toffler, D. Bell, J. Naisbitt, etc.) believe that innovation economy ensures the world economic supremacy of most developed countries that implement it [3, 6, 8, 11].

The Strategy for Innovation Development of the Russian Federation for the period until 2020 emphasizes that the innovative development is the main source of economic growth. According to this document, economic transition to the innovative socially-oriented model of development is the only possible way to ensure a high level of public welfare and secure our country's geopolitical role as one of the global leaders [7].

There are different approaches to innovations in literature. However, it is possible to point out the main feature of innovation that is noted by most authors: it is a practical application of innovations [1, 2, 4, 10]. Thus, the innovation is understood as a result of science, engineering and technology, which is used in practice.

Accordingly, the innovation factor is a driving force of regional economic development aimed at enhancing innovation, the development, commercialization and implementation of innovations for ensuring economic growth in the region. In our opinion, the innovative factor in the development of regional economy, as opposed to natural resources, should be used and significantly improved. In order to use innovations as a developmental factor, it is necessary to assess their contribution to the regional economy.

The problems of innovation factor's influence on the development of economic systems have been actively studied since the mid last century. Macroeconomic modeling with the apparatus of production functions was used to fulfill this task. Modern neoclassical models of economic growth are based on the production function, and they are focused on the prerequisites for full employment, flexible market prices, as well as the complete interchangeability of production factors. The attempts to study the influence of production factors' quality (their efficiency) over economic growth have led to a model of the Cobb − Douglas production function [9].

The Cobb − Douglas production function is a result of mathematical transformation of a simple two-factors production function $y = f (x_1, x_2)$ that reflects the dependency between the amount of output y and two types of resources: material x_1 (costs raw materials, energy, transportation) and labour x_2.

The Cobb − Douglas function is of the following form [5]:

$$N = A \times L^{\alpha} \times K^{\beta},$$

where: N − national incomes;

A − dimensionality coefficient;

L and K − the amount of labour and capital expended, respectively;

α and β − constants (coefficients of production elasticity of labour and capital K).

The Cobb − Douglas function shows the share of the total product that is awarded to the production factor that is used in manufacturing of this product. This feature of the model was considered by an American economist, 1987 Nobel Prize winner for the fundamental research in economic growth theory Robert Solow, who proposed to complete a model with such a factor as technological progress. Solow meant the totality of the qualitative changes in labour and capital under the technological progress.

The Solow growth model describes the mechanism of long-run economic growth, preserving economic balance and full employment of factors. The model identifies the technological progress as the only basis for sustainable welfare growth. However, the Solow model, emphasizing the importance of technological progress for economic growth, does not allow us to determine its impact on this growth (such as to other factors − labour and capital).

Russian authors prove the possibility to use the model of production function, which involves exogenous controlled function of "involvement in innovation processes" besides endogenous neutral technical progress, in order to assess the influence of an innovation factor over economic growth rates. The contribution of innovation factors is to be calculated through this function as a relative change in the complex of indicators of innovation factors prevailing in the world experience, i.e. as a dimensionless rating quantity [9]. Author's conclusion is interesting: scientific-technical progress plays quite a serious role in the economy of Russia, however, the net contribution of innovation factors (including institutional innovation) is too low. Innovation factors have not reached the level of use, which allows transition to accelerated economic growth.

In our opinion, it is possible to assess the impact of the innovation factor on the regional development basing on the evaluation of innovation efficiency.

In this case some different aspects of innovation effectiveness can be considered:

• effectiveness of innovation projects that are strategically important for the regional development;

• innovation activity of enterprises in the region;

• effective management of innovation processes in the region.

The methodology for assessing the effectiveness of innovation projects is widely represented in the literature. Such projects can be considered as investment ones; it is possible to use the Guidelines for the evaluation of investment project efficiency, UNIDO methodology, the works of Russian and foreign scholars that are devoted to this subject [1, 2, 10].

All methods of assessing project's efficiency can be divided into two groups based on discounted and accounting estimates. In modern Russian conditions the discounted methods for evaluating project's effectiveness are preferable because they take into account inflation, interest rates, rates of return, etc. According to these methods, the indicators of project's effectiveness are net present value, internal rate of return, payback period, etc.

As it is proposed to consider strategically important projects, the criteria for labelling the projects as strategic should be defined. This can be determined by the share of budget financing of the project − the more the project is important for the regional development the more such share is; it also can be defined by budget efficiency − budget revenue growth due to project's implementation, and by social significance − the acuteness of the social problem that is solved by the project. In addition, since we are talking about innovation projects, it is necessary to take into account the level of results' novelty that can significantly influence a region's competitiveness on the domestic and foreign markets.

The second aspect of effectiveness is the innovative activity of enterprises in the region.

According to the statistics of Russia, innovative businesses are the companies which have implemented innovations over the last three years or the companies which are investing innovations during the reporting year. Three approaches are proposed to be used in science literature for assessing an enterprise's innovation activity: formal, resource and cost-based, resultative [10].

The main task of a researcher in the formal approach is to identify the activities that can be classified as innovative. The resource and cost-based approach is formed on the valuation of various resources that are used by the company at all the stages of innovation process in monetary terms. It is necessary to identify the kinds of activity that are classified as innovative and the types of resources and costs that are considered in the assessment in order to implement this approach. The resultative approach is based on the identification of possible effects that can be achieved by an enterprise due to innovation activity and their money measure. It is necessary to identify the effects that will be taken into account when assessing innovation activity.

In our opinion, it is better to use the resultative approach in the context of this problem. It is possible to use as the results such indicators as value added created through the implementation of innovation, profit, product cost savings that are obtained due to innovations, as well as product quality growth, increase in job satisfaction among employees, etc. A variety of companies' innovation activity indicators demonstrates the versatility of the characteristics and, at the same time, the possibility of an integrated assessment.

There are different methods for the integrated assessment of a complex phenomenon on the basis of heterogeneous factors or characteristics. It is possible to use a graphical method, when a composite index is defined as the area of the polygon, which vertices number corresponds to the number of particular characteristics considered [10].

In this case the actual values of indicators are compared with standard values that correspond to the best value among the regional companies or that are set by experts. The normalized values of indicators are changed in the range from 0 to 1. One shows the highest level of innovative activity for this indicator, zero shows the absence of innovations.

A leaf-type diagram, showing the distribution of indicators' values in the point of origin, is based on normalized values. The graphical interpretation of a complex index helps to interpret the diverse characteristics that determine the intensity of innovation activities of an enterprise. It is possible to carry out a comparative spatial analysis using this method and determine the general state of innovation activity in the region and its dynamics.

The assessment of innovation management efficiency in the region is the most difficult one. We believe that it is possible to assess three positions:

➢ results achieved;

➢ conditions that are created at the moment for future results;

➢ organization of management process.

In order to assess the first position, it is necessary to determine the indicators characterizing the results of innovation activity in the region, then their target values are established, the degree of achieved target values of innovation activity indicators is estimated by comparing them with the actual indicators obtained in the analyzed period.

It is reasonable to include the following indicators among the showings of the regional innovation activity:

◆ the total number of innovation projects;

◆ the number of innovation projects that are successfully completed;

◆ the amount of research fundings at the expense of the regional budget;

◆ the scientific and technical level of research;

◆ the share of off-budget financing of innovations;

◆ the number of patents;

◆ the number of new products, services and businesses that are launched.

The above list of indicators is not exhaustive; it should be formed taking into account the characteristics of innovation activity in the region.

It is reasonable to assess the possibility of achieving results in future (i.e. the conditions that are created for them) by the amount of diverse resourses, which are involved in innovation activity at the moment.

They are:

✓ the number of people employed in the innovation sphere (intellectual capital);

✓ the number of scientific, research and educational institutions, innovation and implementation structures, including industrial parks, business incubators, etc. (as the material base of innovations);

✓ the number of innovative companies;

✓ total financial resources that are invested into innovation activity.

The organization of innovation management is estimated by experts as a quality of conformance to the following requirements:

➢ feedback efficiency as the possibility to respond rapidly to the signals of external and internal environment (the rational management of organization);

➢ the ability to influence proactively the opportunities and threats that are caused by the external environment (a variety of interaction forms of different administrative authorities and the structure of their tasks, high quality of planning and analytical support for decision making);

➢ effectiveness as a low cost value of management system operation.

Some criteria can be used to evaluate the performance of each requirement, which will increase the validity of expert opinion.

We propose that integrated assessment of innovation factor's contribution to the results of economic development (ED) should be based on the ratio of GRP growth to the increase in the cost of innovations:

$$ED_i = \frac{GRP_t - GRP_b}{I_t - I_b} \times 100,$$

where: GRP_t, GRP_b – gross regional product in the reporting and base period, respectively, rub.;

I_t, I_b – total cost of innovations in the region in the reporting and base period, respectively, rub.

Of course, GRP growth is ensured not only by innovations; it is influenced by many factors. Therefore, the assessment by this formula should be considered in dynamics; it is necessary to account it for several periods and analyze the changes.

In summary, we have drawn the following conclusions:

• the innovative factor of economic development plays a key role in the modern world;

• the impact of innovations on economic growth is reflected mainly through macroeconomic modeling using the apparatus of production functions;

• the assessment of innovation factor's contribution to the development of the regional economy was based on assessing various aspects of innovation effectiveness – innovation projects efficiency, innovation activity of enterprises, effective innovation management in the region;

• it is reasonable to compare GRP growth and innovation costs in dynamics in order to assess fully the contribution of innovation factor to the development of regional economy;

• the assessment of innovation efficiency is a separate and many-sided area of economic knowledge, and it has a great potential for further researches.

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Analysis of trends and development forecast of small enterprises in Russia

This article describes the researching results of trends and development tendencies of small enterprises in Russia and its regions. It presents a number of developed economic and mathematical models that describe the structure and distribution of small-scale enterprises depending on the number of employees. Some indicators of small business according to the types of economic activity are presented here. The author considers the production functions reflecting the dependence of turnover on two factors and describes the forecast results of the main indicators of small business in 2030.

Small-scale enterprises, economic and mathematical model, production function, turnover, number of employees, investments, forecasting.

Yuliya S. PINKOVETSKAYA
Ph.D. in Economics, Assistant of Ulyanovsk State University
judy54@yandex.ru

The President and the Government of the Russian Federation have defined an extensive development and support program for small business in our country. A significant increase in the role of small-scale enterprises in all economic sectors is identified as the main direction here.

This article reviews some results of the author's researches devoted to small business in the whole country and its federal subjects (oblasts, krais and republics). The aim of the study is to analyze developmental mechanism and trends of small enterprises in Russia, as well as to develop the forecasts of small business activity in 2030. The major tasks accomplished during the study were the following:

— analysis of the main characteristics of small enterprises in today's economy of our country and its regions;

— construction of economic and mathematical models describing developmental mechanism and trends of small business and its dynamics;

— forecasting of this economic sector and its elements.

Theoretical and methodological basis of this research consists of the scientific concepts presented in the works of local and foreign scientists in the field of institutional economics, theory of small-scale business, economic and mathematical modeling, management theory; legislative and regulatory acts of governmental authorities, federal laws and regulations of the Government of the Russian Federation relevant to small-scale business.

The methods of logical, economic and statistical, clustered and system analysis, mathematical statistics and econometrics were used

in the study. Such computer programs as "Statistica", "Microsoft Office Excel", "Mathcad", "Maple", "Mathematica" were used to achieve the objectives and process information.

Information base was made by the materials of the Federal State Statistics Service [8, 9, 10], regional and municipal statistics, laws and regulations, periodicals, scientific publications, conferences, symposia, the Internet and author's researching results.

It is known that state ownership had been dominating as the major type of property in Russia and in the Soviet Union till the 1990s. All enterprises were state-owned and most of them were large in size.

The formation of entrepreneurial organizations began in the 1990s. At this particular time, the enterprises owned by individuals and groups of people were established. So, the first cooperatives were set up. They were among the first real private companies. Later, due to the development of laws, they were replaced by various types of small-scale businesses and firms. The number of small-scale enterprises and organizations also increased after privatization in 1992. Small-scale enterprises are the most widespread type of business structures in recent years.

Thus, such entirely new economic sector as small-scale business has been created in the country over twenty years. Of course, it was difficult to form it. The transition from a socialist model to a capitalist model of economy was followed by the economic crisis and high inflation rate. The problems of legal, economic and financial support of the business were not solved in time. The laws aimed at the governmental support for small business didn't keep up with the development of this economic sector. There was a lack of financial support of small-scale enterprises by the state.

As mentioned [11], two ways were used to create small private enterprises. They were small-scale privatization and citizens' initiatives. Small-scale privatization included the transfer of small state-owned enterprises in trade, services, catering to the ownership of their labor collectives. Later, in most cases the rights of ownership to these firms were concentrated in the directors' power who bought the shares of their employees. The second method was based on the creation of new small private enterprises "from scratch". They belonged initially to one owner or the group of founders, who used their money and other resources. Today the difference between privatized businesses and newly established small enterprises is almost obliterated. While the structure of entrepreneurship was being transformed, the legislation of that economical sector was being changed too.

The basic law of Russia, defining the legislative basis of small-scale enterprises today, is the Federal Law № 209-FL dated July 24, 2007 "On the development of small and medium enterprises in the Russian Federation" [21]. The law determines limiting values in the average number of employees for small business amounted to one hundred people inclusive. There are micro-enterprises among small businesses. It is possible to have up to fifteen employees for them. In addition, there is a restriction of the governmental share in the authorized capital at the rate of 25%. The law points out that the maximum values of proceeds from the sale of goods (works, services), as well as the value of small enterprises' fixed assets are determined each year.

There were 1.594 million of small-scale enterprises in Russia in 2010. About 16.16% of the employed population worked in small-scale enterprises. The total production of small businesses amounted to 15% of GDP. Nevertheless, their developmental level isn't sufficient. There were about 900 small-scale enterprises to one hundred thousand people in Russia on average. This rate is significantly lower than in the European Union and the United States (4500 and 7400 small-scale enterprises, respectively) [20, 23, 26]. *Table 1* shows the economic performances of small-scale enterprises in Russia for the period till 2010.

Small-scale enterprises are specializing in five key areas of activity now: manufacturing, construction, trade, transport and communications, real estate transactions. There is a detailed description of different types of enterprises and a list of their products (services) for each kind of economic activity in "National Classification of Economic Activities" [17].

Distribution of small enterprises' staff and turnover between the main kinds of economic activity is given in *table 2*. It shows that trading companies predominate over small businesses. The shares of manufacturing, real estate, construction and transport enterprises are substantially lower.

It is important to estimate the kinds of small enterprises' activity in the economic sector of our country in order to consider the trends in the development of small business.

The results of this analysis are presented in *table 3*. It shows the share of small-scale enterprises to the total number of companies operating in the relevant kind of economic activity.

Table 3 shows that trade, construction and real estate enterprises occupy a significant place (30%) in their respective sectors according to the number of employees and turnover. Increased production of small businesses in these activities is limited. However, there are prerequisites for a significant increase in the proportion of small enterprises in manufacturing, transport and communications.

The author has hypothesized in her research that the formation of small-scale business in our country and its developmental level could be described through a complex of economic and mathematical models.

Table 1. The dynamics of small-scale enterprises in Russia

Indicator	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
The number of employees, thousand people	6514.8	6207.8	6485.8	6596.8	6483.5	7220.3	7458.9	7815.1	8045.2	8582.8	9239.2	10436.9	10247.5
The number of small-scale enterprises, thousand	861.1	868.0	890.6	879.3	843.0	882.3	893.0	953.1	979.3	1032.8	1137.4	1347.7	1602.5

Table 2. Distribution of small enterprises by the number of employees
and their turnover according to the kinds of economic activity

Kind of activity	The share in the number of employees in small enterprises	The share in the turnover of small enterprises
Trade	0.33	0.67
Manufacturing industries	0.16	0.10
Construction	0.16	0.09
Transport and communications	0.05	0.03
Real estate transactions	0.16	0.07
Other	0.14	0.04

Table 3. The share of small-scale enterprises according to the kind of activity

Kind of Activity	The number of employees in small enterprises	The turnover of small enterprises
Trade	0.28	0.39
Manufacturing industries	0.15	0.11
Construction	0.30	0.43
Transport and communications	0.10	0.10
Real estate transactions	0.32	0.34

This complex includes the models, which describe the structure of small businesses depending on the number of their employees, the distribution of the main indicators of small enterprises by economic activities, as well as the production functions reflecting the manufacturing dependence on two factors. These models should allow us to establish the trends of small-scale business. These trends could help us to solve a wide range of management tasks in small businesses such as institutional support, planning and forecasting of the development of this economic sector.

The study of the tendencies specific to small businesses was based on the author's methodological approach. Its main feature is a consideration of all small-scale enterprises as a single object of research. Appropriateness of this approach is based on the following reasons. There are a lot of small-scale enterprises in each subject (republics, krais, oblasts) of the Russian Federation. The development of economic and mathematical models for each enterprise is laborious. Small businesses operate under single institutional policies, compete in the markets, interact in the process of labour division, provide people, as well as other companies with necessary products. So, the study dealt with the possibility to construct the models that reflect integrated indicators of all small-scale enterprises in each region of the country.

The methodology of economic and mathematical models included the following steps:

✓ selection and justification of the indicators in each model;

✓ infobase identification;

✓ initial data collection and processing;

✓ selection of the dependence type between the indicators in the models;

✓ reasoning of possible development methods for each model;

✓ software identification;

✓ carrying out the computational experiments by each method and alternatives of the required dependencies;

✓ logical and statistical quality analysis of these dependences;

✓ choosing the best models to approximate the initial data.

The characteristics of small-scale enterprises from all regions of the Russian Federation were used as initial data in the creation of the models. We have examined 21 republics, 9 krais and 46 oblasts of our country. The autonomous okrugs and autonomous oblasts haven't been considered in order to eliminate double counting.

The main models developed by the author are presented below:

Formula (1) describes the dependence of the share of small-scale enterprises in the total number of employees in small businesses [14]:

$$y_{p1}(x) = -0.27 + \frac{26}{x - 0.04} \quad \text{at} \quad 1 \le x \le 100, (1)$$

where $-y_{p1}(x)$ the share of small-scale enterprises with a certain number of employees in the total number of small businesses, %;

x — the number of employees in small-scale enterprises, persons.

The analysis of the obtained dependence (1) allows us to point out the following trends:

• The enterprises numbering up to 15 employees inclusive predominate over small businesses (69%). There are only 9% of enterprises employing more than 50 people.

• With increased number of employees in small businesses, their share in the total number of small-scale enterprises is decreasing monotonically, i. e. there are more companies with a small number of employees than the enterprises with a relatively large staff.

• When the number of workers employed in a small-scale enterprise is approaching to the maximum value (one hundred persons), the corresponding share is vanishing to zero while remaining positive.

Formula (2) describes the dependence of the share of workers employed by small-scale enterprises with a certain number of persons on the total number of employees in these companies [12]:

$$y_{p2}(x) = 3.42e^{(-0.03)x} \quad \text{at} \quad 1 \le x \le 100, \quad (2)$$

where $y_{p2}(x)$ —the share of workers employed by small-scale enterprises with a certain number of persons in the total number of employees in small companies, %;

x — the number of employees in small-scale enterprises, persons.

The analysis of the obtained dependence (2) allows us to point out the following trends:

♦ The total number of employees in small-scale enterprises is decreasing monotonically with their increased size, although, this decrease isn't so sharp as in the first regression model.

♦ More than 37% of people are employed by the enterprises numbering less than 15 persons. More than a half of the employees in small businesses work in the enterprises employing less than 25 persons. So, most people employed in small business work in small enterprises.

♦ More than 82% of people are employed by the enterprises numbering less than 50 persons and 18% of employees work in the enterprises employing more than 50 persons.

We used a regression analysis in order to make the functions (1), (2) [4]. We used standard methods, determination and correlation criteria, Fisher's and Snedekor's test [3, 7]. For the functions (1) and (2) the coefficients of determination are $R_1^2 = 0.996$ and $R_2^2 = 0.982$, respectively; correlation coefficients are $r_1 = 0.998$ and $r_2 = 0.991$. All these values are close to maximum possible, equal to unity. Verification by Fisher's and Snedekor's test equal to $F_{tabl} = 6.61$ showed that the calculated values were much higher, as they were $F_{observ1} = 1172.41$ and $F_{observ2} = 270.4$ respectively. It is evidence of high-qualified models.

In addition to the statistical tests of obtained regression functions, we used logical analysis, which examined the functions for their compliance with the basic data on the whole range of factors, the correct description of economic parameters and processes.

The following author's models describe the distribution of three main economic indicators of small-scale enterprises according to five types of activities mentioned above. We have considered the following indicators reflecting the level achieved by small business: the average number of employees per one small-scale enterprise (x_1, persons), the average turnover per one small-scale enterprise(x_3, mln. rub.),as well as the values of turnover per one employee (x_2, thsd. rub.).

Studies have shown that three indicators had been assigned for all types of activities mentioned above according to the so-called log-normal distribution law. So, there are the following probability density functions:

• for small trade companies

$$y_1(x_1) = \frac{93}{0.32 \cdot x_1\sqrt{2\pi}} \cdot e^{\frac{(\ln x_1 - 1.74)^2}{2 \cdot 0.102}}; \quad (3)$$

$$y_2(x_2) = \frac{59418}{0.46 \cdot x_2\sqrt{2\pi}} \cdot e^{-\frac{(\ln x_2 - 7.95)^2}{2 \cdot 0.212}}; \quad (4)$$

$$y_3(x_3) = \frac{304}{0.45 \cdot x_3\sqrt{2\pi}} \cdot e^{-\frac{(\ln x_3 - 2.78)^2}{2 \cdot 0.203}}; \quad (5)$$

• for small manufacturing enterprises

$$y_4(x_1) = \frac{182}{0.31 \cdot x_2\sqrt{2\pi}} \cdot e^{-\frac{(\ln x_1 - 2.49)^2}{2 \cdot 0.096}}; \quad (6)$$

$$y_5(x_2) = \frac{30400}{0.4 \cdot x_2\sqrt{2\pi}} \cdot e^{-\frac{(\ln x_2 - 6.78)^2}{2 \cdot 0.16}}; \quad (7)$$

$$y_6(x_3) = \frac{363}{0.49 \cdot x_3\sqrt{2\pi}} \cdot e^{-\frac{(\ln x_3 - 2.36)^2}{2 \cdot 0.24}}; \quad (8)$$

- for small construction companies

$$y_7(x_1) = \frac{287}{0.4 \cdot x_1 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_1 - 2.32)^2}{2 \cdot 0.16}}; \qquad (9)$$

$$y_8(x_2) = \frac{13680}{0.37 \cdot x_2 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_2 - 6.85)^2}{2 \cdot 0.137}}; \qquad (10)$$

$$y_9(x_3) = \frac{403}{0.48 \cdot x_3 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_3 - 2.26)^2}{2 \cdot 0.23}}; \qquad (11)$$

- for small transport and telecommunication agencies

$$y_{10}(x_1) = \frac{129}{0.34 \cdot x_1 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_1 - 2.07)^2}{2 \cdot 0.116}}; \qquad (12)$$

$$y_{11}(x_2) = \frac{15200}{0.47 \cdot x_2 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_2 - 6.63)^2}{2 \cdot 0.221}}; \qquad (13)$$

$$y_{12}(x_3) = \frac{152}{0.54 \cdot x_3 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_3 - 1.79)^2}{2 \cdot 0.292}}; \qquad (14)$$

- for small real estate companies

$$y_{13}(x_1) = \frac{171}{0.4 \cdot x_1 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_1 - 1.95)^2}{2 \cdot 0.16}}; \qquad (15)$$

$$y_{14}(x_2) = \frac{11400}{0.4 \cdot x_2 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_2 - 6.33)^2}{2 \cdot 0.16}}; \qquad (16)$$

$$y_{15}(x_3) = \frac{101}{0.5 \cdot x_3 \sqrt{2\pi}} \cdot e^{\frac{-(\ln x_3 - 1.37)^2}{2 \cdot 0.25}}. \qquad (17)$$

The testing of these functions was carried out according to Pirson criterion and Kolmogorov-Smirnov criterion. *Table 4* shows that they do not exceed the tabulated values: for Pirson criterion $\chi^2_{0.90}(2) = 4.61$ [2] and for Kolmogorov-Smirnov criterion $K_{0.05} = 0.15$ [6]. This table shows the calculated values corresponding to each of the functions (3) − (17). The results have proved the high quality of all the developed models and the fact that they are approximate to the basic data.

These economic and mathematical models allowed us not only to specify the average number of employees in small firms, turnover per employee and turnover per one small company, but to describe accurately the structure of small-scale business and its main performance indicators. In particular, it is possible to determine the share of enterprises for various intervals, where these parameters are changed, based on the models calculating the certain integrals.

For example, the predominant number of employees in small trade enterprises (more than 93%) is in the range from 3 to 10 people. The turnover of 93% businesses is in the range of 8 to 50 million rubles. The turnover per employee (in 93% companies) is in the range from 600 thousand rubles to 5.5 million rubles. The values obtained can be used, particularly, in the development forecasting of small-scale enterprises belonging to different kinds of activities.

The average characteristics of the industrial structure of small-scale business in the whole country are represented in *table 5*.

The average values of turnover per an employee given in Table 5 were compared with the respective values of this rate for the concerned kinds of activity in the whole country. The comparison showed that the average turnover per an employee in small trade and construction enterprises is higher by almost 30% than the same average national rate. At the same time, the average turnover per an employee in small manufacturing enterprises is lower by 40% than the national rate. In our opinion, this fact is caused by weak technical and technological equipment of small businesses. Therefore, further development of small manufacturing industries should be based on the extensive use of innovation and investment.

In addition to absolute values, we determine the values that characterize small businesses in all regions of Russia, in terms of the share of small-scale enterprises, specializing in the economic activities stated above.

Table 4. The results of the models' test

Kind of activity	Indicator	Performance criterion	Calculated value
Trade	x_1	Pirson	1.03
		Kolmogorov-Smirnov	0.075
	x_2	Pirson	1.14
		Kolmogorov-Smirnov	0.037
	x_3	Pirson	1.13
		Kolmogorov-Smirnov	0.033
Manufacturing	x_1	Pirson	2.45
		Kolmogorov-Smirnov	0.061
	x_2	Pirson	1.13
		Kolmogorov-Smirnov	0.05
	x_3	Pirson	4.56
		Kolmogorov-Smirnov	0.06
Construction	x_1	Pirson	1.27
		Kolmogorov-Smirnov	0.03
	x_2	Pirson	4.44
		Kolmogorov-Smirnov	0.06
	x_3	Pirson	0.43
		Kolmogorov-Smirnov	0.02
Transport and communications	x_1	Pirson	1.79
		Kolmogorov-Smirnov	0.04
	x_2	Pirson	1.13
		Kolmogorov-Smirnov	0.03
	x_3	Pirson	1.11
		Kolmogorov-Smirnov	0.04
Real estate transactions	x_1	Pirson	2.68
		Kolmogorov-Smirnov	0.07
	x_2	Pirson	1.05
		Kolmogorov-Smirnov	0.03
	x_3	Pirson	2.5
		Kolmogorov-Smirnov	0.03

Table 5. Average values of the main rates

Kind of activity	x_1, persons	x_2, thsd. rub.	x_3, mln. rub.
Trade	6	3152	17.83
Manufacturing industries	13	964	11.87
Construction	11	1006	10.89
Transport and communications	8	839	6.84
Real estate transactions	8	608	4.41

At the same time, we have calculated three main indicators, which reflect the characteristics of small enterprises in full:

— the share of small enterprises, specializing in the certain activity in the total number of small businesses (x_4);

— the share of employees number in the small enterprises, specializing in the certain activity in the total number of small business employees (x_5);

— the share of turnover of small enterprises, specializing in the certain activity in the total turnover of small business (x_6).

The studies have shown that the values of these indicators for various regions of Russia are over the small range. That is, the indicator's value is almost independent of the subject's location, its size and the developmental level of small business in it. The results of calculations are presented in *table 6*.

Table 6. The share of small-scale enterprises according to the kinds of activity

Kind of activity	Indicator	Average value	Standard deviation
Trade	x_4	0.4	0.05
	x_5	0.28	0.06
	x_6	0.59	0.09
Manufacturing industries	x_4	0.12	0.03
	x_5	0.17	0.05
	x_6	0.12	0.05
Construction	x_4	0.12	0.02
	x_5	0.16	0.04
	x_6	0.12	0.06
Transport and communications	x_4	0,06	0.01
	x_5	0.06	0.02
	x_6	0.03	0.02
Real estate transactions	x_4	0.16	0.03
	x_5	0.14	0.04
	x_6	0.06	0.02

The table shows that the average quadratic deviations for all considered indicators are rather low. So, we can use these average values to analyze and forecast the development of small business in most regions of our country.

The study has proved that it is possible to create the production functions for a set of small enterprises of our country and its regions. It is known that production functions are economic and mathematical models of production processes. They express steady and regular relationship between resources and production volume in terms of quantity [5].

We have examined the dependence of the final result such as the turnover of small-scale enterprises. Turnover is the main indicator used by the Federal State Statistics Service in assessing of production structures of small-scale enterprises. This figure includes the cost of shipped domestic manufactured goods, own works and services, as well as sales revenues of outsourced goods [19].

It is reasonable to consider the employees' wages (characteristics of labour inputs) and investment in their capital as the most acceptable factors determining the turnover of small-scale enterprises.

The following types of production functions were examined: linear function; constant elasticity of substitution (CES) [1, 18]; Revankar production function [16, 25], Cobb – Douglas production function [22, 24].

The comparison of these production functions have showed that the production function, which is similar to Cobb-Douglas function and different from it by a set of factors, approximates to the basic data best of all.

The production function that is based on the characteristics of small-scale enterprises in the Federal subjects of Russia in 2007 has the following form [13]:

$$y_{rf2007}(x_7, x_8) = 7.766 \times x_7^{0.139} \times x_8^{0.930}, \quad (18)$$

where y_{rf2007} — the turnover of small-scale enterprises, bln. rub.;

x_7 — investment in fixed assets of small-scale enterprises, bln. rub.;

x_8 — the wages of employees in small-scale enterprises, bln. rub.

The production function describing the dependence of these indicators for 2008 is the following:

$$y_{rf2008}(x_7, x_8) = 6.966 \times x_7^{0.136} \times x_8^{0.981}. \quad (19)$$

The production function for 2009 is the following:

$$y_{rf2009}\ (x_7, x_8) = 6.659 \times x_7^{0.132} \times x_8^{0.961}. \quad (20)$$

There are quality coefficients of three production functions in *table 7*.

The table shows that the coefficients of correlation and determination are close enough to the best value which is equal to unity. Calculated values by Fisher's and Snedekor's test are more than the vales from the table above.

The test of these equations by the use of logical and statistical analysis methods have showed that all production functions are of high quality.

The comparison of three production functions allowed us to come to the following important conclusions about the developmental mechanisms and trends of small business:

— it is possible to describe the dependence of turnover on two factors referred above by the use of power production function;

— all these production functions are similar but they have small differences both in the coefficient of equations and the values of the factor's powers;

— the sum of powers in all equations is higher than unity; this fact proves the growing economy of scale;

— the decrease in the value of function coefficient (6.659 < 6.966 < 7.766) is caused by the lower turnover of small businesses after the economic crisis in late 2008 and 2009.

The analysis of production functions has revealed some important trends of small-scale enterprises in Russia: their turnover grows slightly faster than investments and wages increase; the increase of one factor with the constant value of another one leads to the raise in the absolute value of turnover; the increase in turnover of small businesses is possible in the long term; one factor's growth improves the use conditions for another factor; investment turnover flexibility is lower than wage turnover flexibility.

The dependences reflecting the relationship between fixed capital investments and wages of employees have been developed on the basis of these production functions (isocosts, isoquants). In addition, the optimal extension trajectories have been created. They reflect the best ratio of fixed capital investments and wages for a set of all small-scale enterprises in each subject of our country. Production functions and the resulting dependences can be used to assess the level achieved by small-scale enterprises in a particular region, to analyze the efficiency of resource utilization, justify the investment needs and set the targets in the development of long-term plans and projections.

The economic and mathematical models were used to forecast the development of small business in our country in future.

The expected economic performances of small businesses in 2030 have been studied according to the following hypotheses:

1. Criteria for enterprises referring to small-scale business will remain unchanged. In particular, limiting values of the average number of employees will vary from one to one hundred persons inclusive. In addition, restrictions will continue to limit the share of the state structures' participation in authorized capital stock, as well as the maximum values of proceeds from the sale of goods (works, services) and the long term assets of small-scale enterprises.

Table 7. Results of quality control of production functions

The number of function	Coefficient of determination	Coefficient of correlation	Calculated value by Fisher's and Snedekor's test
(18)	0.925	0.962	1172.41
(19)	0.939	0.969	599.95
(20)	0.949	0.974	718.45

2. Output volume of small-scale enterprises in Russia will reach a stage of saturation. Since the share of small-scale businesses in various activity categories is different nowadays, the expected growth of output for each of them will be different.

3. The number of small-scale enterprises will increase, based on the modification (transformation) of the existing large and medium-sized enterprises and by the establishment of new companies.

4. The average number of employees in a small-scale enterprise will not change and remain up-to-date.

5. All financial indicators (prices, wages, investments) are taken at the average up-to-date level, their real values can be recalculated based on the actual inflation rate in 2030.

Each Federal subject of Russia has been calculated severally according to the assumption about the optimal development of small-scale business in order to improve the forecast precision. Comparison of the main rates projected for 2030 with the level achieved by small enterprises in 2010 is given in *table 8*.

Different growth rates of the main indicators are caused by the following facts:

— The growth rates of turnover are supposed to be higher than the growth rates of investment because of increasing economy of scale as the analysis of production functions has shown.

— The growth rates of employees are less than the growth rates of turnover due to the expected increase in labour productivity.

— The growth rates of small-scale enterprises are less than growth rates of turnover and employees, because rapid growth of large-sized small businesses (in manufacturing, transport and communication) is expected.

The following tables present the projected rates in the context of Federal Districts and kinds of activities, as well as for small enterprises different in size.

Table 9 presents the resulting calculations of small-scale enterprises' turnover and investment in their fixed assets in the country and Federal Districts.

Table 10 shows the resulting calculations of the number of small-scale enterprises in the federal districts and our country in whole.

Table 8. The growth rates projected for 2030 in comparison with 2010

Indicators	2010	2030	Expected growth rates, %
Turnover of small-scale enterprises, bln. rub.	18925	71645	379
Investments in fixed capital, bln. rub.	574	1610	280
The number of small-scale enterprises, thsd.	1594	4582	287
Average number of employees, bln. persons.	11.10	35.49	320

Table 9. Expected turnover of small-scale enterprises and investment in their fixed assets in 2030, bln.rub.

	Turnover of small-scale enterprises	Investment in fixed assets
Russian Federation	71645	1610
Central Federal District	33807	423
Including Moscow	25193	218
Northwestern Federal District	7794	100
Southern and North Caucasian Federal Districts	5226	276
Volga Federal District	10699	423
Siberian Federal District	5928	98
Ural Federal District	5974	255
Far Eastern Federal District	2217	35

Table 10. Expected number of small-scale enterprises in 2030

	The number of small-scale enterprises, thsd.				
	In total	Including ranges			
		first	second	third	fourth
Russian Federation	4582	1938	1191	1040	412
Federal Districts					
Central Federal District	1578	667	410	358	142
Northwestern Federal District	541	229	141	123	49
Southern and North Caucasian Federal Districts	520	220	135	118	47
Volga Federal District	964	408	251	219	87
Siberian Federal District	502	213	131	114	45
Ural Federal District	308	130	80	70	28
Far Eastern Federal District	169	71	44	38	15

Small-scale businesses have been calculated according to four ranges of employees. The first range includes small-scale enterprises numbering up to 5 employees, the second range consists of enterprises employing from 5 to 15 persons, the third range involves small businesses employing from 15 to 50 people and the fourth range is from 50 to 100 employees. This approach is necessary for taking into account the specifics of small-scale enterprises different in size to form government and regional policy in the sphere of small business development and support. The companies of the selected ranges differ from each other in functioning and management. It influences the development of programs aimed at the improvement of this economic sector.

Then we have determined the number of people employed in small-scale enterprises. These calculations are similar to the calculations referred above: they have been carried out for each federal subject of our country including 4 ranges. The resulting values are given in *table 11*.

The number of managers in small-scale enterprises has been determined during the forecast development according to the optimal values of span of control for small businesses calculated by the author [15]. It is necessary to know the number of managers in order to create training programs and to provide human resource development for small-scale enterprises in Russia. These figures are shown in *table 12*.

The key indicators of small-scale enterprises specializing in five main activities are shown in *table 13*.

The analysis of the main characteristics of small-scale enterprises in today's economy of our country has allowed us to determine the operating rate of these companies and the trends of their dynamics. The study has shown that nowadays small-scale enterprises play a significant role in all regions of our country.

The set of mathematical and economic models developed by the author has allowed her to substantiate a range of developmental mechanisms of small-scale business. These models can be used to monitor small-scale enterprises and to develop long-term plans and forecasts.

The forecast of some indicators of small business in 2030 had been developed on the basis of the developmental mechanisms and the governmental Strategy for Small Business Development in Russia.

The theoretical and practical significance of the study lies in the fact that its conclusions and recommendations including economic and mathematical models can be used as the methodological tools to analyze the developmental mechanisms and trends of small-scale business and evaluate its effectiveness both in separate Federal subjects and in Russia in whole. The results of this study can be applied by the executive authorities in long-term planning of their development.

Table 11.Expected number of employees in small-scale enterprises in 2030

	Average number of employees, thsd. persons				
	In total	Including ranges			
		First	Second	Third	Fourth
Russian Federation	35485	4418	8882	15940	6245
Federal Districts					
Central Federal District	12219	1521	3058	5489	2151
Including Moscow	6342	790	1587	2849	1116
Northwestern Federal District	4190	522	1049	1882	737
Southern and North Caucasian Federal Districts	4030	502	1009	1810	709
Volga Federal District	7464	929	1868	3353	1314
Siberian Federal District	3891	484	974	1748	685
Ural Federal District	2387	297	598	1072	420
Far Eastern Federal District	1306	163	327	586	230

Table 12. Expected number of managers in small-scale enterprises in 2030

	Average number of managers, thsd. persons				
	In total	Including ranges			
		First	Second	Third	Fourth
Russian Federation	5682	884	1480	2277	1041
Central Federal District	1957	304	510	784	358
Including Moscow	1015	158	265	407	186
Northwestern Federal District	671	104	175	269	123
Southern and North Caucasian Federal Districts	645	100	168	259	118
Volga Federal District	1195	186	311	479	219
Siberian Federal District	623	97	162	250	114
Ural Federal District	382	59	100	153	70
Far Eastern Federal District	209	33	54	84	38

Table 13. Key indicators of small-scale enterprises in 2030

Kind of activity	Number of employees, thsd. persons	Turnover, bln. rub.
Trade	7720	39859
Manufacturing industries	5114	9156
Construction	3306	4269
Transport and communications	3629	4578
Real estate transactions	3407	4975

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Assessment of the stock of orders of the executor of ship repair works on the basis of labour balance

Present-day ship repair production is characterized by various work patterns, dynamics, work specialization, complexity and diversity of tasks, faced by management staff. Taking these peculiarities into account, one should not only hire personnel, but also plan the production activity of workers, which is impossible without the use of modern economic and mathematical methods. In particular, the use of the laws of labour balance contributes to a more realistic, objective planning, foresight of the failures in the implementation of the plans and adequate response to emergencies.

Ship-repair enterprises, labour intensity, power, labour balance, coordination.

Andrey I. KIBITKIN
Doctor of Economics, professor, Head of the Department of Murmansk State Technical University
ecofin@mstu.edu.ru

Tatyana V. TURCHANINOVA
Ph.D. in Economics, Associate Professor of Economics and Finance Department Murmansk Academy of Economics and Management
tatyana_0401@mail.ru

The practice of production planning and management uses the laws of different balances, including labour, finance, logistics, etc., at the level of common sense. The basic idea is very simple: you can't spend more than what you have. And if the physical laws of conservation of matter, energy, the impossibility of perpetual motion machines are accepted for use in practice without any doubt or psychological barriers, the laws of balances in industrial-economic activity often were and still are subjected to revision.

This tendency revealed itself to the greatest extent in the centralized administrative-command economic structures of socialistic era, when various plans for gross output, goods, sales, etc. were artificially raised (or lowered), and subjected to voluntary perturbations. A profound assessment of balances as inevitable economic laws contributes to a more realistic, objective planning, foresight of the failures in the implementation of the plans, the adequate response to their failures. All this remains true in the conditions of market economy.

That's why a clear and accurate presentation of balance theory and, in particular, the laws of labour balance, highlighted in this article, is considered relevant even at present, because it is an essential part of the methodology of planning and control in the economy.

When studying the organizational-technical characteristics of the ship repair company personnel one should bear in mind that labour intensity and the structure of vessel repair costs have significant fluctuations which depends on the constructive design of a ship, diversity of installed equipment and degree of deprecation of mechanisms and structures. At machine-building enterprises production is preceded by technical preparation, while at ship repair enterprises this preparation often ends up on the final stage. In addition, while providing high quality and low cost of the vessel repair, it is vital for ship-repair enterprises to ensure the minimum technologically acceptable timing from the start of the repair up to the release of a vessel. Essentially, this task can be solved if there is a clear system of all production resources (including labour) organization and management with the application of modern economic and mathematical methods.

"The availability of sufficient amount and quality of labour resources at an enterprise is determined by comparing the actual number of employees by categories and professions with the planned necessity" [6].

Labour balance is defined as the correlation between the required and available labour resources of a contractor for the planned time period while performing sets of works.

The basic concepts of labour balance include labour intensity of work (of a range of works), intensity (output), working capacity (labour resource) and the power capacity of the executor (output resource).

1. The labour intensity (or volume) of work is determined by the amount of working time in man-hours, which the contractor needs for the execution of the work. For example, if a lathe operator needs 3.2 man-hours to lathe a part on a machine-tool this is the labour intensity of the work. Labour intensity is one of the characteristics of a work (operation), which is determined by many factors (content, executor's qualification, grade, the name and value of the material, etc.).

Planned and record labour intensity is measured by standardized time, i.e. the time which an executor must spend on the work in compliance with the enterprises' standards (measured in standard hours − s.h.). Standards are based on statistical processing of respective observations.

Due to the fact that technical progress changes the amount of standardized time quite rapidly, the standardized time fixed on a certain date, for instance, Jamuary 1, 2010 is used to measure planned labour costs.

Such standards are called conditionally-constant. They are used when making an estimate, and the measuring unit is called estimated standard hour or estimated hour (est.h.). The estimated labour intensity is reviewed not so frequently as the standardized labour intensity, and the emerging gap is a legitimate source of an executor's additional income − as a result of improved technology and work organization.

There are other ways of making up and studying an estimate but they are based on the values proportional to the estimated labour intensity: for example, the measurement of the standard cost of the work for one estimated hour or in team-days, etc. In the present study an estimated hour will be used as a measurement unit of labour intensity.

If the full labour intensity of the performance of the work is Q_m est. h., for example $Q_m = 50$ thousand est. h., then an executor reaches this figure during a certain time period T (days).

If Q est.h. is the interim volume of work, completed by a certain moment of time t < T, then this volume Q should increase from

0 to Q_m, being a certain non-decreasing function of time, reflecting the cumulative total of the executor's work.

$$Q = Q(t) \qquad (1)$$

The function (1) can be represented analytically or in the form of a graph or a table.

If, for example, the volume of $Q_m = 50\,000$ est.h. is coped with according to the law[1] $Q = 5t^2$,

where Q is measured in thousands est. h.,

t is the time in days (the example is fictional).

Then all the works listed in the estimate will be completed for the time $T = \sqrt{Q_m/5} = 100$ days. The function Q is presented in *table 1* and on the graph *(fig. 1)*.

Sometimes it is useful to present the function (1) in relative coordinates (in percent). In this case, the relationship between the absolute values of t and Q and a relative is expressed by the formulae:

$$\bar{t} = \frac{t}{T} \times 100\%, \quad \bar{Q} = \frac{Q}{Q_m} \times 100\% \qquad (2)$$

Table 2 presents the fulfillment of the volume of works on the object from the example in table 1 — on a percentage base. In *figure 2* there is a graph, corresponding to table 2.

2. Output or intensity of the fulfillment of the volume is defined as the rate of labour intensity change and is introduced as any rate of change of the function.

Table 1. Completion of works on an object

t, days	0,0	10	20	30	40	50	60	70	80	90	100
Q, thousands of est.h.	0,0	0,5	2	4,5	8,0	12,5	18,0	24,5	32,0	40,5	50,0

Figure 1. Graph representing the fulfillment of the volume of works on the object
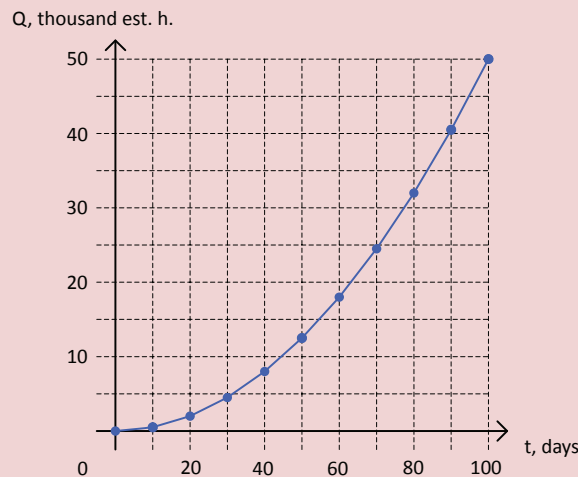
Table 2. Fulfillment of the volume of works on the object on a percentage base

$\bar{t}$, %	0,0	10	20	30	40	50	60	70	80	90	100
$\bar{Q}$, %	0,0	1	4	9	16	25	36	49	64	81	100

---

[1] Strictly speaking, the fuiction Q(t) is not continuous, however, it is convenient to represent it as a continuous function like in the given example

Figure 2. Graph representing the fulfillment of the volume on a percentage base
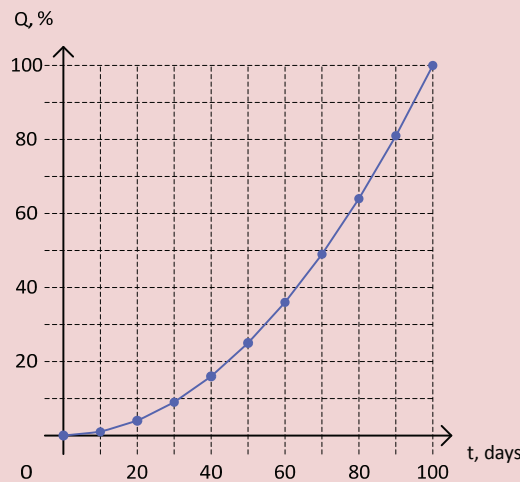
If the developed volume at a moment of time t is Q est. h., at the moment of time t_1 it is $t + \Delta t$, respectively $Q_1 = Q + \Delta Q$ est. h. Then the average speed q_{av} of the development of the volume of the Δt days is:

$$q_{av} = \frac{\Delta Q}{\Delta t} \qquad (3)$$

The speed q of the fulfillment of the volume at a given moment can be essentially called the limit:

$$q = \lim_{\Delta t \to 0} \frac{\Delta Q}{\Delta t} \quad \text{or} \quad q = \frac{dQ}{dt} \qquad (4)$$

The intensity of the fulfillment of the volume (production output) at a given moment is the derivative of the fulfilled volume with respect to time. It is measured in est. h./day.

The formula (4) creates the link

$$Q = \int_{t_1}^{t_2} qdt \qquad (5)$$

The integral (5) can be expressed as area under the curve q = q(t) on the interval $[t_1, t_2]$, if we know the scale. For example, for the function of the fulfillment of the volume $Q = 5t^2$ speed of development (output) is $q = \frac{dQ}{dt} = 10t$ est. h./day.

The corresponding graph is shown in *figure 3*.

The volume of works, fulfilled from the commencement of works for 50 days will equal

$$Q_{0-50} = \int_0^{50} 10tdt = 5t^2 \Big|_0^{50} = 12500 \ \text{(est. h.)}.$$

The volume of works, fulfilled over time from t = 50 up to t = 80: will equal

$$Q_{50-80} = \int_{50}^{80} 10tdt = 5t^2 \Big|_{50}^{80} = 19500 \ \text{(est. h.)}.$$

The actual dependence of the output on the time (for the repair of a vessel), as a rule, can't be described with the help of "neat" formulas, so numerical and numerical-graphic methods are used for the transition from volumes to the outputs and vice versa [4]. Diagrams q = q (t) is referred to as distribution diagrams of workload.

A special role in the planning belongs to the average daily output, which is the relation of the full volume of work Qm on the object to the full time T of execution of the whole range of works:

$$q_{av} = \frac{Qm}{T} \qquad (6)$$

The relation (6) generates two widely used formulae:

Figure 3. Graph representing the changes in output on the object q = 10t
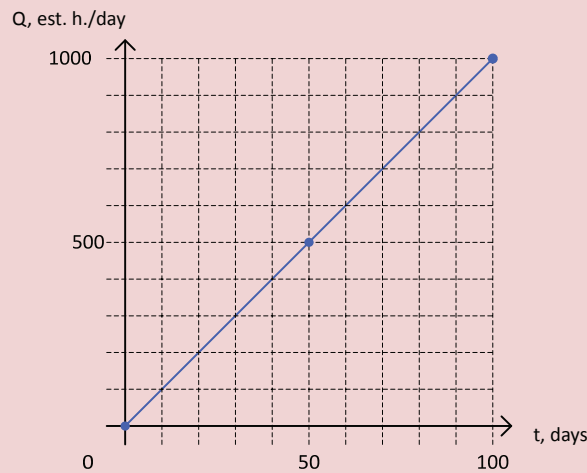
$$T = \frac{Qm}{q_{av}} \qquad (7)$$

$$Q_m = q_{av} \times T \qquad (8)$$

Formula (7), in particular, implies that the ultimate reduction of a vessel's repair duration (item manufacture) is determined by the ultimate increase in the value q_{av}.

3.   Working capacity (resource by volume) A of an executor of work for a certain time period t is the greatest labour intensity which he/she is capable of providing for this time period. An executor can be one person, team, shop, factory, etc. Working capacity A is measured in the estimate hours and forms a non-decreasing function of time:

$$A = A(t) \qquad (9)$$

The function (9) can be represented analytically or in the form of a graph or a table.

For example, the number of actually present multiple-skill crew workers according to the schedule is specified in *table 3*.

If the average daily output per one worker is 10 est. h./day, then the daily working capacity of a crew can be stated in table 4, the second line.

The third line presents the working capacity of a crew (cumulative) in a function of time. *Figure 4* shows working capacity of a crew, corresponding with *table 4*.

4.   The average power of an executor for a certain period of time Δt is the ratio:

$$N_{av} = \frac{\Delta A}{\Delta t} \qquad (10)$$

The power (power resource) of an executor at a certain moment is the limit:

$$N = \lim_{\Delta t \to 0} N_{av} \quad \text{or} \quad N = \frac{dA}{dt} \qquad (11)$$

The power of an executor at a certain moment is the derivative of his/her working capacity with time. The power is measured in est. h./day.

The formula (11) shows an obvious relation:

$$A = \int_{t_1}^{t_2} N dt \qquad (12)$$

In practice, when creating the function of power, numerical and numerical-graphic methods are also used.

On the basis of the main concepts of labour balance stated above, the laws of labour balance can be formulated.

Table 3. the number of actually present crew on an object

Ordinal days	1	2	3	4	5	6	7	8	9	10
Number of workers actually present	20	20	10	10	10	20	20	25	30	35

Table 4. Working capacity as displayed in a table

Ordinal days i	1	2	3	4	5	6	7	8	9	10
ΔA_i est.h.	200	200	100	100	100	200	200	250	300	350
A_i est.h.	200	400	500	600	700	900	1100	1350	1650	2000

Figure 4. Graph representing the function of working capacity
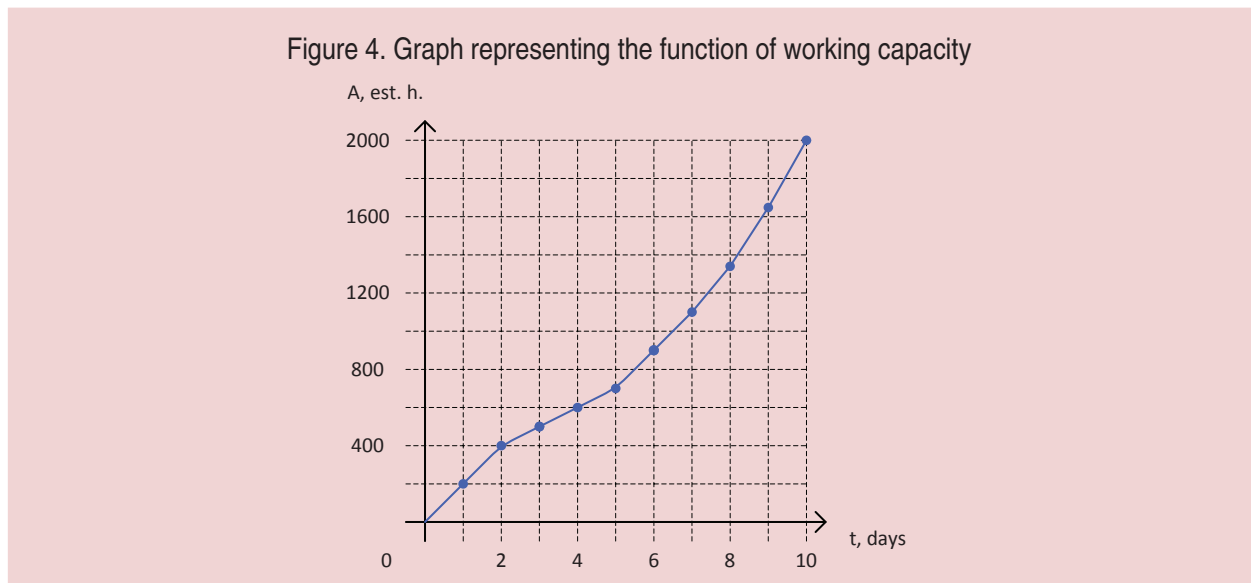
If an executor whose working capacity and power are characterized by the functions A (t) and N (t) respectively, carries out a work (a range of works), the labour intensity and output of which is described, respectively, with the functions Q (t) and q (t), then, for the given values the following laws (axioms) of labour balance are true.

I law. In any interval of time the increment of actually fulfilled labour intensity may not be larger than the increment of the executor's working capacity:

$$\Delta Q \le \Delta A \qquad (13)$$

The formula (13) can look differently:

$$\int_{t_1}^{t_2} q \, dt \le \int_{t_1}^{t_2} N \, dt \qquad (14)$$

II law. In any moment of time the actual output of the executor can not exceed his/her power:

$$q \le N \qquad (15)$$

It is noteworthy that the first law can be derived from the second law. However, both laws should be formulated since each of them has its own value.

III law. If a range of works carried out by the executor has total labour intensity (volume) of Q_m, then the total labour intensity of the works does not depend on the intensity of their execution and, other factors being equal, remains constant.

So, for example, the total labour intensity of the inter-voyage ship repair will remain the same no matter how many crews or which one of them repairs the vessel.

If Q_{m1} and Q_{m2} are full volumes of the same complex of works with different ways of organizing this complex (types of network schedule), then the mathematical expression of the third law is as follows:

$$Q_{m1} = Q_{m2} \qquad (16)$$

IV law. The intensity (output) in the execution of work (a complex of works) in each moment of time is limited from above:

$$q \le q_{max} \qquad (17)$$

The value of q_{max} depends on the state of the object, and therefore the approach to its assessment should not be formal. A few remarks should be made.

Firstly, it is necessary to note, that the laws of labour balance are akin to the laws of nature, and in contrast to the legal laws, they cannot be altered or cancelled. Knowledge of these laws makes it possible to resolve conflicts between the customer and the executor concerning the volumes and timing of the execution of the stock of orders and helps to anticipate the possible under- and overloading of the executor with the work.

Secondly, the formulated laws express only the necessary (but not sufficient) conditions of the feasibility of the plans. The implementation of a plan depends largely on the balance of finances, logistical support, selected specialties and on a wide range of random factors. However, it can be argued that any plans are inevitably doomed to failure, if they contradict the laws of labour balance.

As a rule, relations, expressing the laws of labour balance, deal with average values, which manifest themselves best of all on a large scale. So, the larger the enterprise, the facilities and the range of works, the more reliable is the application of the formula stated above. In particular, this refers to provision of services to ship owners in cluster forms.

Application of the laws of labour balance can be demonstrated on the example of the order backlog analysis.

The following situation can be considered as an example. A list of ships subject to dock repair in the planning period of six months, from July 1 to December 31 of a conditional year, is given in the consolidated application *(tab. 5)*. The average monthly capacity of a dock production, stated in the section "Dock repair of the vessels", equals N = 48.0 thousand est. h./month[2]. Consequently, the working capacity of the production in the planning period is A=48 x 6=288.0 thousand est. h.

Table 5 consists of two parts. The first part contains the application for the docking of vessels undergoing the scheduled - average - major repair. The second part contains the vessels subject to extended inter-voyage ship maintenance (EIVSM) between scheduled repairs.

Column 3 (volume) is compiled with a different degree of accuracy: from almost accurate data for the ships waiting for the second docking with defects already detected, to the predictive data, based on statistics and expert opinions.

Columns 4 and 5 for the ships awaiting scheduled repair are complied on the basis of extended network schedules of this repair or the experts' conclusions.

For vessels undergoing EIVSM, these columns are filled in cooperation with ship owners according to the results of the of EIVSM schedules analysis. Column 6 contains the adopted normative average daily output for each combination "vessel type –type of repair".

Column 7 is calculated by the formula (6):

$$T = \frac{Qm}{q_H}.$$

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[2] Actually, the working capacity is calculated for each month separately, depending on the number of working days in a month and some other factors; however, the round up is methodologically justified here and it doesn't interfere with the logic of the analysis.

Table 5. Consolidated application for the docking of vessels in the second half of the year

№	Name of a vessel (hull number)	Expected volume of dock repair. thousand est. h. Q_m	Earliest date of the beginning of docking	Latest date of the end of dock repair	Normative output. est. h./day q_n	Planned duration of docking T	Note
1	2	3	4	5	6	7	8
I. Dock repair as a part of general scheduled (average) repair							
1.1. Large fishing freezer trawlers (LFFT) project X							
1.	LFFT-0100	30.0	01.07	09.09	500	60	II docking
2.	LFFT-2300	27.0	01.07	11.10	500	54	II docking
3.	LFFT-3200	25.6	01.10	18.01	500	51	
1.2. LFFT project Y							
4.	LFFT-9110	16.0	01.07	10.09	480	33	II docking
5.	LFFT-9120	8.0	01.08	15.02	480	17	
1.3. Wet-fish trawlers (WFT)							
6.	WFT-1135	3.0	-	10.07	400	8	Volume. remaining from the 1st half-year
7.	WFT-1121	8.5	01.07	20.08	400	21	II docking
8.	WFT-1133	7.2	01.07	03.09	400	18	II docking
9.	WFT-1138	8.9	15.08	14.11	400	22	II docking
10.	WFT-1141	8.0	15.09	30.12	400	20	
11.	WFT-1124	8.0	01.11	02.02	400	20	
II. Dock repair as a part of extended inter-voyage ship maintenance (EIVSM)							
2.1. Large autonomous trawlers (LAT)							
12.	LAT-0001	16.0	-	08.08	550	29	Volume. remaining from the 1st half-year
13.	LAT-0012	19.0	12.08	12.10	550	35	
14.	LAT-0024	19.0	01.09	01.11	550	35	
15.	LAT-0017	19.0	17.10	17.12	550	35	
2.2. LFFT project X							
16.	LFFT-2200	4.2	-	30.07	420	10	Volume. remaining from the 1st half-year.
17.	LFFT-2400	6.8	01.07	10.08	420	16	
18.	LFFT-3000	6.8	20.08	29.09	420	16	
19.	LFFT-2500	6.8	20.10	05.12	420	16	
20.	LFFT-1800	6.8	30.10	10.01	420	16	
2.3. LFFT project Y							
21.	LFFT-9150	5.4	05.07	15.08	370	15	
22.	LFFT-9170	5.4	08.10	22.11	370	15	
23.	LFFT-9112	5.4	20.12	16.02	370	15	
2.4. WFT							
24.	WFT-1132	4.4	01.07	06.08	300	15	
25.	WFT-1126	4.4	20.07	29.08	300	15	
26.	WFT-1127	4.4	01.08	10.09	300	15	
27.	WFT-1118	4.4	27.07	13.09	300	15	
28.	WFT-1112	4.4	01.08	20.09	300	15	
29.	WFT-1133	4.4	05.09	13.10	300	15	
30.	WFT-1135	4.4	30.11	04.01	300	15	
31.	WFT-1120	4.4	25.10	06.12	300	15	

Table 6, based on the data from table 5, represents a line graph of reported and passing vessels docking, where 2 lines are pointed out next to each vessel number.

The dotted line represents the time interval from the moment of the allowable early start of the vessel's dock repair till the moment of the allowable latest time of the vessel's dock repair completion.

The solid line represents the normative period of docking time, oriented towards the latest available timing (hence the name of the table – Option "L" – "late").

The volume of forthcoming works for each vessel in each month is distributed along this segment. The corresponding figures are indicated in the upper left corner of the cells. These (rounded) figures were obtained by multiplication of normative output by the corresponding number of days. So, for example, a vessel №1 is undergoing the repair for 21 days in July, 31days in August and 8 days in September. Regulatory output for this vessel (see table 5) is 500 est. h./day. Thus, 500 x 21 = 10.500 est. h. in July. 500 x 31 = 15.500 est. h. in August and 30.000 − 10.500 − 1.500 = 4.000 est. h. in September.

When fulfilling labour intensity per a vessel, the daily output, generally speaking, will not be permanent. The given volume of works can be carried out differently. Therefore, monthly layout of the total amount of works on a ship can be quite random.

However, the sum of figures horizontally for each vessel should converge to the total volume (III law of labour balance).

The output within each period of a vessel's repair is also limited (the fourth law).

The end of table 6 presents: the increment in the total work-load for months ΔQ, as well as the overall work-load of dock production on a cumulative total Q. In addition, the table shows the increment in working capacity (resource) by months $\Delta A = 48.0$ thousand, est. h. and it is also shown on a cumulative total A.

First of all, it can be seen that for six months the total workload at the orientation towards the later date is $Q^L = 271.5$ thousand est. h., the resource A = 288.0 thousand est. h. (the "L" stands for "late"). Thus: $Q^L < A$ that does not conflict with the first law of labour balance. This means that for six months all vessels, with accuracy to the volumes transferred to the following year, can be repaired.

However, overloads appeared within the planned half-year. So, during the first two months the resource will equal 96 thousand est. h., the workload Q = 105.3 thousand est. h., that conflicts with the first axiom. So, 105.3 − 96.0 = 9.3 thousand est. h will be transferred to a third planned month (i.e. September) (the third axiom). Such a phenomenon (overload) will take place until the end of the fourth month of the first half-year, and only in the fifth month of the second half-year, in November, all the planned volume for the vessels will be fulfilled. This fact should be taken into account in advance and the deadlines for completion of least-priority vessels docking should be shifted in accordance with the need of balancing the orders (applications) backlog (it isn't done in the present article).

In any case, it is necessary to be prepared in advance to the fact that, because of the overload, starting in August, the deadlines could be missed; if the prolongation of vessels dock repair is not managed purposefully, it will begin spontaneously: the laws of labour balance are inexorable.

These are the first results of the simplest analysis of an orders backlog.

One more important question is easy to answer: is the underloading, incomplete use of labour resources, connected with the corresponding loss of volume?

Such a possibility should be checked for July, November and December, for which $A − Q^L > 0$. Without a detailed analysis it is evident that there are several options of «shifting» to the left the line segments, representing the timing

Table 6. A line graph of docking. Option "L"

Vessel number	Volume, thsd. est. h.	Duration, days	Scheduled period						Next period
			VII	VIII	IX	X	XI	XII	
1	2	3	4	5	6	7	8	9	10
1	30.0	60	10.5	15.5	4.0 / 9				
2	27.0	54		7.5	14.5	5.0 / 11			
3	26.0	51			1		2.0	15.5	8.5 / 18.01
4	16.0	33		11.2	4.8 / 10				
5	8.0	17	1						8.0 / 15.02
6	3.0	8	3.0 / 10						
7	8.5	21	0.4	8.1 / 20					
8	7.2	18		6.2	1.2 / 3				
9	8.9	22		12		4.1	4.8 / 14		
10	8.0	20			15			8.0	30
11	8.0	20				1			8.0 / 02.02
12	16.0	29	11.6	4.4 / 8					
13	19.0	35		12	12.4	6.6 / 12			
14	19.0	35		1	3.0	16.0 / 1			
15	19.0	35				17	9.6	9.6 / 17	
16	4.2	10	4.2	30					
17	6.8	16	2.6	4.2 / 10					
18	6.8	16		20	6.8	29			
19	6.8	16				20	4.7	2.1 / 5	
20	6.8	16				30		2.6	4.2 / 10.01
21	5.4	15	5	5.4 / 15					
22	5.4	15				8	5.4 / 22		
23	5.4	15						20	5.4 / 16.02
24	4.4	15	2.6	1.8 / 6					
25	4.4	15	20	4.4	29				
26	4.4	15	1	1.4	3.0 / 10				
27	4.4	15	27	0.5	3.9 / 13				
28	4.4	15	1		4.4 / 20				
29	4.4	15			0.8 / 5	3.6 / 13			
30	4.4	15					30	3.6	0.8 / 14.01
31	4.4	15				25	2.6	1.8 / 6	
Totally, for months	Δ Qᴨ		34.9	70.4	58.8	35.3	29.1	43.0	34.0
Progressive total	Qᴨ		34.9	105.3	164.1	199.4	228.5	271.5	306.4
Working capacity for months	Δ A		48.0	48.0	48.0	48.0	48.0	48.0	
Progressive total	A		48.0	96.0	144.0	192.0	240.0	288.0	

of the vessels dock repair, when the amounts to be fulfilled will pass from August to July. For full loading of July $A - Q^L = 48.0 - 34.9 = 13.1$ thousand est. h. should be added. For this purpose, it will be enough to shift the repair of the vessel No. 7 (8.1 thousand est. h.) to July, and also, for example, to redistribute the volume for the vessel No. 21 (5.0 thousand est. h. – on July, and leave 0.4 thousand est. h. for August). The total supplement for July will be $8.1 + 5.0$ $= 13.1$ thousand est. h. Of course, this task can be solved in a different way. Most likely, it will be enough to content oneself with the idea that in July there are no problems concerning the workload, and the question about the specific vessels awaiting the repair, should be left for operative decisions. This idea is emphasized here because it is considered essential. This is how, in particular, the principle of a flexible planning reveals itself.

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Energy efficient lighting as a transition from incandescent lamps to light-emitting diode solutions

Energy efficiency and energy saving are the national objectives set by the President of the Russian Federation Dmitry A. Medvedev. One of the lines of state policy is application of energy saving technologies to lighting. In this regard, the article analyzes the phased measures taken to replace incandescent lamps with energy efficient lamps, including the national development of the energy effective substitutes and the use of technical regulation mechanisms and quality control of the products delivered to the market.

Energy efficiency, energy saving, incandescent lamp, compact fluorescent lamp, light-emitting diodes, marking.

Evgeniya A. SYSOYEVA
Ph.D. in Economics, Associate Professor of the Mordovian State University named after N.P. Ogarev
sysoewa@mail.ru

It is inconceivable that there is no artificial lighting in the life of modern people. A wide range of the optical sources of artificial lighting, developed and manufactured by different companies, helps us to be more independent of natural lighting. In order to achieve ophthalmic comfort it is necessary to sustain a lot of lighting parameters such as optimal luminance, minimal dazzle, specified brightness distribution, good color rendering. Energy efficient healthy light keeps our safety and comfort, preserves our health, improves labour productivity and raises the level of crop yield and livestock products. It also reduces the consumption of natural resources and lowers fatigability and loss of vision. Today energy efficient lighting is a system that produces high-quality lighting and keeps its characteristics over a long period of time at low costs for energy consumption and low capital acquisition expenditures on electrical equipment. At the same time, energy saving shouldn't be pursued by the reduction in lighting standards because the losses caused by the deterioration of light conditions exceed the cost of saving energy.

Nowadays, according to various sources, about 110 billion kW·h of electricity are used for lighting in Russia. They amount to 20% of electricity output. Virtually, lighting is a major single-type consumer of electricity. Light energy unit is produced at the expense of electricity, which is increased by $1.3 - 1.4$ times in Russia as compared with advanced nations. The provision of people in Russia with lighting is $3.5 - 4$ times lower than in the U.S., Japan and leading European countries. Therefore, energy efficient lighting is an important component of Russian energy saving policy. In Russia, like in many developed countries, the lighting equipment market is moving towards the production of energy saving light sources and replacement of inefficient light sources by them.

In this regard, it will be possible to achieve a great result such as 34 billion kW·h of saving energy per year in 5 − 6 years if a necessary range of modern energy saving light sources corresponding to technical features are used extensively. This will provide an opportunity to increase light energy consumption by 1.5 times and spend 18 kW·h to produce 1 Mlm·h, but not 28 kW·h as today [1].

Industrial and housing premises are the most intensive electric energy consumers in our country. More than 70% of the total light sources are used by them. Primarily, the problem of energy saving in industrial and housing lighting can be solved through the widespread use of new highly efficient light sources. It is necessary to replace incandescent lamps, which efficiency is 3 − 5%, with fluorescent lamps including compact ones, which efficiency is 5 times higher.

The Russian Government has passed a whole number of laws aimed at the improvement of energy efficiency, including the Federal Law No. 261-FL dated November 23, 2009 "On energy saving and improvement of energy efficiency and on amendments to certain legislative acts of the Russian Federation" (hereinafter referred to as the Federal Law "On energy saving"). This law has determined the state regulation in the field of energy saving and energy efficiency of products, providing for the prohibition or restriction of production and turnover of goods with low energy efficiency in the Russian Federation, if there are the similar goods with high energy efficiency in circulation and their amount meets the population's demand. According to this law, energy efficiency includes "the characteristics reflecting the ratio between useful effect of energy resources and the energy expenditures produced in order to obtain such an effect in relation to production and process technology" [3]. The Federal Law "On energy saving" has become a major factor in the development of energy saving lamps market.

According to the law, 100-watt and more incandescent lamps, which can be used in AC circuits for lighting, have been banned since January 1, 2011. Since January 1, 2012 it has been prohibited to order for state and municipal needs 100-watt and more incandescent lamps, which can be used in AC circuits for lighting. In order to implement the requirements to reduce the turnover of electric incandescent lamps sequentially, it could be prohibited to use in the territory of the Russian Federation 75-watt and 25-watt incandescent lamps, which can be used in AC circuits for lighting, since January 1, 2013 and January 1, 2014, respectively [3].

This means that the production of 100-watt and more incandescent lamps have been stopped since January 1, 2011. The producing and sale of 75 watt incandescent lamps could be banned since January 1, 2013. These lamps should have been withdrawn from the production and sale by January 1, 2014.

This law favours the active development of the Russian market of energy saving lamps. In this regard, Russia follows lead of other developed countries, where the similar measures have been taken. According to the assessment of Rusnano (Russian Corporation of Nanotechnologies), in 2010 42% of the world markets were occupied by compact fluorescent lamps, 6 % − by LED lamps and about 52% − by incandescent lamps. The Russian market counted to 6% of compact fluorescent lamps, 4% of LED lamps and about 90% of incandescent bulbs in the same period.

Due to the ban on production and turnover of incandescent lamps in Russia, it was reasonable to raise a question about the appearance of high-efficient energy lamps at the light market. They are compact fluorescent lamps with integral starting controller and standard screw caps, which could substitute for incandescent light bulbs. Such lamps save a lot of energy because their light output is 4 − 5 times greater than the light efficiency of incandescent bulbs.

Sales volume of the Russian retail market of compact fluorescent lamps amounted to 16 billion rubles in 2011. Budget institutions of Moscow, St. Petersburg, the Bryansk Oblast, Voronezh, Tyumen and Tomsk switched over to the use of such lamps. It is necessary to emphasize that the Russian lighting equipment market is presented by import compact fluorescent lamps made in China, as a rule. Most Russian companies only assemble compact fluorescent lamps out of Chinese component parts. There is no approved manufacture of component parts for fluorescent lamps in Russia. At the same time, there is a full manufacturing cycle to produce incandescent lamps in electric-bulb plants.

It is also necessary to point out the shortcomings of compact fluorescent lamps. Firstly, they include high cost of these lamps. For comparison, the average price of incandescent lamps in Russia is only about 11.8 rubles; compact fluorescent lamps cost 131.8 rubles. It should be noted that there are a lot of fluorescent lamps of low quality in the lighting equipment market in Russia. Average declared service life of these lamps is 8000 − 10000 hours, but it doesn't exceed 4000 − 4500 hours according to the opinion of consumers. So, it has been overstated by 2 times or more.

The measuring and testing results, founded by the Testing laboratory of the State Unitary Enterprise of the Republic of Mordovia "Centre for Test Run and Implementation of Scientific and Research Institute of Lighting Sources named after A.N. Lodygin" in 2011, proved that Chinese compact fluorescent lamps "Ekola" had lower values of light and luminous efficiency, and therefore they didn't meet the requirements of GOST R 53879-2010 (IEC 60969:1988) and the RF Government Decree № 602 "On approval of requirements for lighting devices and electrical lamps used in AC circuits for lighting" dated 20 July, 2011. There is also an unsolved problem of mercury-containing compact fluorescent lamps recycling.

It should be noted that compact fluorescent lamps are characterized by a stroboscopic effect. It is a pulsating light beam, which can have a negative impact on the human sight. There is an opinion of foreign dermatologists that the people, who have high light sensitivity of their skin, can suffer from compact fluorescent lamps.

In accordance with the global energy saving trends, a major part is assigned to LED light sources and LED lighting systems as the most efficient, economical and safe. The use of light-emitting diodes in illuminating engineering is also developed. According to experts, these products will gradually put traditional light sources out of the market within the next ten years.

The main criteria for the predominant use of LED sources in lighting, even in comparison with promising energy efficient gas-discharge lamps, are the following: low energy consumption during operation; a great service life − up to 50 − 60 thousand hours (it is more by 5 − 10 than service life of fluorescent lamps); the absence of pulsations of light characteristics; the ability to work both at low and high ambient temperatures (from -50 ° C up to +60 ° C), that is especially important for cold and hot regions of our country; resistance to mechanical effects; a high level of security (they don't contain harmful substances, ultraviolet or infrared radiation, mercury, they are not dangerously explosive, etc.) [1]. It is an incomplete list of the advantages of LED light sources.

Our country has begun to develop and use light-emitting diode sources. But unfortunately, this process is too slow. The first samples of Russian LED lamps have come into the market in Moscow and St. Petersburg. The cost of a lamp from the first parcel is about 1 thousand rubles. It is planned that the price will have dropped to 250 rubles by 2014.

The Government of the Russian Federation has approved the document "The procedures for producing efficient light sources "New Light" [2] in order to transform the structure of the lighting market in Russia in favor of energy efficient illumination and protection of the domestic market against energy-intensive unpromising domestic and imported products.

The total investment in the project "New Light" is 12.7 billion rubles, including 6.8 billion rubles of off-budget funds and 4.3 billion rubles of Rusnano. The project "New Light" has found that the introduction of energy efficient light sources and the organization of their production in Russia will be implemented in three phases:

2009 − 2012: Removal of incandescent lamps and introduction of compact fluorescent lamps.

2013 − 2016: Sales peak of compact fluorescent lamps.

2017 − 2020: Active introduction of LED equipment.

The implementation of these activities in the country must ensure a system modernization of lighting products at the expense of domestic production of energy efficient lamps and gradual exclusion of imported products.

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AGRICULTURAL ECONOMY

Agriculture of the Vologda Oblast on the eve of Russia's accession to the World Trade Organisation

This article presents the main problems of the Vologda Oblast agricultural development, the rapid solution of which becomes even more important in the conditions of joining WTO. The authors also consider the region's opportunities of food security provision. In general, the problems raised in the article, highlight the main directions of the necessary activities of the regional authorities and handling the threats that may emerge in the agricultural sector of the Oblast economy.

WTO, Vologda Oblast, agricultural production, efficiency, problems of development, food security.

Nikolay I.
ANISHCHENKO
Ph.D. in Economics, Head of the Vologda Oblast Department of Agriculture,
Food Stocks and Trade
dep@vologda-agro.ru

Marina N.
IVANOVA
Head of the Economic Policy Agency of the Vologda Oblast Department
of Agriculture, Food Stocks and Trade
m.ivanova@vologda-agro.ru

Valentin A.
BILKOV
Doctor of Agricultural Sciences, Head of the Stock Breeding Section of the Vologda
Oblast Department of Agriculture, Food Stocks and Trade
v.bilkov@vologda-agro.ru

The federal authorities consider Russia's joining WTO as the step of paramount importance, which will give an impetus to the modernization of the national economy. At the same time, it is acknowledged, that Russia's accession to WTO will lead to serious complications in the functioning of certain real sector branches. First of all, it concerns agriculture and the provision of the country's food security. As a matter of fact, the national economy considerably lags behind the developed countries in the issues of productivity and competitiveness.

Despite the fact that WTO norms and regulations will be introduced gradually, the fundamentally new economic and organizational-legal environment is being created for Russian agribusiness.

Acute issues of the Oblast's agricultural development

Agricultural branch of the Vologda Oblast at the beginning of 2011 was represented by 480 agricultural organizations (including part-time farms of enterprises, organizations, educational institutions), 2363 peasant (farmer) enterprises, including individual entrepreneurs, and 258.9 thousand individual farms (private subsidiary plots of the population). 29% of the Oblast population live in rural areas. 7% of those employed in the region's economy work in the agricultural sector [1, 8].

Possessing 0.6% of the Russian Federation's agricultural land, the Oblast produces 0.7% of the country's gross agricultural output. According to the agricultural enterprises' production volume per capita in 2011,

the Oblast ranks 3rd in milk production, 8th — in egg production, 24th — in meat production.

However, it should be emphasized, that the branch is functioning under difficult economic conditions determined by the lack of financial resources of agricultural goods producers, obsolete agricultural material and technical base, unfavorable price ratio between agricultural and industrial products, as well as other adverse factors, many of which have been formed in the process of transition to a market economy [5]. As a result, the Oblast's agricultural potential is used not to the fullest extent.

Low efficiency of agricultural land usage is the major problem. For 20 years of market reforms 106 thousand hectares of cropland have been excluded from agricultural usage, and the share of ploughland used for cultivation of crops has decreased from 95.7% to 60% *(tab. 1)*.

The process of soil fertility reduction is taking place. One of the factors, hampering the development of crop growing, is the unsatisfactory physiochemical state of soils (overacidity and hyperhydration, negative balance of nutrients and humus, etc.), which can be improved by implementing a set of special measures, but the actions, undertaken in this direction, are extremely limited *(tab. 2)*.

During the years of reforms, the input of organic fertilizers decreased 8.3-fold, mineral fertilizers — 7.5-fold, and calculated per 1 hectare of crops — 4-fold and 3.5-fold respectively; liming of acidic soils has been practically abandoned (areas of liming have decreased 125-fold). Due to the lack of funding, the melioration systems, created earlier, are now deteriorating.

Table 1. Dynamics of agricultural land area in all types of farms, at the end of the year, thousand hectares

Indicators	1990	1995	2000	2005	2010	2011	2011 in % to 1990
Agricultural land, total, thousand hectares	**1369**	**1335**	**1189**	**1141**	**1096**	**1089**	**79.5**
Including cropland	851	847	792	764	748	745	87.5
Including ploughland under crop	815	757	686	542	478	446	54.7
Share of ploughland under crop, %	95.7	89.4	86.6	70.9	63.9	60	-35.7 p.p.
Natural hayfields and pastures	468	469	357	326	295	291	62.2
Other	50	19	40	51	53	52	104.0

Table 2. The volume of works aimed at increasing soil fertility of the Vologda Oblast agricultural land

Indicators	Year						1990 to 2011, fold
	1990	1995	2000	2005	2010	2011	
Organic fertilizers input							
Total, thousand tons	7770	3695	1653	1249	922	936	8.3
Per 1 hectare of crops,	10.1	5.5	2.6	2.5	2.3	2.5	4.0
Mineral fertilizers input (as calculated to 100% of nutrients)							
Total, thousand tons	118.4	22.5	26.3	14.7	13.7	15.8	7.5
Per 1 hectare of crops, kg of active substance	144	32	42	28.5	34.0	41.5	3.5
Liming of acid soils							
Total, thousand hectares	**108.0***	8.8	4.7	2.2	1.4	0.8	135
* In average for the period of 1986 – 1990.							

Table 3. Dynamics of investments in the fixed capital of the Vologda Oblast
agroindustrial complex in 2000 – 2011, mln. rubles (in actual prices)

Indicators	Year							2011 to 2000, fold
	2000	2001	2002	2005	2008	2010	2011	
Investments in the agroindustrial complex, total	745.8	973	1024.6	2406.4	3196.6	2845.0	3029.0	4.1
Including agriculture	435.2	593.4	775.8	1075.6	2242.9	1765.5	2153.5	4.9
Share of agriculture, %	58.4	61.0	75.7	44.7	70.2	62.1	71.1	x

The problem of capital assets renewal and provision of equipment. The investments in the fixed capital of agriculture in 2010 – 2011 grew to a lesser extent than in other sectors of the Oblast's agroindustrial complex.

Dynamics of investments, as shown in *table 3*, is presented in current prices of each year, and in the comparable estimation the growth of investments is not detected.

The volume of investments in the fixed capital of agriculture significantly lags behind the requirements, necessary for the restoration of the deteriorating funds (first of all, agricultural machinery) and their quality renovation *(tab. 4)*.

Due to the high costs of the machinery and equipment, the level of agricultural enterprises' technical equipping is decreasing, which leads to the untimely and low-quality seasonal field works, non-observance of technologies and, ultimately, low productivity of agricultural crops.

The problem of human resources availability. Despite the fact that in rural areas there is a considerable number of unemployed able-bodied population, agricultural enterprises experience the shortage of qualified personnel of all categories – from managers to workers *(tab. 5)*.

As of the beginning of 2012, only 54% of household managers had a higher education, and 13% of them did not even have a specialized education. From 3793 actually working professionals 2395 persons (63%) do not have a higher education, 453 persons (12%) are of the retirement age. The greatest shortage of the leading specialists is registered among agronomists, economists and zootechnicians.

The shortage of qualified specialists in the Oblast's agricultural sector, current as well as anticipated in the mid-term perspective, is determined by a rather tough intersectoral competition and the sector's low competitiveness in the labour market (wages in agriculture in 2011 equaled 69% of the average Oblast level). In this respect, the state should implement the system of cardinal measures aimed at the provision of social guarantees and benefits to the graduates of universities, technical schools and other educational establishments [4, 8].

Table 4. The availability of technical means in the Vologda Oblast
agricultural organizations, units at the end of the year

Types of machinery and equipment	Year								2011 in % to 2000
	2000	2001	2002	2005	2008	2009	2010	2011	
Tractors	10417	9686	9218	6722	5055	4699	4397	3907	37.5
Seeders	1527	1315	1246	1083	788	731	690	549	36.0
Combine harvester threshers	1458	1361	1321	937	698	655	579	554	38.0
Flax harvesters	307	246	218	109	74	76	64	60	19.5
Forage harvesters	886	906	892	729	539	539	496	436	49.2
Pickup balers	1108	1061	1023	775	568	526	516	462	41.7

Table 5. The need, availability and shortage of managerial personnel and specialists
in the Vologda Oblast agricultural organizations as of January 1, 2012

Position	Staff requirement, persons	Availability, persons	Shortage, persons	Staffing level, %
Managerial personnel and specialists, total	4636	4345	291	93.7
Including: - directors of an organisation	247	245	2	99.2
- main specialists, total	993	887	106	89.3
Among them: agronomists	134	105	29	78.4
Zootechnicians	169	154	15	91.1
Veterinarians	125	111	14	88.8
Engineers	159	147	12	92.5
Economists	114	93	21	81.6
Accountants	226	220	6	97.3
Others	66	57	9	82.6
- specialists of all fields (excluding main)	2109	1984	125	94.1
- middle managers	750	726	24	96.8
- personnel management employees	95	91	4	95.8
- others	442	412	30	93.2

The problem of high production costs in agricultural enterprises. The production and sales costs in the Oblast's agricultural enterprises per unit of production, due to a number of objective and subjective reasons, are significantly higher than the selling prices, which results in unprofitability and low cost-effectiveness of agricultural production *(tab. 6)*.

This is mainly caused by the yearly increasing disparity of prices for production resources and agricultural products.

Due to the unfavorable market price ratio of agricultural production and material-technical resources used in this sector, agricultural enterprises have to attract credits and loans in increasing amounts.

This results in the growing debt of enterprises. For example, accounts payable for the period from 2000 have increased 2.9-fold (from 1636.5 million rubles to 4728.0 million rubles at the end of 2011), indebtedness under short-term credits and loans — 59-fold (from 86.3 million rubles to 5088.3 million rubles, respectively), long-term liabilities on credits and loans of industrial enterprises — 17.9-fold (from 381.2 million rubles to 6812.3 million rubles, respectively).

By the end of 2011, the Oblast's agricultural enterprises, that submitted the financial accounts to the Department, have received the revenue from the realization of products, works and services in the amount of 15.4

Table 6. The ratio of production costs and selling prices for the main
types of agricultural products in the Vologda Oblast, rubles/t

Type of production	2010				2011			
	Production cost (manufacturing)	Selling price	Selling price to production cost ratio	Selling profitability % (without subsidies)	Production cost	Selling price	Selling price to production cost ratio	Selling profitability % (without subsidies)
Grain	7141	5142	- 1999	- 4.9	6475	6355	-120	4.8
Potato	5062	8908	+ 3846	51.1	4209	12103	+7894	97.8
Milk	11507	14979	+3472	21.5	12891	16988	+4097	20.1
Cattle meat	105827	56132	- 49695	- 32.5	120357	65695	-54662	- 29.6
Pork meat	64905	68959	+4054	13.0	77571	69742	-7829	- 8.1
Poultry	42466	57861	+15395	18.2	49593	70572	+20979	4.8
Eggs, rub./1000 pcs.	2060	2309	+249	20.6	2072	2308	+236	21.1

Table 7. Dynamics of the quality of raw milk, sold by the Vologda Oblast enterprises

Indicators	Years						2011 +,- to 2000
	2000	2005	2006	2009	2010	2011	
Total amount of milk sold, thousand tons	282.6	360.7	382.4	403.0	392.3	410.3	+127.7
Including:							
highest grade and 1st grade, %	84.6	95.3	93.8	88.8	94.6	95.3	+10.7
2nd grade, %	14.4	4.5	5.8	10.7	5.2	4.6	-9.8

billion rubles (117% to the level of 2010); pre-tax profit equaled 0.65 billion rubles (83.8%), including at the expense of subsidies charged to the profit − 1.06 billion rubles; cost-effectiveness +4.5% including the subsidies and − 2.8% excluding the subsidies. Thus, without the state support, the sector remains unprofitable [7, 9].

The problem of the manufactured and sold products quality. The quality of the products significantly affects their selling price. However, so far the sold products quality remains unstable *(tab. 7).*

Russia's accession to WTO requires improving the quality of sold products. This will largely depend on its competitiveness in the food market and, consequently, the prospects of the agricultural organizations [2].

The problem of the agricultural enterprises insolvency. The total share of insolvent enterprises of the 3rd group (insolvent, requiring non-market measures to improve their financial and economic status), the 4th group (insolvent and unable to manage the assets) and the 5th group (bankrupt enterprises, without commodity production) in the total Oblast indicators equals: by the number of enterprises − 39.9%, by the number of employees − 39.6%, by the ploughland area − 43.2%, by the cost of basic production assets − 41.1% *(tab. 8).*

Thus, almost 40% of the Oblast's farms are insolvent, requiring a certain form of state support. Given the conditions under which the agricultural enterprises function if Russia joins WTO, the additional measures aimed at reducing the number of unprofitable and insolvent enterprises should be determined and implemented [4, 5].

The problem of agricultural development in the Oblast's peripheral areas. As a result of the action of market mechanisms, given the imperfection of the state regulation measures, the territorial differentiation in the Oblast's agricultural development has increased sharply.

Table 8. The number of Oblast's insolvent agricultural enterprises
and their provision with basic resources as of January 1, 2011

Indicators	Total in the Oblast	Including insolvent enterprises				Share of enterprises of the III, IV, V groups in overall Oblast indicators, %
		III group	IV group	V group	III, IV, V groups in total	
Number of enterprises	258	40	53	10	103	39.9
Number of employees, thousand persons	22.3	4.5	4.3	0.03	8.83	39.6
Ploughland area, thousand hectares	437	91.9	91.7	5.3	188.9	43.2
Cost of main production assets, mln. rubles	18967	4376.6	3416.2	0.7	7793.5	41.1

Table 9. Indicators of territorial differentiation in the development
of the Vologda Oblast agriculture in 1990 and 2010

Districts	Share of districts in the oblast indicators, %							
	Area of agricultural land		Value of gross production		Pretax profit of agricultural enterprises		Subsidies allocated to the revenues of agricultural organizations	
	1990	2010	1990	2010	1990	2010	1990	2010
Suburban districts: Vologodsky, Gryazovetsky, Cherepovetsky, Sheksninsky	28	29	50	62	46	77	x	65
The rest 22 oblast districts	72	71	50	38	54	23	x	35
In the oblast on the whole	100	100	100	100	100	100	x	100

In 1990 the agriculture of four suburban districts (Vologda, Gryazovets, Cherepovets and Sheksna) produced 50% of the gross output and received 46% of profit, and in 2010 these indicators reached 62 and 77%, respectively, taking into account profitable farms. In 2010 the agricultural enterprises of these four districts received from the budgets of all levels 65% of the subsidies charged to profit *(tab. 9)*.

In turn, the remaining 22 districts, with 65% of the rural population, account for only 38 % of the agricultural output and receive 35% of the state support.

22 peripheral areas account for only 39% of milk and 12% of meat and poultry, sold by the Oblast's agricultural organizations.

The agriculture in the half of these regions experiences the process of uncontrolled transition to the extensive way of development and the gradual elimination of some of its branches. The economic activity is connected exclusively with dairy livestock breeding in 18 districts of the oblast. At the same time, in 11 districts the cow density equals less than 10 head per 100 hectares of agricultural land, and in the Babushkinsky, Vytegorsky and Kaduysky districts there are not more than 3 dairy cows per one agricultural worker.

While in the suburban areas investments in fixed capital are growing, advanced technologies are being implemented, large-scale investment projects are being realized, incentives for further agricultural development are being created, the most part of the rest of the oblast's territory experiences the deterioration of agricultural commodity production, that is the rural population employment basis and income source, this state of events will provoke the aggravation of the crisis situation.

The agricultural production volumes decrease in peripheral areas leads to the growth of fixed costs per unit of production, underutilization of processing enterprises' available capacity, unprofitability and cessation of production activity of some of them and, ultimately, to undesirable social consequences.

Food security issues

Food security is ensured, if:

– foodstuffs are available on the market in the amounts, sufficient for providing the population with the recommended consumption rates;

– population's real incomes allow consuming foodstuffs in recommended rates;

proper quality of foodstuffs presented on the market is ensured [6].

Table 10 presents the data on production and consumption of basic food products per capita for the oblast. It can be seen, that for a number of products consumption lags behind the standards [1, 6, 8].

In solving the food security problems of the oblast's inhabitants, a special role belongs to meat and dairy industry as the vital sphere of the agro-industrial complex. According to the Vologdastat (regional authority of the Russian Federal State Statistics Service) these branches provide 62% of the oblast's volume of commodity production of foodstuffs.

Annually, the oblast's population consumes:

◆ 148 thousand tons of whole-milk products (in milk equivalent), 91% of which are produced in the Vologda oblast;

◆ 4.6 thousand tons of butter, 54% of which are produced in the Vologda oblast (import of butter from other regions equals 46% due to the influence of the price factor);

◆ 4.3 million of standard cans, 88% of which are Vologda products;

◆ 5.2 thousand tons of cheese, 17% of which are produced in the Vologda oblast (import of these products equals 83% due

to the absence of necessary capacities for their production).

The oblast's meat market peculiarity lies in the fact that its main volume (90% are the sausage products and semi-finished products) consists of the finished foodstuffs of local production. At the same time, 56% of the imported raw meat is used for sausage and semi-finished foodstuffs production.

As for the other food products, the oblast population's actual provision with internal resources (taking into account the export) equals: 64% for eggs and egg products, 98% for potato, 46% for vegetables and melons, 10% for fruits and berries, 14% for food grain, 71% for flour, 70% for bread and bakery products, 13% for fish and fish products.

One of the most important products, which are not produced in sufficient amounts in the oblast, is food grain, used for flour production. The import of this type of product is 95 – 100%. In addition, the oblast imports fodder grain — up to 70% of the required amount.

The delivery contracts for the foodstuffs, not produced in the oblast, like sugar, salt, cereals, vegetable oil, are concluded directly by the economic entities of wholesale trade. They also determine the price and assortment policies.

In the period of economic crisis they were recommended to retain the two-month supply of these goods. The Department, in turn, carries out the monitoring of commodity stocks of foodstuffs with long-term storage period, imported into the oblast, as on the first day of each month.

Table 10. Production and consumption of basic food products per capita in the Vologda Oblast in 2010, kg

Products	Production	Consumption	Rational norm	Consumption, in % to the norm
Milk and milk products	368	237	320 – 340	72
Meat and meat products	42	66	70 – 75	91
Eggs and egg products, pcs.	488	318	260	199
Potato	144	86	95 – 100	89
Vegetables	44	96	120 – 140	74

According to the information of the Department of International, Interregional Ties and Tourism, the Vologda Oblast has bilateral agreements with 33 different subjects of the Russian Federation, it also signed an agreement with the Republic of Belarus. In cooperation with each RF subject the joint measures for these agreements implementation are being developed, that envisage the cooperation in the agro-industrial complex and the supply of food products to the regional markets.

Organizing agricultural fairs is considered very important in the provision of the oblast population with basic foodstuffs at affordable prices. Thus, in 2010, 89 agricultural fairs were organized and their total trade turnover amounted to 156 million rubles.

In 2011, 83 agricultural fairs with a total turnover of 126.5 million rubles were held in 20 municipalities. The average number of trade outlets was 60. According to the oblast local self-governing bodies, the average prices at fairs are 12% lower in comparison with the prices at fixed shop retailing.

Certain importance in the formation of the permanent distribution of agricultural products belongs to agricultural retail markets. This segment of the consumers market is extremely important for organizing the channel of direct (bypassing the wholesale link) supplies of agricultural products to the consumers.

At present, 27 markets are included into the retail markets register. As of January 1, 2012 the total number of market stalls at them was 2598, out of which 37.3% (969 places) were unoccupied. 6 markets out of 27 are retail agriculture markets, 3 of which were opened in 2011 (in the Ust-Kubinsky, Kichmengsko-Gorodetsky and Syamzhensky municipal districts). In 2012 two more agricultural retail markets (in the Kharovsky and Mezhdurechensky districts) are planned to be opened.

In the present-day conditions, among the acute issues is the provision of the remote rural settlements with socially important foodstuffs that is solved by organizing the itinerant trade.

The Oblast Department of Agriculture, Food Stocks and Trade takes the following measures to solve the above stated problems that the agro-industrial complex faces:

The most acute problem of the Vologda Oblast agriculture (which will become even more urgent when Russia joins WTO) is the significant debt load of agricultural producers. Even now the subsidies allocated to a region for the purpose of compensating the part of expenses to pay interest on loans constitute the main part of state support from the federal budget.

On the whole, in Russia the amount of loan debt in agriculture (data of the RF Ministry of Agriculture) exceeds 1 trillion 500 billion rubles, as for the Vologda Oblast, the agricultural enterprises' total loan debt by the end of 2011 exceeded 11.9 billion rubles, which equals almost 77% of the annual gross revenue. About 8% of the revenue is spent annually on interest payments on loans and credits (that is 1.1 − 1.2 billion rubles per year are withdrawn from circulation, and are compensated from the budget partly and after the costs are effected).

In order to increase the domestic agroindustrial complex competitiveness in the conditions of Russia's accession to WTO, the proposals to the Chairman of the Government of the Russian Federation (letter No. 01-33/388 dated March 3, 2012) were sent concerning the revision of the mechanisms of allocating subsidies for payment of interest on loans and credits.

If the federal budget compensated directly to the credit institutions the shortfall in their revenues from the loans and credits granted to agricultural enterprises (similarly to car loans − the RF Government Resolution No. 244 dated March 19, 2009), the agricultural producers would significantly reduce their expenditures for loan servicing and would be able to direct their financial resources to other purposes (wages, taxes, settlements with creditors).

Table 11. Ongoing long-term target programs in the Vologda Oblast agroindustrial complex

№ п/п	Program	Regulatory legal act on the adoption of a program
1.	Development of flax complex in the Vologda Oblast for the period of 2009 – 2012	The Vologda Oblast Government Resolution No. 1719 dated September 9, 2008
2.	Development of dairy cattle breeding in the Vologda Oblast for the period of 2009 – 2012	The Vologda Oblast Government Resolution No. 1727 dated September 9, 2008
3.	Development of beef cattle breeding in the Vologda Oblast for the period of 2011 – 2020	The Vologda Oblast Government Resolution No. 983 dated August 23, 2008
4.	Social development of the village for the period of 2009 – 2012	The Vologda Oblast Government Resolution No.1734 dated September 9, 2008
5.	Preservation and recovery of agricultural lands fertility in the Vologda Oblast for the period of 2011 – 2013	The Vologda Oblast Government Resolution No.1130 dated October 4, 2010
6.	Prevention of Sosnowsky's Hogweed plant spreading on the territory of the Vologda Oblast for the period of 2011 – 2013	The Vologda Oblast Government Resolution No.1122 dated October 4, 2010
7.	Healthy nutrition for schoolchildren for the period of 2009 – 2015	The Vologda Oblast Government Resolution No.1732 dated September 9, 2008
8.	Development of food and processing industry in the Vologda Oblast for the period of 2012 – 2017	The Vologda Oblast Government Resolution No.273 dated March 28, 2011
9.	Development of family farm enterprises in the Vologda Oblast for the period of 2012 – 2020	The Vologda Oblast Government Resolution No.1158 dated September 21, 2011
10.	Provision of quality and security of alimentary raw materials and foodstuffs in the Vologda Oblast for the period of 2012 – 2020	The Vologda Oblast Government Resolution No.1163 dated September 21, 2011

In 2011, the Oblast Government approved the Strategy of the Vologda Oblast agroindustrial complex and consumer market development up to 2020 [8].

Currently, the Department of Agriculture, Food Stocks and Trade is elaborating the State programme on the development of the Oblast agroindustrial complex for 2013 — 2020.

The main sections of the Programme and the guidelines of support correspond to the State Programme of the RF Ministry of Agriculture. The discussion and defence of the Pro-gramme will be held in the Oblast Government before August 1 of the current year.

At present, 10 long-term target programmes are being implemented in the oblast *(tab. 11)*. It is envisaged to allocate 455.1 million rubles for their realization from the Oblast and Federal budgets. On the whole, in 2012 it is planned to allocate 1130.7 million rubles from the Federal and Oblast budgets for the support of agriculture. Thus, the Oblast possesses quite a firm basis for ensuring food security and significant reserves for the development and increase of agricultural sector efficiency.

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Quality system implementation of the basis of the stable functioning of processing enterprises

The article proves the necessity to use quality system in the conditions of Russia's accession to the World Trade Organization. It characterizes the main principles of this work in industrial dairy enterprises. The authors present a set of measures to implement the HACCP system (Hazard Analysis and Critical Control Points) at CJSC Totma Butter-Making Plant (the Vologda Oblast) in order to improve the competitiveness of its products.

Quality system, efficiency, competitiveness, dairy products quality, World Trade Organization (WTO), Hazard Analysis and Critical Control Points (HACCP), the critical control points (CCPs).

Vladimir N. OSTRETSOV
Doctor of Economics, Professor of the Vologda State Dairy Farming Academy named after N.V. Vereshchagin

Anna I. GNEZDILOVA
Doctor of Technical Sciences, Professor of the Vologda State Dairy Farming Academy named after N.V. Vereshchagin
gnezdilova.anna@mail.ru

Olga V. BARASHKOVA
Postgraduate of the Vologda State Dairy Farming Academy named after N.V. Vereshchagin

Global progress trends in nutrition are associated with the products which are enriched with functional ingredients that contribute to the promotion and strengthening of public health. The improvement of product quality is an essential condition of this process. It is the most important and determining factor of producer's success among the customers [3].

The factors of final dairy output quality include the characteristics of feedstock, components and materials, the individual stages of production that determine the overall

quality level of technological processes, as well as clear control system operation at all the stages of production.

The development of single standards and requirements for product safety is necessary for the members of the Customs Union – Russia, Belarus and Kazakhstan – in order to protect their markets from low-quality imports and reduce of trade barriers for their products and services within the scope of the Common Economic Space that has been formed since January 1, 2012.

The harmonization of technical regulations and standards of the Customs Union and the Single Economic Space will be conducted within the European legislation. It is one of the most important questions for Russia's accession to the World Trade Organization (WTO). Moreover, the problem of WTO should be seen as the problem of protecting domestic markets and the contest for the expansion into foreign markets. This applies primarily to the agricultural and food industries. According to the unanimous opinion of most experts, politicians and state figures, these branches will be the most vulnerable sectors in the first years of Russia's membership in WTO.

Meanwhile, the analysis shows that a lot of Russian enterprises haven't come to the point of this organization's requirements, so they are poorly prepared for Russia's entry into WTO. In this connection it should be noted that Russian companies have already entered the zone of risk; the current state of affairs urge them to think about competitiveness. The growing competition of foreign companies on the Russian domestic market and the low competitiveness of domestic products on the foreign market cause significant economic and social problems. The accession to WTO may increase these problems greatly if we don't reconstruct quality management and don't use the best international and national experience to improve the organization of production. As for the export ambitions of some enterprises, they will have to be left behind [4].

Upon the accession to WTO, many companies and the whole industries couldn't meet competition because of the influx of overseas goods and services which are often cheaper and of better quality. Western foodstuffs, which are well-subsidized and more competitive, will displace Russian products due to their amount and affordability, as it takes place in Ukraine. This will lead to the lack of domestic foodstuff competitiveness and consumer debalance in favor of imported chicken legs, stale meat, dairy products, etc.

According to expert estimates, only 25% of domestic enterprises can be able to compete with foreign producers on the domestic market, especially after the significant reduction of some customs duties.

Today, quality management system is one of the main methods to produce competitive products. Of course, this system should be effective. World experience in quality control management shows that the stable quality of a product can not be achieved without the stabile quality of raw materials. Therefore, there is a trend to closer cooperation between the manufacturers and suppliers of raw materials and component parts. This is true both for developed and developing countries, though these trends are different there. It is no coincidence that the international standard offers the procedure of choosing a supplier as an element of quality assurance system [6].

The cost of quality has a direct impact on the cost price for goods – a key competitive factor. The systematic analysis of these costs in order to optimize them is an integral part of enterprise's quality programs. The role of top management is undeniable in creating such a climate in the team, when the principle of "first and foremost quality" isn't just a slogan.

For over three decades the tasks of creating high-quality products have been solved in the world through the quality control system. Nowadays, the principles of quality management, which are influenced by the development

of economic, cultural and political systems of the country, are quite diverse. As for the quality assurance methods, the long-standing international practice shows that they are similar and some main trends can be pointed out in this connection [2].

Japanese scientist H. Taguchi expressed the essence of modern quality assurance methods in the following statements:

1. It is necessary to assess the damage that poor-quality products can inflict on the society. In this case we take into account the damage caused by finished products (refusals, injuries, accidents, impossibility of own functions performance, failure to meet customer requirements) and the damage in the production of defective products (waste of time, overhead energy, strength and toxicity of some manufacturing processes). It is necessary to take into account the amount of such damages in calculating the preventive costs of quality.

2. A company should continually improve production quality and reduce costs in order to produce competitive goods. It is necessary to take into account the fact that customer requirements increase constantly. This fact should be considered when developing a firm's strategy.

3. The main purpose of the program on improving products' quality must be the permanent reduction in the differences between the product quality indicators and characteristics specified by a customer. This task is associated with the regular improvement of metrological service.

4. The damage, which is suffered by a customer because of failure to comply with his requirements, is proportional to the square of deviation value of quality indicators. This must be taken into account when setting the requirements for the quality of production processes.

5. The quality and cost prices of finished product are mainly determined by the quality of design and technology. Therefore, it is necessary to focus on the requirements for the quality

of finished products in designing and planning production process and control methods.

6. The deviation of product performances from the specified characteristics of product quality should be reduced during the development period and prototype tests.

7. It is necessary to identify the dependence of operational characteristics on other parameters of a product and technological process and plan an experiment based on statistical calculations using this dependence [5].

The HACCP system (Hazard Analysis and Critical Control Points) is the main model of quality management and food safety in the developed countries. The HACCP concept was developed in the early 80-ies of the XX century in the United States. The implementation of HACCP began in the European Union with the adoption of the Directive 93/43/EEC on the Hygiene of Foodstuffs. Then these countries developed national documents regulating the requirements of the HACCP system and the procedures for its development. The HACCP system had become the mandatory requirement in the U.S., Canada and most European Union countries by 2000. In 2004 the European Parliament and the Council of the European Union adopted the Regulation on the Hygiene of Foodstuffs instead of the Directive 93/43/EEC. According to Article 6, the executive agencies of the European countries should recognize as necessary the certification of the HACCP system that is carried out by competent authorities, i.e. by authorized governments of the countries in which they are located. In Russia the All-Russian Research Institute of Standards developed the State Standard R 51705.1-2001 "Quality systems. HACCP principles for food products quality management. General requirements" that was enacted on July 1, 2001. In the same year the State Standard developed and implemented the System of Voluntary Certification HACCP. Eleven certification agencies are operating today within the scope of this system.

As for food industry enterprises, HACCP is a system which allows the companies to direct their resources and efforts to the critical zones of production and, at the same time, it reduces the risk of manufacturing and selling a dangerous product. However, this system is a strong evidence of the fact that the producer provides all the conditions which guarantee the stable production of quality and safe products.

The modern HACCP system is based on seven principles, the consequent implementation of which allows the producers to develop, implement and successfully manage this system at the enterprise:

- Principle 1: Conduct a hazard analysis.
- Principle 2: Identify critical control points (CCPs).
- Principle 3: Establish critical limits for each critical control point.
- Principle 4: Establish critical control point monitoring requirements.
- Principle 5: Establish corrective actions.
- Principle 6: Establish record keeping procedures.
- Principle 7: Establish procedures for ensuring the HACCP system is working as intended.

The rapid expansion, general acceptance and extensive use of the HACCP system in the industrial experience can be explained by a number of advantages for the organizations which use it.

There are the following internal benefits of HACCP implementation:

✓ the basis of HACCP is a system approach to the parameters of food safety at all stages of life cycle − from processing raw materials to final consumer use of the product;

✓ the use of preventive measures rather than belated attempts to rework and withdraw products;

✓ the unambiguous determination of the responsibility for ensuring food safety;

✓ the exact identification of critical processes and focusing the main resources and efforts of the company on them;

✓ significant saving due to the reduction of the share of manufacturing defects in the total production volume;

✓ documentary evidence proving reliance upon the safety of foodstuffs that is particularly important when analyzing complaints and litigations.

There are the following external benefits of HACCP implementation:

➢ consumer confidence in products;

➢ the possibility of entering new markets, including the international ones, and expanding the present outlets;

➢ additional benefits for the participation in major tenders;

➢ improved competitiveness of a company's production;

➢ increased investment attractiveness of an enterprise;

➢ reducing the number of reclamations by providing stable quality of products;

➢ building up the reputation for producing quality and safe foodstuffs [7].

We have developed a working program of measures aimed at the implementation of the HACCP system at CJSC Totma Butter-Making Plant. It is located in the Totma District of the Vologda Oblast. The main activities of the company involve milk purchasing and processing. The plant is specialized in producing whole-milk foodstuffs. The main performance indicators of the plant in 2009 − 2010 are presented in *tables 1 and 2.*

The production volume decreased by 17.23% in 2010 as compared with 2009. The decline in whole-milk production is associated with the insufficient supply of feedstock.

There is the largest share of milk, curd and kefir in the output of products because they are the most popular foodstuffs. The company is going to expand the output of dairy products in future.

Table 1. Output volume and product mix in CJSC Totma Butter-Making Plant

Product	2009		2010		Deviation	
	Volume, t	%	Volume, t	%	(+;-)	%
Milk	1152.00	58.92	977.49	60.40	-174.51	84.85
Kefir	175.70	8.98	207.85	12.84	32.15	118.30
Sour cream	108.10	5.53	90.70	5.60	-17.40	83.90
Butter	116.80	5.97	71.52	4.42	-45.28	61.23
Curd	392.20	20.06	259.69	16.05	-132.51	66.21
Cheese	10.50	0.54	11.19	0.69	0.69	106.57
Total	1955.30	100.00	1618.44	100.00	-336.86	82.77

Table 2. Economic indicators of CJSC Totma Butter-Making Plant in 2009 – 2010

Indicator	2009	2010	Deviation, (+;-)
Cost price, thsd. rub.	131704.40	81702.00	-50002.40
Sales proceeds, thsd. rub.	120604.00	73531.00	-47073.00
Profit (loss), thsd. rub.	(12762.00)	(695.00)	+12067.00
Profitability of production, %	-9.7	-0.9	8.8
Profitability of sale, %	-10.05	-0.9	9.15

Unfortunately, a product range is quite narrow now, there is a lack of secondary raw milk products (they use little buttermilk and whey for normalization but the main amount of secondary milk is flown away through sewers. Nowadays, new products with various fillers and high biological and nutritional value are in great demand [1].

These figures show that the production was unprofitable both in 2009 and 2010. CJSC Totma Butter-Making Plant is inefficient. It is necessary to arrange special activities aimed at preventing and reducing damage and losses and increasing investment profit.

The main sources of profit are increased sales, reduced production costs, improving the quality of commodity output. The most important strategic goal of the company CJSC Totma Butter-Making Plant is an increase in the competitiveness of production sold in the markets.

The implementation program of the HACCP system can be considered in the case of the plant's curd production.

CJSC Totma Butter-Making Plant produced curd using traditional vats until 2005. The equipment was both physically outdated and obsolescent. The mechanization of curd making process was excluded. In addition, the produced curd did not always satisfy the requirements: there were the significant deliveries of raw milk of poor quality, so it was necessary to reduce the risk of secondary contamination and extraneous microflora growth in the finished products.

The curd production line by "Alpma" was run at the plant in 2005. The main difference between the curd production line and the traditional patterns of production is fully mechanized process that ensures high hygienic indicators and, consequently, increased shelf life of this product.

Dynamics of curd production by CJSC Totma Butter-Making Plant in 2006 − 2010 is presented in *table 3*.

The average level of dynamics range in that period:

$$y = \frac{\sum y_i}{n} = \frac{142423.00}{5} = 28484.60 \text{ thsd. rub.}$$

Absolute average annual increase:

$$\Delta y = \frac{\sum \Delta y_i}{n-1} = \frac{20890.00}{4} = 5222.50 \text{ thsd. rub.}$$

Table 3. Dynamics of curd production in 2006 – 2010

Year	Commodity output at current prices, thsd. rub.	Absolute increase		Growth rate, %		Rate of increase, %	
		Basic	Chain	Basic	Chain	Basic	Chain
2006	11231.00	-	-	-	-	-	-
2007	21205.00	9974.00	9974.00	188.8	188.8	88.8	88.8
2008	31520.00	20289.00	10315.00	280.7	148.6	180.7	48.6
2009	46346.00	35115.00	14826.00	412.7	147.0	312.7	47.0
2010	32121.00	20890.00	-14225.00	286.0	69.3	186.0	-30.7
Total	142423.00	-	20890.00	-	-	-	-

Growth coefficient:

$$C_g = \sqrt[n-1]{\prod_{i=1}^{n} PC_i} = \sqrt[4]{1.888 \cdot 1.486 \cdot 1.470 \cdot 0.693} \approx 1.300.$$

The curd production volume increased by 186% in 2010 as compared with 2006. But the company has significant reserves to improve the efficiency of curd production which are provided for in the HACCP system implementation at the plant during the period from 2012 to 2014.

Before developing the HACCP plan, the company's management has informed the entire engineering staff about their intentions. The personnel should fully share the idea of implementing the HACCP plan.

Production control at CJSC Totma Butter-Making Plant is effected by technical and microbiological control services, as their goal is ensuring production in strict accordance with the standards, improving taste and nutritional quality, increasing storage quality on the base of adherence to all technological modes of production.

In order to control quality we conducted researches and identified critical control points. The purpose of this phase was to determine the points, steps or procedures that can be applied to control, making it possible to prevent the hazards, eliminate or reduce them down to acceptable levels. There are the following examples of critical control points: thermal processing, cooling, chemical resi-

dues test for the ingredients, control over the structure of products, metal contamination test for products.

Critical control points have been set at the plant in accordance with the recommendations of the State Standard R 51705.1-2001 by the "decision tree" method.

Critical control points for incoming inspection of feedstock are shown in *table 4*.

In order to determine critical control points of the production process it was necessary to answer each question sequentially for every stage, where significant hazards had been identified, and for each hazard. Critical control points of the production process are shown in *table 5*.

The production process hazards were divided into the groups *(tab. 6)*.

Thus, five critical control points were identified:

— 1 CCP — spoilage microorganisms;

— 2 CCP — pathogenic and conditionally pathogenic microorganisms;

— 3 CCP — chemical toxicants in the environment;

— 4 CCP — radioactive elements;

— 5 CCP — extraneous impurities.

Monitoring system was developed for each critical control point in order to carry out planned observations and measurements which were necessary for the early detection of critical limits violations and the implementation of appropriate preventive or corrective effects (process setting-up).

Table 4. Critical control points of incoming feedstock (incoming inspection)

Name of feedstock	Hazard	B1	B2	CCP
Raw milk	Toxic elements	Yes	No	CCP (№1)
	Pesticides	Yes	No	CCP (№2)
	Antibiotics	Yes	No	CCP (№3)
	Radionuclides	Yes	No	CCP (№4)
	Coliform bacteria	Yes	No	CCP (№5)
	Quantity of mesophilic aerobes and facultative anaerobes	Yes	No	CCP (№6)
	Pathogens, including salmonella	Yes	No	CCP (№7)
	L.monocytogenes	Yes	No	CCP (№8)
Auxiliary feedstock	Toxic elements	Yes	No	CCP (№9)
	Pesticides	Yes	No	CCP (№10)
	Radionuclides	Yes	No	CCP (№11)
	Mycotoxins	Yes	No	CCP (№12)
	Nitrates	Yes	No	CCP (№13)
	Quantity of mesophilic aerobes and facultative anaerobes	Yes	No	CCP (№14)
	Coliform bacteria	Yes	No	CCP (№15)
	Staphylococcus aureus	Yes	No	CCP (№16)
	Pathogens, including salmonella	Yes	No	CCP (№17)
	Mold	Yes	No	CCP (№18)
	Yeast	Yes	No	CCP (№19)
	Minor impurities	Yes	Yes	Absent

The absence of unacceptable risk ensures frequency of monitoring procedures.

All registered data and documents related to the monitoring of critical control points must be signed by performers and registered in HACCP worksheets.

Corrective actions aimed at the violations of critical limits should be established and documented for each critical control point.

We have studied two competing products by 5 parameters (external qualities, taste, package security, market outlet, enterprise's prestige) of the elements of HACCP quality management system in points on a 5-point scale *(tab. 7)*.

The coefficient of competitiveness can be calculated by the formula:

$$C = (5 \times 35 + 5 \times 20 + 4 \times 15 + 4 \times 20 + 3 \times 10)/$$
$$/(5 \times 35 + 5 \times 20 + 4 \times 15 + 5 \times 20 + 4 \times 10) =$$
$$= 445/475 = 0.94;$$

C < 1 — low competitive products.

The introduction of the HACCP system will improve package security, expand market outlet and increase enterprise's prestige *(tab. 8)*.

There is the following calculation of the competitiveness coefficient:

$$C = (5 \times 35 + 5 \times 20 + 5 \times 15 + 5 \times 20 + 5 \times 10)/$$
$$/(5 \times 35 + 5 \times 20 + 4 \times 15 + 5 \times 20 + 4 \times 10) =$$
$$= 500/475 = 1.05.$$

C > 1 — high competitive products.

So, the implementation of the elements of the HACCP system is efficient and positive for an enterprise's activity.

The elements of production quality system have been implemented at CJSC Totma Butter-Making Plant since 2012. In order to analyze the cost of quality we have defined four groups of costs for the next three years *(tab. 9)*.

Table 9 shows that the structure of cost is changing. The shares of cost of controlling, internal and external costs of defective products are decreasing, while the cost of preventive measures is rising. The most important object of control is the percentage of quality assurance cost *(figure)*.

Indeed, if the quality management system functions, it reduces the amount of defective

Table 5. Critical control points of the production process

Stage of technological process	Hazard	Availability				CCP
		Close to zero	Insigni-ficant	Signi-ficant	Critical	
Cleaning and cooling	Coliform bacteria	No	-	-	-	Absent
	Quantity of mesophilic aerobes and facultative anaerobes	No	-	-	-	Absent
	Pathogens, including salmonella	No	-	-	-	Absent
	L.monocytogenes	No	-	-	-	Absent
Pasteurization and normalization	Quantity of mesophilic aerobes and facultative anaerobes	No	-	-	-	Absent
	Pathogens, including salmonella	No	-	-	-	Absent
	Coliform bacteria	No	-	-	-	Absent
	L.monocytogenes	No	-	-	-	Absent
	Glass	No	-	-	-	Absent
	Metal filings	Yes	No	Yes	No	CCP (№20)
Inoculation and ripening	Quantity of mesophilic aerobes and facultative anaerobes	No	-	-	-	Absent
	Pathogens, including salmonella	No	-	-	-	Absent
	Coliform bacteria	No	-	-	-	Absent
	L.monocytogenes	No	-	-	-	Absent
	S.aureus	No	-	-	-	Absent
	Yeast and mold	Yes	No	Yes	No	CCP (№21)
	Glass	Yes	No	Yes	No	CCP (№22)
	Metal filings	Yes	No	Yes	No	CCP (№23)
Bunch processing	Quantity of mesophilic aerobes and facultative anaerobes	No	-	-	-	Absent
	Pathogens, including salmonella	No	-	-	-	Absent
	Coliform bacteria	No	-	-	-	Absent
	L.monocytogenes	No	-	-	-	Absent
	S.aureus	No	-	-	-	Absent
	Yeast and mold	Yes	No	Yes	No	CCP (№24)
	Glass	No	-	-	-	Absent
	Metal filings	Yes	No	Yes	No	CCP (№25)
Reheating, whey removal	Quantity of mesophilic aerobes and facultative anaerobes	No	-	-	-	Absent
	Pathogens, including salmonella	No	-	-	-	Absent
	Coliform bacteria	No	-	-	-	Absent
	L.monocytogenes	No	-	-	-	Absent
	S.aureus	No	-	-	-	Absent
	Mold	No	-	-	-	Absent
	Glass	No	-	-	-	Absent
Quality control	Coliform bacteria	Yes	No	Yes	No	CCP (№26)
Marking and packaging	Quantity of mesophilic aerobes and facultative anaerobes	Yes	No	Yes	No	CCP (№27)
	Pathogens, including salmonella	Yes	No	Yes	No	CCP (№28)
	Mold	Yes	No	Yes	No	CCP (№29)
	L.monocytogenes	Yes	No	Yes	No	CCP (№30)
	Toxic elements	Yes	No	Yes	No	CCP (№31)
	Antibiotics	Yes	No	Yes	No	CCP (№32)
	Pesticides	Yes	No	Yes	No	CCP (№33)
	Radionuclides	Yes	No	Yes	No	CCP (№34)
	Coliform bacteria	Yes	No	No	-	Absent
Transportation	Quantity of mesophilic aerobes and facultative anaerobes	Yes	No	No	-	Absent
	Pathogens, including salmonella	Yes	No	No	-	Absent
	Mold	Yes	No	Yes	No	CCP (№35)
	L.monocytogenes	Yes	No	No	-	Absent
	Coliform bacteria	Yes	No	No	-	Absent
	Quantity of mesophilic aerobes and facultative anaerobes	Yes	No	No	-	Absent
	Pathogens, including salmonella	Yes	No	No	-	Absent
	Mold	Yes	No	No		Absent
	L.monocytogenes	Yes	No	No	-	Absent

Table 6. Groups of hazards

Relevant hazard	The group of relevant hazards
Yeast and mold	1. Spoilage microorganisms
Coliform bacteria	2. Pathogenic and conditionally pathogenic microorganisms
Listeria monocytogenes	
Salmonella	
Staphylococcus aureus	
Toxic metals	3. Chemical toxicants in the environment
Pesticides	
Antibiotics	
Nitrates	
Radionuclides	4. Radioactive elements
Glass, metal filings	5. Extraneous impurities

Table 7. The competitiveness indicators before the introduction of a quality management system based on the principles of HACCP (in points on a 5-point scale)

Indicators	Curd «Slavic»	Curd «Classic»	Indicator's share, %
External qualities	5	5	35
Taste	5	5	20
Package security	4	4	15
Market outlet	4	5	20
Enterprise's Prestige	3	4	10

Table 8. The competitiveness indicators after the introduction of a quality management system based on the principles of HACCP (in points on a 5-point scale)

Indicators	Curd "Slavic"	Curd "Classic"	Indicator's share, %
External qualities	5	5	35
Taste	5	5	20
Package security	5	4	15
Market outlet	5	5	20
Enterprise's Prestige	5	4	10

Table 9. Plant's costs of the quality system implementation in 2012 – 2014

| Group of cost	2012		2013		2014	
	Amount, thsd. rub.	Structure, %	Amount, thsd. rub.	Structure, %	Amount, thsd. rub.	Structure, %
1. Cost of controlling	**176.30**	**25.5**	**138.53**	**21.2**	**129.53**	**20.2**
Remuneration of the personnel engaged in monitoring and testing	160.28		125.94		117.75	
The cost of materials	16.02		12.59		11.78	
2. Internal cost of defective products	**254.43**	**36.9**	**206.75**	**31.8**	**208.25**	**32.5**
The cost of spoiled goods	254.43		206.75		208.25	
3. External cost of defective products	**147.00**	**21.3**	**120.76**	**18.5**	**88.30**	**13.8**
Remuneration of the personnel engaged in reimbursement	17.80		14.69		10.77	
Transportation cost	4.5		2.70		1.80	
Cost price for spoiled goods	124.70		103.37		75.73	
4. Cost of preventive measures	**112.50**	**16.3**	**185.00**	**28.4**	**215.00**	**33.5**
Training, consulting, etc.	112.50		185.00		215.00	
Total costs	**690.20**	**100**	**651.04**	**100**	**641.08**	**100**

The cost structure of product quality assurance
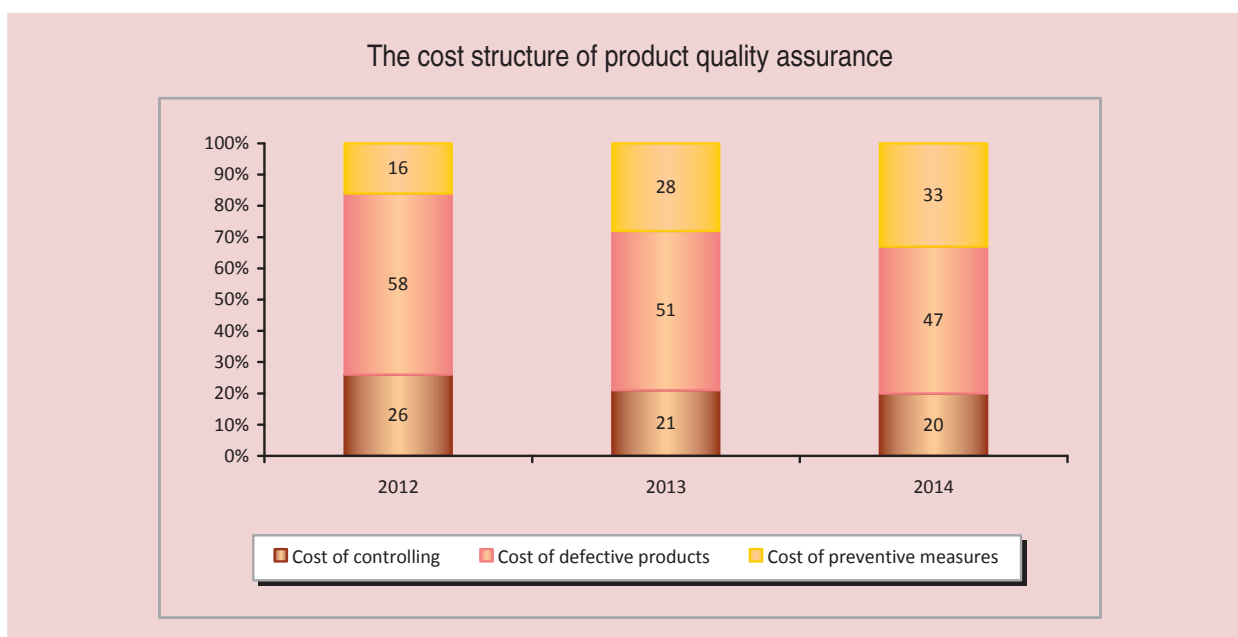
Table 10. Performance indices of CJSC Totma Butter-Making Plan
after the introduction of a quality management system

Index	2012	2013	2014
The volume of production, t	250	260	270
Unit cost, rub.	124	127	130
Sell price for production unit, rub.	139	142	146
Cost of commercial output, thsd. rub.	31000	33020	35100
Sale proceeds, thsd. rub.	34750	36920	39420
Gross profit, thsd. rub.	3750	3900	4320
Implementation costs, thsd. rub.	690	651	641
Financial effect, thsd. rub.	+3060	+3249	+3679

products and the cost of controlling, and the main objective of the plant is to guide and coordinate the processes of production.

CJSC Totma Butter-Making Plant will be able to increase the volume of curd production in 2013 and 2014 because this product is competitive and it is in demand *(tab. 10)*.

According to these data, the cost price for curd is rising because the volume of production is increasing. Sale proceeds of these products will increase by 2170 thousand rubles in 2013 as compared with 2012 and by 2500 thousand rubles in 2014 in comparison with 2013.

The growth rate of profit will amount to 104% in 2013 as compared with 2012 and 110.77% in 2014 as compared with 2013.

The effectiveness of quality management is evaluated on the base of profit and profit margins (static values) and the dynamic rate of profit (dynamic values).

Since these values are positive, then the quality management of CJSC Totma Butter-Making Plant can be recognized as effective.

It is obvious that under increasing pressure of regulatory requirements on the food industry, the system similar to HACCP makes business more attractive, increasing its safety and quality standards.

These measures will expand product market of CJSC Totma Butter-Making Plant and, consequently, increase profit that remains at the disposal of the company after the sale of products.

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Methodology of estimating the economic efficiency of milk production technologies in the summer period

The methodology of estimating the milk production technologies efficiency during the summer period is described in the article. Three types of cow housing: stall and pasturable, camping and pasturable, stall and outdoor were analyzed and the results are produced here. It is proved, that for the farms of all types and sizes the camping and pasturable cow housing leads to the lowest values of reduced expenditures and milk cost price during the summer period. These performance indicators can be obtained only if the intensive technologies of milk production are used during the summer period, i.e. the combined green forage chain with the rotational rationed system of livestock grazing and two-shift work scheme.

Milk production technology, cow productivity, production cost, reduced expenditures, economic effect.

**Vladimir N.
TUVAYEV**
Doctor of Technical Sciences, Professor, Head of the Department
of the Vologda State Dairy Farming Academy named after N.V. Vereshchagin

**Evgeniy G.
GULYAYEV**
Doctor of Agricultural Sciences, Professor of the Vologda State Dairy Farming
Academy named after N.V. Vereshchagin

In dairy cattle breeding, summer period is an important organizational and technological stage, which allows without any additional material costs to increase milk yields and reduce production costs, to improve the health of cows and their reproductive functions. With the proper organization of feeding, milking and housing of cows during this period, farm enterprises receive the cheapest milk, the production cost of which is 1,5 − 2 times lower, than during the stall housing [4]. Further improvement of the dairy cattle breeding technical equipment is becoming a trend, and a factor of economic changes; however, the choice of cow housing system in the summer period at the designing stage should be economically grounded, and in case of possessing appropriate means, farms should have a notion about the economic effect, which can be obtained when introducing innovative technologies.

Given the importance of the tasks facing the dairy cattle breeding concerning the production output increase and its cost price reduction, the aim of the work is to improve the methodology of estimating the milk production technologies efficiency during the summer period. To achieve this goal it is necessary to solve the following tasks: substantiate the distinctive features of the proposed methodology; select the criteria for evaluating the economic efficiency of the compared types of cow housing in the summer period; to specify the economic indicators calculation algorithm and approbate the methodology on a real object.

When selecting the most cost-effective technologies of milk production during the summer period it is necessary to correct existing methodical provisions and recommendations concerning the economic justification of standard project solutions of cattle-breeding farms and complexes according to the country's zones [1, 6], in order to estimate objectively the compared types of cow housing in the summer period with regard to the influence of various factors and production conditions.

The most important of these factors are the systems of cow housing and feeding in the summer period depending on the spatial, planning and constructive peculiarities of farms and summer cow camps, means of technological processes mechanization, systems of production and labour organization. The economic performance of technological options depends also on the different sizes and types of farms and summer camps, the productivity levels of cows, forage production options.

The differentiated approach used in the calculation of milk production costs by the periods of the year is the distinctive feature of the proposed methodology. In order to identify the main factors influencing costs in the summer period, it is necessary to vary the production technologies of that period only. It is necessary to consider the widespread cow housing types given the different variants of the green forage chain organisation: stall and pasturable, camping and pasturable with the use of various grazing types; stall and outdoor, camping and outdoor with the use of the green fodder and changing its transportation distance.

Another distinctive feature of the proposed methodology is the clarification of milk production costs calculation by taking into account the capital investments into the main livestock breeding assets along with the capital investments into the main fodder production assets. The latter change depending on the green forage chain options and influence the amounts of current as well as reduced expenditures.

Another distinctive feature of the methodological recommendations is the consideration of the time factor when calculating the reduced expenditures by the reduction of the main production assets to the single moment of time. Capital investments in buildings, constructions, equipment, summer camps, in the animals of the basic herd as well as the machinery for fodder production constitute the main production assets having different lifetime. While using the farm buildings with the longest service life, other fixed assets with shorter life duration will be repeatedly renewed. The total one-time accounting of all capital investments in the reduced expenditures calculation does not assess the compared options objectively enough.

Therefore, in order to take into account the time factor in calculating the reduced expenditures and the annual economic effect according to the technological options, it is necessary to multiply all capital investments in the basic production assets, renewable several times during the operation of the basic objects with the longest service life, by the variable reduction coefficient.

Economic efficiency estimation, when using different technologies and technical solutions, involves applying the system of indicators, reflecting the cost and natural characteristics of the studied cow housing types.

The objects under consideration, i.e. milk production technologies during the summer period, are a complex system; therefore, the technological processes efficiency estimation requires a multi-criterion approach. The efficiency criterion should be considered, taking into account the following aspects: the trends in the development of the summer cattle breeding technologies and forecast of optimal economic indicators of the studied technologies for the specific regional conditions of their application.

The maximum of the expected annual economic effect which is determined as the difference between the reduced costs of compared technological options is used as the global criterion to ensure the adequate, on the social production scale, approach to the planned perspective technologies.

$$E = (R_1 - R_2)A \rightarrow \max, \qquad (1)$$

E – annual economic effect, rubles;

R_1 and R_2 – reduced costs for the unit of production (work), produced (performed) with the use of basic and new equipment, rubles;

A – annual production (work) output with the use of new equipment in the estimated year, in physical units.

The expected annual economic effect describes the peculiarities and efficiency of the object as a whole. It connects the private, integral and local criteria. In the technological processes forecasting and optimization, with regard for the zonal conditions, it is suggested to use the reduced costs minimumas the integral (generalized) criterion, it establishes a linkage between private and local criteria, provides a compromise solution to the problem of technological variants optimization. It is suggested to use the reduced costs minimum index at the stage of making a decision concerning the farm or summer camp reconstruction or the new construction [3, 4].

Essentially, the reduced costs include both intensive and extensive components, i.e. the current production expenses and one-time expenses – capital investments in fixed assets.

Then the reduced costs of milk production during the summer period can be determined as follows:

$$R_{iab} = C_{iab} + E_N K_{iab}, \qquad (2)$$

E_N – normative coefficient of capital investments efficiency equal to the refinancing interest rate established by the RF Central Bank with regard to inflation;

C_{iab} – production unit cost, rubles;

K_{iab} – capital investments in the main production assets according to the technological options, reduced to the initial level by multi-plying by the reduction coefficient, (α_i), rubles.

The amount of capital investments in fixed assets is determined in accordance with the estimates and projects on standard sizes and types of farms or summer camps for cattle. Thereby, the standard general layout projects of the farms and camps' types and sizes are reduced to a comparable view according to the structure of buildings, constructions and the level of equipment, and the estimated costs are adjusted accordingly.

At pasturable cow housing the additional capital investments in permanent fences along drove paddocks, stock driving roads and at stall housing – around barn yards are taken into account.

In order to determine the amount of capital investments in tractors and machinery for forage production given the different variants of the green forage chain organization, the calculation of the required areas for forage procurement is produced here. The areas of herbage procurement for the summer period are calculated by dividing the gross requirement for each crop by its yielding capacity. The areas suitable for cultivation, maintenance and harvesting are multiplied by the specific capital investments in tractors and machinery for fodder production.

The production cost of milk in the summer period will be determined as follows [2, 5]:

$$C_{i\alpha\beta} = C^F_{i\alpha\beta} + C^P_{i\alpha\beta} + C^{AR}_{i\alpha\beta} + C^E_{i\alpha\beta} + C^W_{i\alpha\beta} +$$
$$+ C^{MD}_{i\alpha\beta} + C^L_{i\alpha\beta} + C^{OM}_{i\alpha\beta} - C^M_{i\alpha\beta}, \quad (3)$$

i — sizes and types of farms and summer camps;

α — cow housing and feeding options in the summer period, ways of production and labour organization;

β — average productivity of cows in the summer period depending on the duration of the period, kg;

$C^F_{i\alpha\beta}$ — fodder price and the costs of its transportation and distribution according to the green forage chain options, rubles;

$C^P_{i\alpha\beta}$ — total payroll fund in the summer period, rubles.;

$C^{AR}_{i\alpha\beta}$ — amortization and current repair charges in the summer period, rubles.;

$C^E_{i\alpha\beta}$ — electricity costs in the summer period, rubles;

$C^W_{i\alpha\beta}$ — water costs in the summer period, rubles;

$C^{MD}_{i\alpha\beta}$ — expenses on medicines and disinfectants in the summer period, rubles;

$C^L_{i\alpha\beta}$ — cost of litter in the summer period, rubles;

$C^{OM}_{i\alpha\beta}$ — price for by-products (manure) in the summer period, rubles;

$C^M_{i\alpha\beta}$ — production organization and management costs, tax and insurance payments for the summer period, rubles.

The production cost of product unit (1 centner of milk) in the summer period is calculated according to the formula:

$$C^I_{i\alpha\beta} = \frac{C_{i\alpha\beta}}{n_i M^{100}_{\alpha\beta} m_\alpha}, \quad (4)$$

n_i — coefficient of cows and heifers population depending on the sizes and types of farms and summer camps;

$$M^{100}_{\alpha\beta} = M^{100}_{\beta} + T^{100}_{\beta} v_\alpha w,$$

$M^{100}_{\alpha\beta}$ — milk production per 100 cows with regard to calf crop, centners;

m_α — coefficient of cows productivity increase depending on the type of summer housing and feeding;

M^{100}_{β} — milk production per 100 cows during the summer period, centners;

T^{100}_{β} — calf crop per 100 cows during the summer period, head;

v_α — coefficient of increase of calf crop per 100 cows depending on the type of summer housing and feeding;

w — coefficient indicating the relation between the number of calves and milk yield accepted at the rate of 1.5 centners for 1 calf.

Fodder price and the costs of its transportation and distribution according to the green forage chain options are calculated by the formula:

$$C^F_{i\alpha\beta} = n_i (C^{1003H}_{\alpha} + N^{1003F}_{\alpha} P^{HT} + C^{100RFC}_{\alpha}) +$$
$$+ (P^{CF} + P^{CFT}) + (n_{iC} N^{100CFC}_{\beta} + n_{iH} N^{100CFH}_{\beta}) +$$
$$+ C^{FL}_{i\alpha}, \quad (5)$$

n_{iC} — cow population coefficient;

n_{iH} — heifers population coefficient;

C^{1003H}_{α} — herbage cost per 100 cows depending the green forage chain options, rubles;

C^{100RFS}_{α} — costs and expenses on the transportation of roughage feed and microaddings from a farm to a camp per 100 cows, rubles;

P^{HT} — cost of herbage transportation depending on the distance, rubles/t;

P^{CF} — price for the concentrated feedstuffs, rubles/t;

P^{CFT} — cost of the concentrated feed stuffs transportation, rubles/t;

N^{1003F}_{α} — requirement for the green fodder procured outside a pasture per 100 cows, t;

N^{100CFC}_{β} — requirement for concentrated feedstuffs in summer per 100 cows, t;

N^{100CFH}_{β} — requirement for concentrated feedstuffs in summer per 100 heifers, t;

$C^E_{i\alpha}$ — expenses for fuels and lubricants (fodder loading and distribution) in the summer period per a farm, camp, rubles.

The costs of the feedstuffs are firstly determined per 100 cows by multiplying their gross requirement by the production cost calculated in operation cards; secondly, they are multiplied by the livestock population coefficients, corresponding to the types and sizes of farms and summer camps.

The costs for transportation of mineral additives and concentrates from a farm to a camp are additionally taken into account, as well as roughage transportation in transition periods.

The requirement for feedstuff for several livestock productivity levels is calculated per 100 cows given the feeding rates, which take into account the energy and protein concentration in dry matter of the diet. In order to simplify the calculations, the gross demand for herbage in summer can be considered common for all levels of cows' productivity, but not less than 60 kg per head.

The need for concentrates per 100 cows at different productivity levels is calculated on the basis of 3 physiological groups into which a herd is divided: newly calved cows under 100 days of lactation (26 head), dairy cows 100 up to 300 days of lactation (56 head), dry cows (16 head). This distribution of the cows livestock in a herd is given with regard to regular annual calving.

The green forage chain options, most acceptable in the Non-Black Earth Zone, per 100 cows for different types of pastures and without them are developed for calculating green fodder input in the summer period. Grazing performance, the distribution of green matter yield by the cycles, average yielding capacity of annual and perennial crops are determined by the generalization of the region's data.

The expenses for fuels and lubricants during the loading and distribution of fodder in the summer period are calculated according to the formula:

$$C_{i\alpha}^{FL} = K_i \left(\sum_{i}^{K} \frac{N^{1003H} + N^{100RF}}{W} \right) P^{FL}, \quad (6)$$

i — types and sizes of farms and camps;

K_i — amount of technical means;

N^{1003H} — need for herbage per 100 cows, t,

N^{100RF} — need for roughage feed per 100 cows in summer, t;

W — technical equipment (loader and fodder distributor) performance per hour of the main time, t/hour;

P^{FL} — cost of fuels and lubricants per 1 hour of operational work of technical equipment, rubles/hour.

In order to calculate the payroll fund for the summer period it is necessary to determine the labour intensity of the works, the number of maintenance and management personnel depending on the size of the farm or summer camp, the system of cow housing in the summer and stabling periods, the average annual and summer productivity of the animals, the work management, the duration of the grazing period.

The number of livestock maintenance personnel (milking machine operators — milkers; livestock maintenance personnel — cattlemen, shepherds; cattle-feeding operators, etc.) is calculated according to the standard norms of livestock maintenance, depending on the level of production organization and mechanization.

The number of administrative personnel can be defined by the norms of technological projecting.

Labor costs per 1 centner of production, depending on the technology options, are determined by dividing the total working time fund by gross milk production.

Depreciation and current repair allocations in the summer period are calculated as follows:

$$C_{i\alpha\beta}^{DR} = (C_{i\alpha}^{DRF} + C_{i\alpha}^{DRC} + C_{i\alpha}^{DRP}) \frac{D^S}{365}, \quad (7)$$

D^S — duration of the summer period, days;

$C_{i\alpha}^{DRF}$ — depreciation and current repair allocations for a farm, rubles;

$C_{i\alpha}^{DRC}$ — depreciation and current repair allocations for a summer camp or summer barnyards, rubles;

$C_{i\alpha}^{DRP}$ — depreciation and current repair allocations for the fencing of pastures and livestock pasture watering equipment, rubles.

The amounts of depreciation and current repair allocations are defined according to the current normative and reference material.

The electricity costs in the summer period are determined as follows:

$$C_{i\alpha\beta}^{E} = n_i E_\alpha 100 P^E \frac{D^S}{365}, \qquad (8)$$

E_α — summarized norms of energy consumption in production processes for 1 head of livestock per year depending on the summer housing option, kWh/head a year;

$100P^E$ — price for 1 kW·h of electricity for agriculture, rubles.

The costs of water supply:

$$C_{i\alpha\beta}^{W} = n_i W 100 P^W D^S, \qquad (9)$$

W — summarized rate of water consumption for one cow per day, m³;

P^W — the cost of water, rubles/m³.

Costs of medicines and disinfectants:

$$C_{i\alpha}^{MD} = n_i 100 P^{MD} \frac{D^S}{365}, \qquad (10)$$

P^{MD} — price for medicines and disinfectants for one cow per year in average, rubles.

The cost of litter and by-products (manure) in the summer period are determined according to the formulae:

$$C_{i\alpha}^{L} = n_i 100 N^L D^S P^L, \qquad (11)$$

N^L — amount of litter for one cow per day, t;

P^L — price for litter, rubles/t.

$$C_{i\alpha}^{M} = n_i 100 (N^M + N^L) 0.7 D^S P^M, \quad (12)$$

N^M — manure output for one cow per day, t;

0.7 — organic fertilizer output rate;

P^M — price for by-products, rubles/t.

The average data on the regional farms' expenses can be used in order to simplify the calculations of production and management costs, insurance payments in the summer period for all the options.

$$C_{i\beta}^{PM} = n_i 100 C_\beta \frac{D^S}{365}, \qquad (13)$$

C_β — farms' average expenses for organizing management and production, rubles.

The three types of cow housing: stall and pasturable, camping and pasturable, stall and outdoor were compared, and the results prove that the lowest values of milk production costs during the summer period are obtained for all farm types and sizes (200, 400, 600, 800 head) when using the camping and pasturable cow housing type [4]. Accordingly, in the summer period, the milk production cost is $19 - 26\%$ lower, reduced costs are $6 - 7\%$ lower, and the profit is $12 - 16\%$ higher than the indicators for the stall and outdoor cow housing.

The stall and pasturable cow housing ranks second according to the performance indicators: the milk production cost in the summer period is $20 - 27\%$ lower, reduced costs are $5 - 6\%$ lower, and the profit is $10 - 15\%$ higher than the indicators for the stall and outdoor housing.

If a summer camp is located at a 12 km distance from a farm, the economic performance indicators decline insignificantly — in the limit of 1%. For the stall and outdoor housing, if herbage transportation distance increases from 3 to 12 km, the milk production cost in the summer period increases by $6 - 8\%$ and reduced costs — by $2 - 3\%$.

The construction of summer camps requires from 1000 to 3000 rubles of additional capital investments per one cow.

However, this eliminates the need for hard surface barn- and feed yards, which allows reducing capital investments for the farm improvement up to 1000 rubles per one cow. In addition, capital investments in agricultural equipment for fodder production increase 1.2-fold and fuel and lubricants consumption increases by 10 − 14% per year when using the green forage chain of grazing crops as compared to the pasturable cow housing type.

These efficiency indicators can be obtained only when using the intensive technologies of milk production during the summer period [3], i.e. the combined green forage chain with the rotational rationed system of livestock grazing and two-shift work scheme. When using camping and pasturable housing type, it is essential to implement advanced planning and building solutions for summer camps and new technological equipment.

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Assessment of innovation and investment projects of municipality's development in the northern region*

The article reveals the dependence of the development of rural economy's basis branch — the agricultural sector — on innovation. It shows the role of cattle breeding in providing the people with low-transportable dairy and meat products, peasant employment and rational use of natural forage grasslands. The authors examine the evaluation technique of innovation and investment project efficiency and reveal the effective implementation of such projects in cattle breeding in the peripheral northern rural region in the case of the Republic of Komi. There is a calculation of commercial efficiency indices of constructing 100 and 200 head dairies with the use of innovative technologies in different variants of state support. The article proves that it is necessary to strengthen the state support to farmers' income and prolong the terms of concessional lending for the modernization of innovative cattle breeding.

Cattle breeding, innovation, technique of effectiveness, innovation and investment projects, peripheral region, the Republic of Komi.

**Valentin A.
IVANOV**
Doctor of Economics, Professor of the Institute of Socio-Economic and Energy Problems of the North Komi Scientific Center of the Ural RAS Department
ivanov@iespn.komics.ru

**Anna S.
PONOMAREVA**
Postgraduate Student of the Institute of Socio-Economic and Energy Problems of the North Komi Scientific Center of the Ural RAS Department
anita-85_07@mail.ru, ponomareva@iespn.komics.ru

The urgency of cattle breeding development on the base of modernization and innovation technology

The urgency and significance of cattle breeding modernization for the Northern Zone based on the use of innovation technology is caused by the need of preserving and developing this important industry. The development of cattle breeding is constrained by the lack of investment and low level of their efficiency.

The research is aimed at assessing economic efficiency of innovation and investment projects in dairy and beef breeding in the Republic of Komi for making management decisions on attracting investment to the industry. Proceeding from the research objectives, the following tasks were solved:

1. To assess the recoupment of 100 and 200 head dairies construction in different variants of state support, using the indicators of commercial efficiency of innovative and investment projects.

2. To identify the eligibility of current terms of concessional lending and the level of state support for the construction and modernization of livestock houses in the North.

3. To develop practice guidelines for applying a differentiated approach to the terms of concessional lending and pricing support for the industry based on the analysis of innovation and investment projects effectiveness.

Cattle breeding is very important for rural areas of the North. It provides the population with low-transportable dairy and meat products, ensures the whole-year employment and allows peasants to use natural grasslands more efficiently. Northern hayfields and pastures are the sources of the cheapest and complete feed. Huge meadow tracts, laying in high-water beds, are especially valuable from the economic point of view. For example, it is possible to gather more than 410 tons of fodder units from the flood meadows of the Northern Dvina, Pechora, Mezen, Pinega, Vychegda and their tributaries [1, p. 73].

The development of cattle breeding is highly dependent on investment growth and transition to innovative technologies. Investments have been substantially reduced over the years of market reforms. Over the period from 1990 to 2010 the investment share in the fixed capital of Komi agriculture declined from 5.7 to 0.8% when the share of agriculture in the gross regional product amounted to 2.6%. The investment decline rate in the agricultural sector was more than four times higher than in the whole republic [2, p. 26]. Naturally, this affected launching of production capacity, primarily for cattle breeding, and ageing of livestock house and equipment. If 2.8 thousand places for cattle were launched in 1990 due to new construction, expansion and renovation, in 2010 only 0.4 thousand places for cattle were built [4, p. 24].

Figure 1. Launching cattle production capacity in the Republic of Komi in 1995 – 2010, thsd. places for cattle
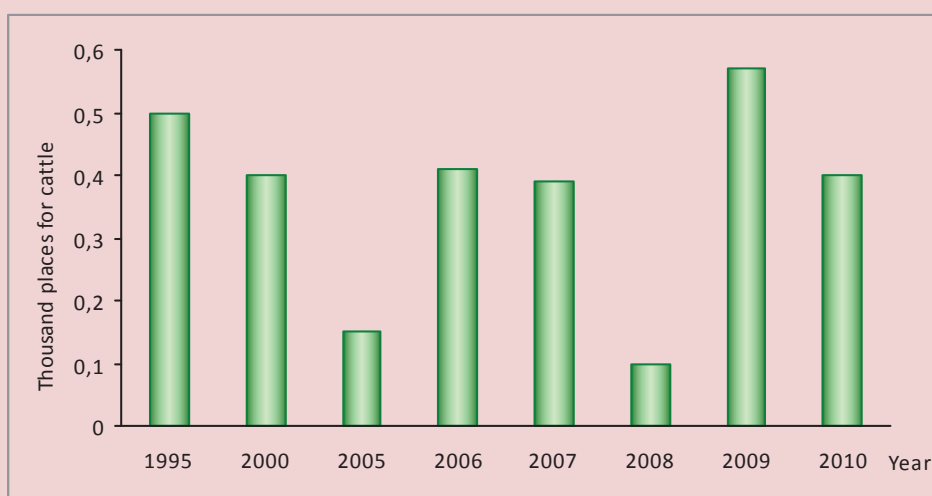
Figure 2. Dynamics of milk production on the farms of all categories
in the Republic of Komi in 1990 – 2010, thsd. t
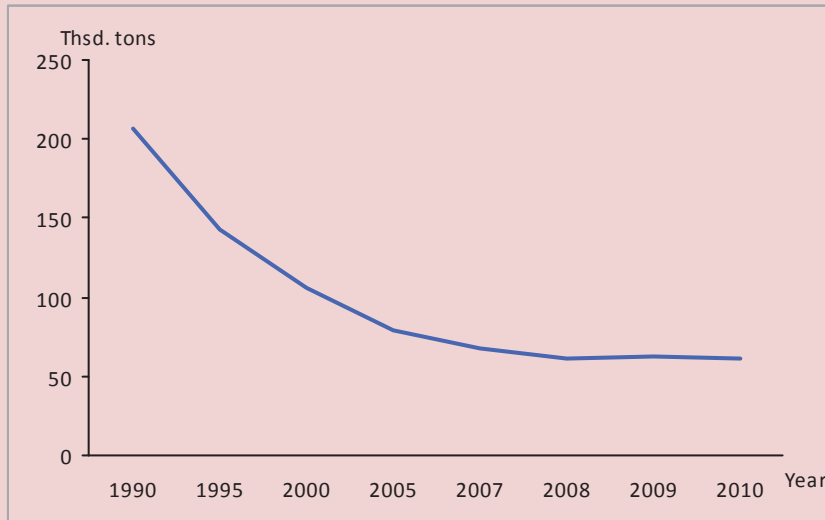
Figure 3. Dynamics of beef and poultry production on the farms
of all categories in the Republic of Komi in 1990 – 2010, thsd. t
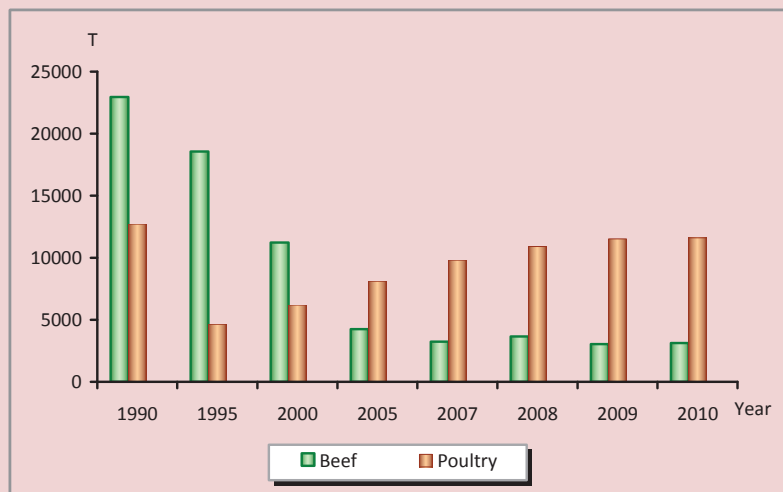
The implementation of the State Program for the Development of Agriculture and Markets Regulation of Agricultural Production, Raw Materials and Food for 2008 − 2012 slightly revived the innovation activity in the industry *(fig. 1)*. Currently, however, investments are attracted by suburban areas. Peripheral agricultural organizations and farm enterprises are in special need of investments. Fixed assets of agricultural cattle-breeding enterprises in the remote areas are worn out by more than 70%.

The negative situation in the industry is characterized by statistical data *(fig. 2, fig. 3)*. There has been 3.4-fold decrease in milk production and a 5.9-fold decrease in beef production for the period of twenty years [5, p. 45].

Efficiency assessment method for innovation and investment projects

Economic assessment of innovation and investment projects is especially important in connection with the modernization of industry and development of innovation technologies.

The foreign experience in investment calculations, which is based on the analysis of financial flows — dynamics of income and outgoings associated with the project, is significantly interesting. This approach is the basis of the Methodical Recommendations on Assessing Innovation Projects [3].

The Recommendations propose to divide innovation project's efficiency indices into the following types:

• commercial (financial) efficiency indices, taking into account the financial implications of the project for its direct participants;

• budget efficiency indices, reflecting the financial implications of the project for the federal, regional and local budgets;

• economic efficiency indices, taking into account the costs of project's implementation, but which go beyond the direct financial interests of innovation project's participants and allow cost measurement.

The effectiveness of an innovative project is characterized by a system of indices that includes net present value, profitability index, internal rate of return and payback period.

Net present value (NPV) is defined as the sum of present effects, reduced to the initial step, or the difference between discounted profits and costs at a fixed discount rate:

$$NPV = -I + \frac{P_1}{(1+d)^2} + \frac{P_2}{(1+d)^2} + \frac{P_3}{(1+d)^3} + ... + \frac{P_t}{(1+d)^t}, \quad (1)$$

where I — investment costs that are required to implement the project;

P — net cash flow at time t;

d — discount rate.

If NPV > 0, return on investment exceeds the minimum discount coefficient. If NPV < 0, project profitability is lower than the minimum coefficient and the project should be rejected.

Profitability index (PI) is the ratio of discounted profit amount to the amount of discounted cost.

The project is considered to be effective if its profitability index is greater than or equal to unity. Profitability index allows us to compare the projects of various scales and choose the most effective project.

$$PI = \frac{\frac{P_1}{(1+d)^1} + \frac{P_2}{(1+d)^2} + \frac{P_3}{(1+d)^3} + ... + \frac{P_t}{(1+d)^t}}{I}, \quad (2)$$

The project is considered to be attractive, if PI > 1; the project should be rejected, if PI < 1.

Internal rate of return (IRR) is a discounted rate that makes the net present value equal to zero. An innovative project is considered to be efficient if its internal rate is greater than or equal to the fixed discount rate, corresponding to opportunity cost of capital.

Internal rate of return (IRR) is calculated as follows:

$$IRR = d_1 + \frac{NPV_1}{NPV_1 - NPV_2} \times (d_2 - d_1), \quad (3)$$

where d_1 — discount rate, corresponding to opportunity cost;

d_2 — discount rate for negative net present value (NPV2);

NPV_1 — net present value for discount rate d_1.

Payback period on investment defines the time from project's investment starting till the moment when net project income covers the initial investment. The payback period is determined by discounting. Simple payback period (without discounting) is calculated for approximate calculations. The project is considered to be effective when its payback period is less than the term of project's implementation.

The effectiveness of innovation and investment projects implementation in cattle breeding in a peripheral region of the Republic of Komi

Using this technique, we'll calculate economical construction efficiency of livestock buildings for the agricultural organizations that are situated in peripheral Udorsky District in the Republic of Komi — agricultural production cooperative (APC) Collective Farm Chernu-

tyevskiy and APC Vashka. Nowadays, APC Collective Farm Chernutyevskiy has 55 cows, and it is going to increase the total number of cattle up to 100 head. In order to fulfill this task, the farm should lease 45 Ayrshire heifers in the period from 2013 to 2015. They will cost 2.48 million rubles. The Ministry of Agriculture and Food of the Republic of Komi will refund their purchase in the amount of 1.44 million rubles. The construction of a cowshed, purchasing equipment and heifers will cost 18.28 million rubles. The Ministry of Agriculture and Food will refund 70% of construction and equipment costs.

The system of cattle housing in new buildings will be stall and pasturable in summer and stall and outdoor in winter. There will be untethered method of cattle housing on the farm. Cattle will be kept on deep litter. Cattle's food ration will consist of natural forage, mainly of grass from the meadows and pastures. Cattle breeding in these agricultural organizations meets the principals of organic production. It is planned to breed highly productive Ayrshire cows; fat content of their milk is $4.2 - 4.5\%$. All processes will be mechanized and automated.

In the scope of this project we calculated the current costs based on the following fact. Five people, two of them are milkmaids, will service cows. It is planned to increase average monthly wage up to 30 thousand rubles, which corresponds to the average level of the republic economy. Depreciation cost is calculated taking into account that cowshed will be exploited for 50 years, equipment – for 10 years and lifespan of cows will be 5 years. Depreciation cost will amount to 740 thousand rubles in 2013. It is planned to increase cow productivity up to 5500 kg per year.

It is assumed in the calculation that the current state support from the budget of the Republic of Komi will be saved. The forecast of cash flows of this innovation and investment project to APC Collective Farm Chernutyevskiy is based on these conditions *(tab. 1)*.

The analysis of financial indicators shows that the net profit of project implementation is 16.9 million rubles, and net income (the difference between net profit and the amount of loan repayment) is estimated at 12.3 million rubles.

The simple rate of return on total investment costs (R) is calculated by the following formula:

$$R = \frac{NP + P/^t}{I} \times 100\%, \qquad (4)$$

where NP – net profit;

P – interests on loan capital;

I – overall investment costs;

t – investment period.

$$R = \frac{(16942 + 1281)/8}{18280} \times 100\% = 12.5\%.$$

Simple payback period (without discounting) is calculated by the following formula:

$$I = \sum\nolimits_{t=1}^{T} (NP_t + D_t + P_t), \qquad (5)$$

where T – payback period;

NP_t – net income per year t;

D_t – depreciation per year t,

P_t – interests on loan capital per year t.

Simple payback period will be:

$$18280 = (425 + 740 + 184)_1 + (602 + 850 + 177)_2 +$$
$$+ (748 + 960 + 170)_3 + (885 + 990 + 162)_4 +$$
$$(971 + 990 + 156)_5 + (1075 + 990 + 150)_6 +$$
$$+ (1173 + 990 + 144)_7 + (1368 + 990 + 138)_8 + 2252.$$

The components of the right-hand side of the equation allow us to determine the payback period that is equal to 8.93 years.

Return on investment (simple rate of return) is equal to 12.5%, and payback period on investment is 8.93 years, so it is longer than project investment period (8 years). Net profit of the project will be gained in more than 14 years.

Table 1. Cash flow forecast for the implementation of innovation and investment project "100 Head Dairy Farm" with the current state support to APC Collective Farm Chernutyevskiy, thsd. rub.

Indicator	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
1. Cash inflow – total	15300	8893	10166	11853	12559	13322	14212	15174	16091	16916	18015	18746	20153	21568	212958
Including:															
1.1. Sales revenues	-	7693	9066	10653	11809	12522	13362	14254	15096	15846	16855	17526	18843	20193	183718
1.2. Budgetary funds	10700	1200	1100	1200	750	800	850	920	995	1070	1150	1220	1310	1375	26090
1.3. Bank loans	4600	-	-	-	-	-	-	-	-	-	-	-	-	-	4600
2. Cash payment, total	15800	7938	9094	10515	10594	11221	11731	12524	13171	13423	14190	15050	16100	16995	178346
Including															
2.1. Investment cost	15800	750	820	910	-	-	-	-	-	-	-	-	-	-	18280
2.1.1. Investment in fixed assets	15300	750	820	910	-	-	-	-	-	-	-	-	-	-	17780
2.1.2. Working capital financing	500	-	-	-	-	-	-	-	-	-	-	-	-	-	500
2.2. Current costs (except for depreciation)	-	6244	7292	8590	9547	10136	10830	11584	12188	12833	13540	14350	15340	16180	148654
2.2.1. Wages with taxes	-	2400	2640	2850	2980	3100	3350	3480	3560	3796	3930	4120	4280	4430	44916
2.2.2. Material cost	-	3480	4250	5320	6115	6550	6940	7490	7950	8427	8930	9460	10200	10810	106222
2.2.3. Interest for loans	-	184	177	170	162	156	150	144	138	-	-	-	-	-	1281
2.2.4. Other costs	-	180	225	250	290	330	390	470	540	610	680	770	860	940	1030
2.3. Commercial expenses	-	100	115	125	140	165	185	210	235	260	290	320	350	365	6535
For reference only: Capital depreciation	-	740	850	960	990	990	990	990	990	990	990	610	610	610	11310
Product cost	-	7084	8257	9675	10677	11291	12005	12784	13413	14083	14820	15280	16300	17155	162824
Taxable profit	-	609	809	978	1132	1231	1357	1470	1683	1763	2035	2246	2543	3038	20894
Production profitability, %	-	8.6	9.8	10.1	10.6	10.9	11.3	11.5	11.8	12.6	13.8	14.7	15.6	18.4	-
2.4. Unified agricultural tax	-	184	207	230	247	260	282	297	315	330	360	380	410	450	3952
For reference only: Net profit	-	425	602	748	885	971	1075	1173	1368	1433	1675	1866	2133	2588	16942
2.5. Loan repayment	-	660	660	660	660	660	433	434	433	-	-	-	-	-	4600
3. Net cash flow (NCF)	-500	955	1072	1338	1965	2101	2481	2650	2920	3493	3815	3696	4053	4573	34612

In order to assess the economic efficiency of the project it is important to take into account the various values of funds for project's participants that are gained or spent by them at the different points of time. The flows taking place at different times are compared by discounting, i.e. by the reduction of flows (incomings and outgoings) taking place at different times to a single point of time.

Discount rate in our calculation is estimated at the rate of 8%. Net present value of the project is defined as follows:

$$NPV_1 = -18280 + \frac{955}{(1+0.08)^1} + \frac{1072}{(1+0.08)^2} + \frac{1338}{(1+0.08)^3} +$$

$$+ \frac{1965}{(1+0.08)^4} + \frac{2101}{(1+0.08)^5} + \frac{2481}{(1+0.08)^6} + \frac{2650}{(1+0.08)^7} +$$

$$+ \frac{2920}{(1+0.08)^8} + \frac{3493}{(1+0.08)^9} + \frac{3815}{(1+0.08)^{10}} + \frac{3696}{(1+0.08)^{11}} +$$

$$+ \frac{4053}{(1+0.08)^{12}} + \frac{4573}{(1+0.08)^{13}} = 859.8 \text{ thsd. rub.}$$

A positive value of this indicator proves the economic attractiveness of the project.

Profitability index is calculated as follows:

$$PI = \frac{\begin{array}{c}(884.3 + 919.4 + 1082.52 + 1471.9 + \\ + 1457.0 + 1593.5 + 1575.5 + 1607.0 + \\ + 1780.3 + 1799.5 + 1615.4 + 1640.2 + 1713.4)\end{array}}{18280} = 1.04.$$

Profitability index is greater than unity, so the project is considered to be economically advantageous.

It is necessary to calculate negative net present value (NPV_2) to determine the internal rate of return. A discount rate is 12%.

$$NPV_2 = -18280 + \frac{955}{(1+0.12)^1} + \frac{1072}{(1+0.12)^2} + \frac{1338}{(1+0.12)^3} +$$

$$+ \frac{1965}{(1+0.12)^4} + \frac{2101}{(1+0.12)^5} + \frac{2481}{(1+0.12)^6} + \frac{2650}{(1+0.12)^7} +$$

$$+ \frac{2920}{(1+0.12)^8} + \frac{3493}{(1+0.12)^9} + \frac{3815}{(1+0.12)^{10}} + \frac{3696}{(1+0.12)^{11}} +$$

$$+ \frac{4053}{(1+0.12)^{12}} + \frac{4573}{(1+0.12)^{13}} = -188.6 \text{ thsd. rub.}$$

The internal rate of return is calculated by the formula 3:

$$IRR = 8 + \frac{859.8}{859.8 - (-188.6)} \times (12 - 8) = 11.3\%.$$

The internal rate of return is higher than the discount rate (8%), this fact indicates the economic attractiveness of the project.

It is necessary to calculate a cumulative cash flow in order to determine the discounted payback period of the project *(tab. 2)*.

Discounted payback period (DP_P) is calculated by the following formula:

$$DP_P = n - \frac{K_{nt}}{p(t+1)}, \qquad (6)$$

where n — the number of years when a cumulative cash flow is less than zero;

K_{nt} — the last year when the value of cumulative cash flow is negative;

$P_{(t+1)}$ — the discounted cash flow that follows the last negative cumulative cash flow.

$$DP_P = 12 - \frac{-853.5}{1713.4} = 12.49 \text{ years}$$

The discounted payback period of the project is equal to 12.49 years; it is longer than the loan taken (8 years). Therefore, this innovation project is considered to be ineffective.

Under the current support the profitability level of agricultural production at APC Collective Farm Chernutyevskiy will amount from 8.6% in 2013 to 18.4% in 2025; these figures are below the optimal rate of return (40 – 50%). In this situation this agriculture organization can start building a farm, if the period of long-term loan will be at least 13 years.

The efficiency of the innovation and investment project for APC Collective Farm Chernutyevskiy is defined in achieving the optimal level of livestock production profitability. It is planned to increase a profitability level from 7.2% in 2013 up to 38.5% in 2015 and up to 48% in 2020. This task will require a significant rise in the guaranteed prices for dairy products and beef.

Table 2. The calculation of a cumulative cash flow of the innovation and investment project for APC Collective Farm Chernutyevskiy in 2012 – 2025, thsd. rub.

Indicator	Cash outflow in 2012	2013	2014	2015	2016	2017	2018	2019
Cash flow	-15800	955	1072	1338	1965	2101	2481	2650
Discounted cash flow	-15800	884.3	919.4	1082.5	1471.9	1457.0	1593.5	1575.5
Cumulative cash flow	-15800	-15800 + 750 + 884/3 = -15665.7	-15665.7 - 820 + 919.4 = -15566.3	-15566.3 – 910 + 1082.4 = -15939.8	-15393.8 + 1471.9 = -13921.3	-13921.9 + 1457.0 = -12464.9	-12464.9 + 1593.5 = -10871.4	-10871.4 + 1575.5 = -9295.9

Indicator	Cash outflow in 2012	2020	2021	2022	2023	2024	2025
Cash flow	-15800	2920	3493	3815	3696	4053	4573
Discounted cash flow	-15800	1607.0	1780.3	1799.5	1615.4	1640.2	1713.4
Cumulative cash flow	-15800	-9595.9 + 1607.0 = -7688.9	-7688.9 + 1780.3 = -5908.6	-5908.6 + 1799.5 = -4109.1	-4109.1 + 1615.4 = -2493.7	-2493.7 + 1640.2 = -853.5	-853.5 + 1713.4 = 859.8

The calculation shows that the return on investment (simple rate of return) is equal to 22.4% and payback period is 4.52 years, which is less than the investment period of this project. The discounted payback period (7.1 years) is less than the period of project's implementation. Therefore, this investment and innovation project will be effective while maintaining the existing state support and ensuring the optimal level of livestock production profitability.

The economic evaluation of building 200 head dairy farm for APC Vashka was carried out similarly. The investment costs of building a cowshed, purchasing equipment and Ayrshire heifers will amount to 30 million rubles.

It is planned to have cattle housing conditions, production rates of cows and the form of state support that are similar to the Project for APC Collective Farm Chernutyevskiy.

With the current state support the net profit of project implementation is 28.8 million rubles and net income (the difference between net profit and the amount of loan repayment) is estimated at 19.8 million rubles.

The simple rate of return on total investment costs:

$$R = \frac{(28778 + 2510)/8}{34810} \times 100\% = 11.2\%.$$

Calculations show that the simple payback period for this project will be 9.16 years.

Payback period on investment (without discounting) is longer than the investment period of this project. Net profit of the project will be gained in more than 15 years.

Profitability index:

$$PI = \frac{\begin{array}{l} 1949.1 + 2354.2 + 2540.5 + 2985.1 + \\ + 3034.7 + 3355.8 + 3290.7 + 3243.8 + \\ + 3732.9 + 3706.1 + 3701.5 + 3719.6 + 3856.1 \end{array}}{34810} = 1.19.$$

Discounted payback period is 11.25 years; it is longer than the implementation period of this project. Therefore, this innovation project is considered to be ineffective.

The calculation of investment and innovation project efficiency indicators for APC Vashka at the optimal level of livestock produce profitability shows that the net profit of project implementation is equal to 48.7 million rubles and net income (the difference between net profit and the amount of loan repayment) is estimated at 39.7 million rubles *(tab. 3)*.

Simple rate of return on total investment costs will amount to:

$$R = \frac{(48721 + 2510)/8}{34810} \times 100\% = 18.4\%.$$

Simple payback period (without discounting) is calculated as follows:

$$\begin{array}{l} 34810 = (2009 + 1950 + 360) + \\ + (2780 + 2170 + 346) + (3607 + 2320 + 332) + \\ + (4995 + 2320 + 319) + (6100 + 2320 + 306) + \\ + (7417 + 2320 + 294) + 2576 = 5.26 \text{ years.} \end{array}$$

Return on investment (simple rate of return) is equal to 18.4%, and payback period on investment is 5.26 years, and so it is less than project investment period.

Table 3. Cash flow forecast for the implementation of innovation and investment project "200 Head Dairy Farm" at the optimal level of produce profitability to APC Vashka, thsd. rub.

Indicator	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
1. Cash inflow - total	30000	21621	24399	26942	28536	31761	35188	40432	46307	285186
Including: 1.1. Sales revenues	-	20321	22949	25372	28536	31761	35188	40432	46307	250866
1.2. Budgetary funds	21000	1300	1430	1570	-	-	-	-	-	25300
1.3. Bank loans	9000	-	-	-	-	-	-	-	-	9000
2. Cash payment, total	31500	18667	20404	21960	22526	24646	26276	29364	32572	227915
Including 2.1. Investment cost	31500	1000	1100	1210	-	-	-	-	-	34810
2.1.1. Investment in fixed assets	30000	1000	1100	1210	-	-	-	-	-	33310
2.1.2. Working capital financing	1500	-	-	-	-	-	-	-	-	1500
2.2. Current costs (except for depreciation)	-	15640	17161	18496	20118	22086	24036	26873	29790	174200
2.2.1. Wages with taxes	-	5850	6435	6950	7576	8334	9085	10175	11294	65699
2.2.2. Material cost	-	8680	9550	10314	11242	12366	13480	15098	16760	97490
2.2.3. Interest for loans	-	360	346	332	319	306	294	282	271	2510
2.2.4. Other costs	-	750	830	900	981	1080	1177	1318	1465	8501
2.3. Commercial expenses	-	220	250	275	300	362	406	455	500	2768
For reference only: Capital depreciation Product cost Taxable profit Production profitability, %	- - - -	1950 17810 2511 14.1	2170 19581 3368 17.2	2320 21091 4281 20.3	2320 22738 5798 25.5	2320 24736 7025 28.4	2320 26718 8470 31.7	2320 29599 10833 36.6	2320 32565 13742 42.2	18040 194838 56028 -
2.4. Unified agricultural tax	-	502	588	674	803	925	1053	1260	1502	7307
For reference only: Net profit	-	2009	2780	3607	4995	6100	7417	9573	12240	48721
2.5. Loan repayment	-	1305	1305	1305	1305	1305	825	825	825	9000
3. Net cash flow (NCF)	-1500	2954	3995	4982	6010	7115	8912	11068	13735	57271

Net present value of the project is defined as follows:

$$NPV_1 = -34810 + \frac{2954}{(1+0.08)} + \frac{3995}{(1+0.08)^2} + \frac{4982}{(1+0.08)^3} +$$

$$+ \frac{6010}{(1+0.08)^4} + \frac{7115}{(1+0.08)^5} + \frac{8912}{(1+0.08)^6} + \frac{11068}{(1+0.08)^7} +$$

$$+ \frac{13735}{(1+0.08)^8} = -34810 + 39498.5 = 4688.5 \text{ thsd. rub.}$$

A positive value of this indicator proves the economic attractiveness of the project.

Profitability index is calculated as follows:

$$PI = \frac{\begin{matrix}2735.2 + 34269.3 + 4030.7 + 4508.9 + \\ + 4934 + 5723.8 + 6580.3 + 7559.2\end{matrix}}{34810} = 1.13.$$

Profitability index is greater than unity, so the project is considered to be economically advantageous.

It is necessary to calculate negative net present value (NPV_2) to determine the internal rate of return. A discount rate is 20%.

$$NPV_2 = -34810 + \frac{2954}{(1+0.2)} + \frac{3995}{(1+0.2)^2} + \frac{4982}{(1+0.2)^3} +$$

$$+ \frac{6010}{(1+0.2)^4} + \frac{7115}{(1+0.2)^5} + \frac{8912}{(1+0.2)^6} + \frac{11068}{(1+0.2)^7} + \frac{13735}{(1+0.2)^8} =$$

$$= -34810 + 23145.1 = -11664.9$$

The internal rate of return is calculated by the formula 3:

$$IRR = 8 + \frac{4688.5}{4688.5 - (-111664.9)} \times (20-8) = 11.4\%.$$

The internal rate of return is higher than the discount rate (8%), this fact indicates the economic attractiveness of the project.

Cumulative cash flow, determining the discounted payback period of the project, is presented in *table 4*.

Discounted payback period will be:

$$DP_P = 8 - \frac{-2873.7}{7559.2} = 7 + 0.38 = 7.38 \text{ years.}$$

The discounted payback period of the project is less than its implementation period. Therefore, this innovation project is considered to be effective.

Table 5 presents the performance of projects' efficiency with the different variants of state support.

In summary, we have drawn the following conclusions:

1. The sustainable development of cattle breeding in the peripheral regions requires a considerable increase in investing construction, reconstruction and launching innovation technologies. Therefore, economic assessment

Table 4. The calculation of a cumulative cash flow of the project for APC Vashka in 2012 – 2020, thsd. rub.

Indicator	Cash inflow in 2012	22013	22014	22015	22016	22017	22018	22019	22020
Cash flow	-31500	2954	3995	4982	6010	7115	8912	11068	13735
Discounted cash flow	-31500	2735.2	3426.,3	4030.7	4508.9	4934.1	5723.8	6580.3	7559.2
Cumulative cash flow	-31500	-31500 – 1000 + 2735.2 = -29764.8	-29764.8 – 1100 + 3426.3 = -27438.5	-27438.5 – 1210 + 4030.7 = -24617.8	-24617.8 + 4508.9 = -20111.9	-20111.9 + 4934.1 = -15177.8	-15177.8 + 5723.8 = -9454.0	-9454.0 + 6580.3 = -2873.7	-2873.7 + +7559.2 = 4685.5

Table 5. Assessment of innovation and investment projects' efficiency

Project		Net present value (NPV), thsd. rub.	Simple rate of return (R),%	Simple payback period, years	Profitability index (PI)	Internal rate of return (IRR), %	Discounted payback period (DP$_p$), years
Constructing 100 head dairy in APC Collective Farm Chernutyevskiy	1	859.8	12.5	8.93	1.04	11.3	12.49
	2	6642.2	22.4	4.52	1.36	16.3	7.1
Constructing 200 head dairy in APC Vashka	1	6660.1	11.2	9.16	1.19	11.6	11.25
	2	4688.5	18.4	5.26	1.13	11.4	7.38
1. With the current state support. 2. With the support to revenue, ensuring the optimum level of profitability.							

of innovation and investment projects is especially important.

2. Calculating the economic efficiency of 100 and 200 head dairies with the use of high technologies and highly productive animals shows that having the current state support to innovation and investment activity and farmers' incomes, the expenses on these projects will be covered in 12.49 and 11.25 years if the length of credit is 8 years. The payback period of these projects will be lower than the term of credit when agricultural organizations reach the optimal level of profitability and the current state support to innovation projects is saved.

3. It is necessary to significantly increase the guaranteed price for milk and beef and strengthen the role of long-term credit in order to enhance innovation in the dairy industry. Soft loan for the construction and modernization of livestock houses in the North should be provided for 20 − 25 years, and the length of loans for purchasing machinery and equipment should be six or eight years.

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NATURE MANAGEMENT ECONOMY

Economic and qualimetric assessment of pine and spruce species in the Vologda Oblast

The Vologda Oblast is among the wooded regions of Russia. Wood requirements of our region, neighboring territories and other countries have been covered for many decades due to the intensive exploitation of forests. At present, the Vologda Oblast that increases production volumes is a leader in wood felling and processing. Intensive forest exploitation has deteriorated the quality and species of wood and reduced the share of valuable coniferous plantations. It is possible to solve these problems due to growing economically valuable species of wood in the logged areas. Economic and qualimetric analysis of pine and spruce species in the Vologda Oblast proves that it is reasonable to grow spruce species in the southern taiga subzone in order to produce pulp wood. This will increase the pulpwood productivity of forest plantations and efficiency of timber production in the region.

Economic and qualimetric assessment, forestry species, cellulose, wood, forest cultivation, pulp and paper industry.

**Sergey A.
KORCHAGOV**
Doctor of Agricultural Science, Professor of the Vologda State Dairy Farming
Academy named after N.V. Vereshchagin
kors45@yandex.ru
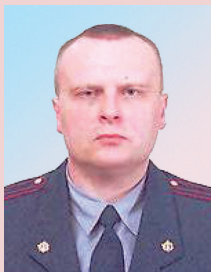
**Nikolay N.
STREBKOV**
Senior Lecturer of the Department of organization of production
and labor adaptation of convicts, the Vologda Institute of Law and Economics
of the Federal Penitentiary Service
nstreb73@yandex.ru

The Vologda Oblast has been famous for its forest resources for a long time. Vologda timber was shipped to England under Ivan the Terrible; it was used to build the Russian navy under Peter the First. The Vologda Oblast with three-quarters of its territory covered with forest was called Siberia near Moscow [5].

Nowadays, the Vologda Oblast that increases production volumes is a leader in wood felling and processing. According to the Oblast's Forestry Department, wood felling increased by 3.4% for 2011 (in comparison with 2010), the production of timber increased by 10.2%, plywood— by 6.3%, wood-particle board — by 21,1%, fibreboards — by 10.1%, factory-built wooden houses — by 14.8%, cellulose — by 7.5%, paper — by 5.9%, paperboard — by 19.2%. Twelve priority investment projects with the total investment of more than 10.0 billion rubles are being implemented in the region.

Wood and paper products are exported to over 50 countries worldwide. According to the press service of the Vologda Customs, regional timber companies exported wood products to the amount of 172.6 million dollars in 2010 and 203.9 million dollars in 2011. The main types of exported products are plywood, saw timber, wood chips, fuel wood briquettes, joinery products, paper, chipboard, match-wood. In summary it should be noted that the regional forests were intensively exploited; logging volume is increasing today.

The intensive exploitation of forests has resulted in the wood quality and species deterioration and reduced the share of valuable coniferous plantations in the transport accessible and economically sound part of the forest fund. This important issue is studied in the works of a number of researchers [2, 7], and the employees of forestry enterprises that operate in the territory of the Vologda Oblast touch on this question (JSC Holding Company "Vologda Timber Merchants", CJSC "Investlesprom", JSC "Vologdalesprom Corporation", etc.).

It is possible to solve these problems due to sowing or planting of wood species in the logged areas. Experience shows that science-based selection and the adherence to forest growing technology allow us to form high-yield plantations of economically valuable coniferous species (pine and spruce). A retrospective analysis of literature shows that silvicultural theory and practice, as well as growing pine and spruce plantations in the area of more than 0.3 million hectares are wide-spread in the region.

The cultivation of forest species should be based on profound theoretical and validated knowledge of the growth and development of woody plants in the logged areas.

This article deals with the problem of priority selection of wood species for the cultivation of pulpwood to meet the needs of pulp and paper industry in the scope of economic and qualimetric analysis. The fundamental principles of economic and qualimetric assessment of forest plantations are laid by O.I. Poluboyarinov and R.B. Fedorov [6]. In this case the problems of timber quality (qualimetry) are in the limelight. It is very important in the economic substantiation to consider the fact that it is not the cost of wood that is assessed, but the cost of the final product (cellulose), obtained from one hectare of forest area.

It should be noted that, historically, spruce was the main wood species for the pulp and paper industry. It is characterized by the slight gumminess of wood. This feature has a positive impact on the process of pulping and the quality of cellulose. However, a significant share of companies consuming spruce wood predetermines a shortage of raw wood that has recently caused the reduction of sulfite spruce pulping and the implementation of sulfate spruce and pine pulping. The pine, as opposed to the spruce, has a higher density of wood; this feature allows the producers to increase the yield of pulp from a cubic meter of raw wood. These wood species take priority when creating forest plantations in the Vologda Oblast. The analysis of the status and development of the pulp and paper industry proves that pine and spruce remain the main sources of raw wood for pulp production.

Here are the results obtained due to the monitoring of 48-year-old pines and spruces in the Vologda Oblast (southern taiga subzone).

The species are created in the similar conditions according to the same technology and at the same level of investment in their production. The seedlings were planted in the logged areas. Three thousand trees were planted per a hectare. There was no care for pines and spruces before.

The calculation of the yield of stem wood per a unit of forest area (reserve, m³/ha) was made on the base of methodological approaches that were written by N.P. Anuchin [1] and N.N. Sokolov [8]. The results showed the predominance of spruce reserves over pine at the time of study (392 m³/ha vs. 325 m³/ha).

The determination of potential raw wood yield for the pulp and paper industry (pulpwood), performed with the use of forest valuation data [4], also proves the superiority of spruce index by 50 cubic meters per one hectare of forest area *(tab. 1)*.

The pulpwood productivity has been calculated for pine and spruce species. It is a rate of possible cellulose yield (tons) from the total amount of pulpwood growing in the area of one hectare. The calculation was based on the values of qualimetric indicator — pine and spruce density.

The formula for calculating the productivity of pulpwood is as follows:

$$M_{p.} = Y / R, \qquad (1)$$

Y — pulpwood yield, m³/ha;

R — wood consumption rate per one ton of produced cellulose, m³/t.

The wood consumption rate per one ton of pulped cellulose has been calculated on the base of the recommendations of L.N. Erofeyev [3]:

$$R = \frac{880}{D_{base}P} \times \frac{100}{C}, \qquad (2)$$

880 — the content of absolutely dry matter in one ton of raw wood with the humidity rate of 12%, kg/t;

$D_{base.}$ — basic wood density, kg/m³;

P — pulp yield, % of wood that is loaded into the boiler;

C — the coefficient of effective technological wood processing, the share in unbarked wood.

Sulfate pulp has been chosen as a final product in the calculations because it is the most important and widespread type of semi-fibrous pulp. The yield of sulfate pulp in pulping (P, %) has been adopted on the basis of published data [3, 6]: 45.04 — for pine, 49.04 — for spruce.

The coefficient of effective technological wood processing (C) has been calculated by multiplying the coefficients of technological wood yield for the individual production stages of its preparation as follows:

$$C = C_s \times C_b \times C_{c.s.}, \qquad (3)$$

C_s — coefficient of wood yield when sawing;

C_b — coefficient of wood yield when barking;

$C_{c.s.}$ — coefficient of wood yield when cutting, disintegration and wood chips sorting.

$$C_{s,b,c.s.} = \frac{100 - P_{s,b,c.s.}}{100}, \qquad (4)$$

P_s — percentage of wood loss and waste when sawing (it is excluded from the calculation due to supplying the pulp and paper industry with raw materials of required size);

Table 1. Forest density and pulpwood yield of pine and spruce species

Cultivated forest species	Cultivated forest density, m³/ha	Pulpwood yield	
		%	m³/ha
Pine	325	86	280
Spruce	392	84	330

Table 2. Sulfate pulp costing per one hectare of pine and spruce forest area

Forest species	Pulp yield, t/ha	Market price for one ton of cellulose, rub.	Volume of production per one hectare, thsd. rub.
Pine	48.4	17350	839.74
Spruce	58.9		1021.92

$P_{b.}$ – percentage of wood loss and waste when barking (1,2%);

$P_{c.s.}$ – percentage of wood loss and waste when cutting, disintegration and wood chips sorting. (6,0%).

The percentages of wood loss and waste $P_{s.;}$ $P_{b.,}$ $P_{c.s.}$ have been determined on the basis of the data published by L.N. Erofeyev [3].

These calculations prove that it is possible to produce 48.4 tons of pulp per one hectare of pine plantations and 58.9 tons per one hectare of spruce plantations. Thus, the spruce pulpwood productivity is 1.2 times higher than the pine pulpwood productivity.

Economic calculation has been carried out on the basis of market prices for market cellulose in 2011 accounting the potential pulp yield per one hectare of forest *(tab. 2)*.

The calculations allow us to judge the possibility to produce sulfate pulp to the total amount of 839.74 thousand rubles form the pulpwood per one hectare of pine plantations and to the sum of 1021.92 thousand rubles per one hectare of spruce forest areas. Thus, other conditions being equal, semi-finished products (sulfate pulp) that are produced from the spruce wood covering one hectare will cost by 20% more than the pulp produced from pine.

In conclusion, it is necessary to note that spruce wood is characterized by a relatively homogeneous structure, which has a positive effect on the process of pulp production and its quality. It should be also considered that spruce wood is not as resiniferous as pine wood. This fact prioritizes the use of spruce in pulp production. All this allows us to recommend spruce for the target pulpwood growing in the southern taiga subzone of the Vologda Oblast. This approach will improve the pulpwood productivity of forest plantations and thereby enhance the effectiveness of silvicultural production in the region.

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Information about authors

Anishchenko Nikolay Ivanovich	
Academic degree	Ph.D. in Economics
Academic rank	
Full name of the organization – the place of employment	The Vologda Oblast Department of Agriculture, Food Stocks and Trade
Work status	Head of the Department
Off. tel. / Fax	8(8172) 72-15-51
E-mail	dep@vologda-agro.ru
Mailing address	19 Predtechenskaya St., Vologda, 160000, Russia
Barashkova Olga Vladimirovna	
Academic degree	
Academic rank	
Full name of the organization – the place of employment	Vologda State Dairy Farming Academy named after N.V. Vereshchagin
Work status	Postgraduate
Off. tel. / Fax	
E-mail	
Mailing address	2 Schmidt St., Molochnoye, Vologda, 160555, Russia
Bilkov Valentin Alekseyevich	
Academic degree	Doctor of Agricultural Sciences
Academic rank	Associate Professor
Full name of the organization – the place of employment	The Vologda Oblast Department of Agriculture, Food Stocks and Trade
Work status	Head of the Stock breeding section of the animal husbandry and pedigree department
Off. tel. / Fax	8(8172) 72-54-90
E-mail	v.bilkov@vologda-agro.ru
Mailing address	19 Predtechenskaya St., Vologda, 160000, Russia
Glazyev Sergey Yuryevich	
Academic degree	Doctor of Economics
Academic rank	RAS Academician
Full name of the organization – the place of employment	D.S. Lvov Institute of the New Economy of the State University of Management
Work status	Director
Off. tel. / Fax	
E-mail	glazievs@mail.ru
Mailing address	99 Ryazanskiy Av., Moscow, 109542, Russia
Gnezdilova Anna Ivanovna	
Academic degree	Doctor of Technical Sciences
Academic rank	Professor
Full name of the organization – the place of employment	Vologda State Dairy Farming Academy named after N.V. Vereshchagin
Work status	Professor of the Department for the organization of production and business
Off. tel. / Fax	
E-mail	gnezdilova.anna@mail.ru
Mailing address	2 Schmidt St., Molochnoye, Vologda, 160555, Russia

Gulyayev Evgeniy Gennadyevich	
Academic degree	Doctor of Agricultural Sciences
Academic rank	Professor
Full name of the organization – the place of employment	Vologda State Dairy Farming Academy named after N.V. Vereshchagin
Work status	Head of the Department of farm animal nutrition
Off. tel. / Fax	
E-mail	
Mailing address	2 Schmidt St., Molochnoye, Vologda, 160555, Russia
Zhukov Aleksandr Nikolayevich	
Academic degree	
Academic rank	
Full name of the organization – the place of employment	Volgograd Institute of Business
Work status	Lecturer
Off. tel. / Fax	+7(8442) 54-10-14
E-mail	labser@volsu.ru
Mailing address	1 Aviators Highway, Volgograd, 400075, Russia
Zakirov Ilnur Dilfatovich	
Academic degree	Ph.D. in Economics
Academic rank	
Full name of the organization – the place of employment	Institute of Social and Economic Research of Ufa Science Centre of RAS
Work status	Scientific Associate of the Economic Security Sector
Off. tel. / Fax	(347) 235-55-44
E-mail	zid_zid@rabler.ru
Mailing address	71 October Av., Ufa, 450054, the Republic of Bashkortostan, Russia
Ivanov Valentin Aleksandrovich	
Academic degree	Doctor of Economics
Academic rank	Professor
Full name of the organization – the place of employment	Institute of Socio-Economic and Energy Problems of the North Komi Scientific Center of the Ural RAS Department
Work status	Head of Laboratory of Agrarian Economy
Off. tel. / Fax	8 (8212) 24-52-45; 24-42-67
E-mail	ivanov@iespn.komics.ru
Mailing address	26 Kommunisticheskaya St., Syktyvkar, 167982, Russia
Ivanova Marina Nikolayevna	
Academic degree	
Academic rank	
Full name of the organization – the place of employment	The Vologda Oblast Department of Agriculture, Food Stocks and Trade
Work status	Head of the Economic Policy Agency
Off. tel. / Fax	8(8172) 72-33-78
E-mail	m.ivanova@vologda-agro.ru
Mailing address	19 Predtechenskaya St., Vologda, 160000, Russia
Ilyin Vladimir Aleksandrovich	
Academic degree	Doctor of Economics
Academic rank	Professor, Honoured Scientist of the Russian Federation
Full name of the organization – the place of employment	Institute of Socio-Economic Development of Territories of Russian Academy of Science
Work status	Director
Off. tel. / Fax	8 (8172) 59-78-01
E-mail	ilin@vscc.ac.ru
Mailing address	56A Gorky St., Vologda, 160014, Russia

Kibitkin Andrey Ivanovich	
Academic degree	Doctor of Economics
Academic rank	Professor
Full name of the organization – the place of employment	Murmansk State Technical University
Work status	Head of the Department of finance, accounting and management of economic systems
Off. tel. / Fax	8 (8152) 25-40-72
E-mail	ecofin@mstu.edu.ru
Mailing address	13 Sportivnaya St., Murmansk, 183010, Russia
Korchagov Sergey Anatolyevich	
Academic degree	Doctor of Agricultural Sciences
Academic rank	Associate Professor
Full name of the organization – the place of employment	Vologda State Dairy Farming Academy named after N.V. Vereshchagin
Work status	Professor of the Forestry Department
Off. tel. / Fax	8(8172) 52-47-29
E-mail	kors45@yandex.ru
Mailing address	9A-7, Pankratov St., Molochnoye, Vologda, 160555, Russia
Mitrofanova Inna Vasilyevna	
Academic degree	Doctor of Economics
Academic rank	
Full name of the organization – the place of employment	Institute of Socio-Economic and Humanitarian Research of Southern Science Centre of RAS, Volgograd State University
Work status	Chief Scientific Associate of the Institute, Professor at the University
Off. tel. / Fax	
E-mail	mitrofanova@volsu.ru, mitrofanovaia@rambler.ru
Mailing address	100 University Av., Volgograd, 400062, Russia
Neustroyev Sergey Sergeyevich	
Academic degree	Ph.D. in Economics
Academic rank	
Full name of the organization – the place of employment	Institute of Problems of Regional Economy of RAS
Work status	Doctoral Candidate
Off. tel. / Fax	8 (812) 316-48-65
E-mail	info@iresras.ru
Mailing address	38 Serpukhovskaya St., St. Petersburg, 198013, Russia
Ostretsov Vladimir Nikolayevich	
Academic degree	Doctor of Economics
Academic rank	Professor
Full name of the organization – the place of employment	Vologda State Dairy Farming Academy named after N.V. Vereshchagin
Work status	Professor of the Department for the organization of production and business
Off. tel. / Fax	(8 8172) 52-53-97
E-mail	
Mailing address	2 Schmidt St., Molochnoye, Vologda, 160555, Russia
Pinkovetskaya Yuliya Semenovna	
Academic degree	Ph.D. in Economics
Academic rank	
Full name of the organization – the place of employment	Ulyanovsk State University
Work status	Assistant
Off. tel. / Fax	8 (8422) 41-20-88
E-mail	judy54@yandex.ru
Mailing address	42 Leo Tolstoy St., Ulyanovsk, 432017, Russia

Povarova Anna Ivanovna	
Academic degree	
Academic rank	
Full name of the organization – the place of employment	Institute of Socio-Economic Development of Territories of Russian Academy of Science
Work status	Scientific Associate of the Department of Social and Economic Development and Management in the Territorial Systems
Off. tel. / Fax	8 (8172) 54-43-95
E-mail	aip150663@yandex.ru
Mailing address	56A Gorky St., Vologda, 160014, Russia

Ponomareva Anna Sergeyevna	
Academic degree	
Academic rank	
Full name of the organization – the place of employment	Institute of Socio-Economic and Energy Problems of the North Komi Scientific Center of the Ural RAS Department
Work status	Postgraduate Student
Off. tel. / Fax	8 (8212) 24-52-45; 24-42-67
E-mail	anita-85_07@mail.ru, ponomareva@iespn.komics.ru
Mailing address	26 Kommunisticheskaya St., Syktyvkar, 167982, Russia

Strebkov Nikolay Nikolayevich	
Academic degree	
Academic rank	
Full name of the organization – the place of employment	Vologda Institute of Law and Economics of the Federal Penitentiary Service
Work status	Senior Lecturer of the Department of organization of production and labor adaptation of convicts
Off. tel. / Fax	8 (8172) 51-42-47
E-mail	nstreb73@yandex.ru
Mailing address	2 Shchetinin St., Vologda, 160002, Russia

Sysoyeva Evgeniya Aleksandrovna	
Academic degree	Ph.D. in Economics
Academic rank	Associate Professor
Full name of the organization – the place of employment	Mordovian State University named after N. P. Ogarev
Work status	Associate Professor of the Department of Statistics
Off. tel. / Fax	8(834) 2-29-06-80
E-mail	sysoewa@mail.ru
Mailing address	68 Bolshevistskaya St., Saransk, 430005, the Republic of Mordovia, Russia

Tazhitdinov Ilshat Azamatovich	
Academic degree	Ph.D. in Economics
Academic rank	Associate Professor
Full name of the organization – the place of employment	Government of the Republic of Bashkortostan
Work status	Deputy Prime Minister of the Government of the Republic of Bashkortostan, Head of the Government Apparatus of the Republic of Bashkortostan
Off. tel. / Fax	(347) 2-50-36-42 / 2-35-55-44
E-mail	letters@bashkortostan.ru
Mailing address	46 Tukayev St., Ufa, 450000, the Republic of Bashkortostan, Russia

Tatarkin Aleksandr Ivanovich	
Academic degree	Doctor of Economics
Academic rank	RAS Academician
Full name of the organization – the place of employment	Institute of Economics of the Ural Branch of RAS
Work status	Director
Off. tel. / Fax	+7 (343) 371-97-08 / 371-02-23
E-mail	tatarkin_ai@mail.ru
Mailing address	29 Moskovskaya St., Yekaterinburg, 620014, Russia
Tuvayev Vladimir Nikolayevich	
Academic degree	Doctor of Technical Sciences
Academic rank	Professor
Full name of the organization – the place of employment	Vologda State Dairy Farming Academy named after N.V. Vereshchagin
Work status	Head of the Department of graphics and technical mechanics
Off. tel. / Fax	
E-mail	
Mailing address	2 Schmidt St., Molochnoye, Vologda, 160555, Russia
Turchaninova Tatyana Vladimirovna	
Academic degree	Ph.D. in Economics
Academic rank	
Full name of the organization – the place of employment	Murmansk Academy of Economics and Management
Work status	Associate Professor of Economics and Finance Department
Off. tel. / Fax	8 (8152) 44-04-49
E-mail	tatyana_0401@mail.ru
Mailing address	8 Polyarnaya Pravda St., Murmansk, 183025, Russia

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