

Prospects of Innovative Development of the Enterprises of the Chemical Industry

¹Peter Pavlovich Taburchak, ¹Alexander Vasilyevich Matros and ²Yarmolenko Irina Vladimirovna

¹St. Petersburg State Technological Institute (Technical University),
Russian Federation Saint Petersburg Moskovsky Prospect, 26
²Belgorod State Technological University Named After V.G. Shukhov,
Russia, 308012, Belgorod, Kostyukov Street, 46

Submitted: Aug 24, 2013; **Accepted:** Sep 26, 2013; **Published:** Oct 1, 2013

Abstract: In this article the current state of the chemical industry is analysed, the reasons of decreasing of innovative activity within recent twenty years are established. It is defined that the main obstacle for development of domestic economy according to the innovative program is the problem of attraction of finance, technology and manpower. Prospects of innovative development of enterprises of chemical industry are considered.

Key words: Innovations • Innovative development • Chemical industry • Economic growth • Sustainable development

INTRODUCTION

Innovative development is a basis of modernization of economy. The states taking leading positions in the field of innovations, can influence development of economic process. Existing innovative development of the Russian economy is insufficiently active.

Development of potential of a chemical complex in economy of Russia demands using of the effective mechanism of forecasting. Economic reforms of the 1990-2000th years lowered a share of innovative products in national produce of Russia on 0,19 points (from 1,12 % in 2006 to 0,93 % in 2013). On a share of innovative products, Russia in 2013 took the 312th place in world production. Leading places in the field belong to the countries whose national produce is defined by technical development up to 80-90%. The situation in the country, during the period from 1990 to 2013 led to reduction of number of the scientific organizations and the enterprises introducing innovations in 1,8 times. It indicates "weakness" of material resources and the corresponding frames of development of innovative technologies that leads to growth of their import [1, 2].

Therefore, now, in spite of the fact that the considerable part of production of the chemical industry let out in the Russian Federation is advanced and modern,

it is not considerably new. At the same time Russia is the country with the powerful scientific and technical base providing more than 73 % of world innovations in economy of the developed countries. Unfortunately, for 2007-2013 Russia developed mainly at the expense of sale of natural resources (oil, gas, etc.), instead of results of their processing that is much more favorable and also at the expense of the low credits of foreign banks [3].

Thus, stated testifies to problems in innovative development of the enterprises of a chemical complex above and confirms an urgency of a subject of this article.

Main part

The innovative program of the Russian economy is carried out to two stages. *At the first stage* – strengthening of competitive advantages (2007-2012): 1) creation of competitive advantages in primary branches; 2) adaptation to influence of world crisis; 3) creation of the technological reserves providing transition of economy in innovative development; 4) investments in the human capital and infrastructure. *At the second stage* – innovative development (2013-2020) as a result of which it is provided: 1) creation of the advanced technological base; 2) increase of efficiency of labor potential and social environment; 3) formation of optimum structure of economy; 4) formation of modern society of development [3].

Key question in increase of efficiency of activity of the country is attraction of available financial, technological resources and manpower. The solution of this problem demands the corresponding state credits for the innovative technologies which volume makes from 50 % to 70 % that allows the organizations to involve bank investments.

At the present stage in Russia no more than 50 % of businessmen invest in modernization of production technologies of output, 30 % adjust release of new products and only 20 % invest money in researches on development of absolutely new production [4].

So, according to forecasts, the innovative way of development of domestic economy by the end of 2020 will cause receiving: 1) shares of the enterprises which are carrying out IT technologies to 40-50 %; 2) increase of specific weight of technically new chemical production to 25-35 %; 3) growth of volume of expenses for researches and development to 2,5-3 % from national produce [3].

Development of chemical production – the most important criterion of technical development of the country. It is connected with demand and demands the corresponding development of high competitiveness of chemical production and rates of its growth and development. Therefore the purpose of development of chemical production of Russia for the considered period is ensuring necessary release, quality and the range of the chemical production, the corresponding demand domestic and world markets, on the basis of modernization operating and creations of new productions on a modern technical basis.

At this conjuncture country development the chemical industry has no corresponding production and technological base. As a result of the Russian Federation occupies only about 1,0 percent of world release of chemical production (a share of branch in gross domestic product – 1,9 %). In total in Russia about 5,0 kg/years of chemical production are per capita made, at an average in the world – 34 kg/years. Consumption of separate types of production of the chemical industry per capita, at 8-10 times is lower, than in Germany, France, England. Backlogs in competitive advantages are caused, first of all, by weak innovative activity and low efficiency of investment process at the chemical companies [5].

Such situation is caused by efficiency of export of goods of low processing within the last 20 years, in the conditions of sharp decrease in internal demand. The developed environment in the world market does not stimulate exporters to improvement of quality of production and development of the chemical companies.

In addition, the important factor constraining development of branch is discrepancy of structure of the chemical industry of the Russian Federation to chemical complexes of other countries. Despite it, in the chemical industry there are possibilities for creation of the developed branch, among which: existence of power-raw, water and other natural resources; the growing capacity of domestic market; existence of the corresponding production and scientific and technical potential.

The government of the Russian Federation presented the program of development of a chemical complex of Russia till 2020 according to which it is planned to increase release of chemical production by 2015 in 2,2 times in comparison with 2007, to raise a level of quality of chemical production to world level at the expense of the organization of production of new hi-tech chemical production with the high added cost, that is, achievement of a share of innovative technologies in chemical production to 30-50 % of world level is predicted; import substitution implementation for growth of a role of domestic market in a chemical complex of the country. The sustainable development of the chemical industry causes formation of a number of necessary internal and external conditions [6].

External conditions treat development of economy of Russia, at the expense of improvement of structure of branch (creation of the state oil and gas holdings [7]) on purpose: a) ensuring productions with raw materials at the prices providing competitiveness of production in the markets; b) financings of long-term investment projects; c) stimulations of the state investments into a sustainable development of the chemical industry; d) strengthening of system of training.

Thus, necessary intra branch conditions are: a) production re-equipment at the expense of introduction resource-and energy saving the equipment, technologies; b) decrease in expenses on material, power and manpower (for 12-15 %) in production of chemical production; c) deepening of processing of raw materials in 1,8-2,0 times in comparison with 2007, at the expense of introduction of innovations, IT technologies; d) development of nanotechnologies [8].

So far strategy of development of the chemical companies was based on the first option of development of economy of the Russian Federation till 2015, not providing break of large-scale investment projects. Till 2015 in a forecast the prices for raw materials, fuel, energy resources and the transport, accepted in strategy till 2020 that provides continuity of indicators on prospect (Table 1) [2] are used.

Table 1: The Characteristic of the purpose of innovative development of the chemical companies

No	Purpose	Criterion of an assessment	Indicators	
			I stage 2006-2015.	II stage 2015-2020.
1	Modernization operating and creation of new productions	Physical wear of fixed assets, %	40,0	30,0
		Factor of OPF updating, %	5,5	15,0
2	Development of export and domestic market of chemical production	Volume of export, bln. dollars.	16,3	18,1
3	Increase in release of new technological production in structure of the chemical companies, %	Share of volume of new production	-	30,0
4	Growth of efficiency of innovative activity of the chemical companies	Volume of shipped new production, billion roubles.	74,0	185,0

Table 2: The Forecast of innovative development of the chemical companies of the Russian Federation

Indicator	2007, report	2010, report	2012, report	2015, forecast	2015 in % by 2007.
Share in gross domestic product in % of the Russian Federation	1,7	2,0	2,4	2,9	(+) 1,2 items
Chain index of industrial production, in %	104,2	112,3	114,8	115,6	334,5
Balance of financial result, billion roubles.	112,7	187,4	40,0	1206,0	1070,1
Export, bln. dollars USA	13,2	5,7	16,3	18,1	137,1
Import, bln. dollars USA	10,9	14,5	16,0	17,5	160,6
Tax revenues in the budgetary system, billion roubles.	42,8	75,0	195,0	470,0	1098,1
Share in tax revenues in the budgetary system Russian Federation, in %	0,8	1,0	1,2	2,0	(+) 1,2 items
Mid-annual number of PPP, one thousand people.	791	782	779	780	98,6
Monthly average salary of PPP, rub.	11033	15020	18310	27460	248,9
Investments into fixed capital, billion roubles.	8,6	138,8	219,5	1133,3	1441,9

Table 3: Structure of the chemical companies for forms of ownership in 2013, % [11]

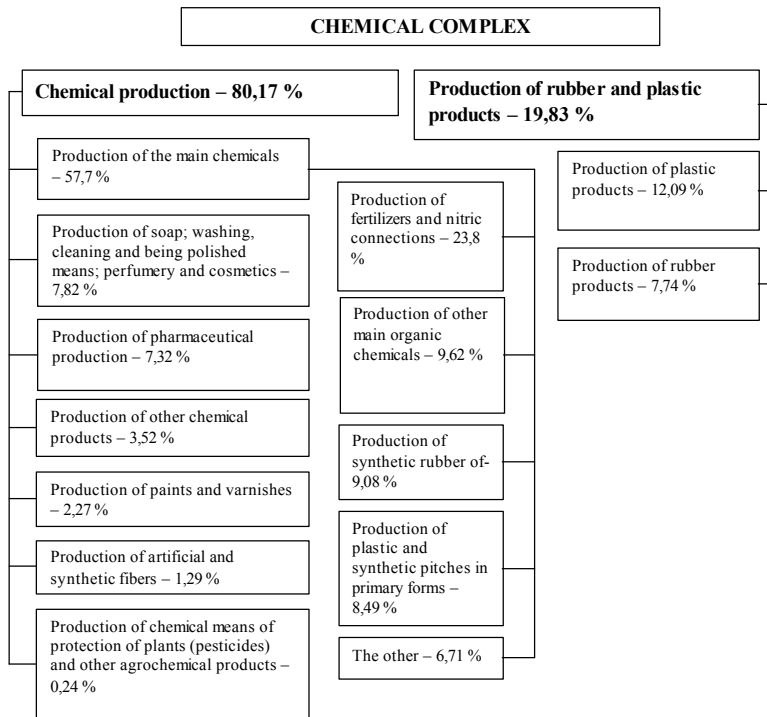
Name	Chemical production	Production of RTI and plastic products
Number of the enterprises of corporations	100	100
Including:		
Private property	79,3	88,8
The mixed Russian property	6,6	2,8
State ownership	6,3	2,8
Joint Russian foreign property	3,9	3,0
Municipal property	2,3	0,1
Foreign property	1,4	1,3
Property of the public and religious organizations (associations)	0,2	1,0
Property of consumer cooperation	-	0,1
In total it is shipped the goods, it is executed works and services of own production	100	100
Including:		
Private property	41,9	65,0
The mixed Russian property	25,9	13,1
Joint Russian foreign property	20,6	11,9
Foreign property	8,9	8,9
State ownership	2,7	1,0
Property of the public and religious organizations (associations)	0,1	0,1

If at the first stage of the scenario of development of the chemical companies (2007-2015) it was planned, generally reconstruction of operating capacities and only insignificant input of new productions, at the second stage – innovative (2015-2020) provide input of new capacities and creation of competitive productions on release of chemical production. For development of the chemical companies of Russia, the solution of a number of tasks (Table 2) [2] is supposed.

Introduction of new technologies in all subindustries the chemical industry that will give the chance to increase specific weight of advanced processing in production structure to 15-20 % (in 2007 is planned – it made only 3,7 %). It is predicted that cost of production of the chemical companies in the comparable prices of 2007 will grow from 2011 billion roubles in 2007 to 5756 billion roubles by 2020 and volume of production of chemical production in the prices of 2007 – in 2,83 times [9].

Table 4: Dynamics of financial and economic indicators of the enterprises of the chemical industry during 2000-2013 [12]

Indicator	Year													
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Share of an investment in gross domestic product of the Russian Federation, %	1,6	1,4	1,2	1,1	1,2	1,9	1,7	1,6	1,4	1,2	1,1	1,2	1,9	1,7
Chain index of industrial production, %	114,3	106,5	101,6	104,4	107,4	103,3	104,2	114,3	106,5	101,6	104,4	107,4	103,3	104,2
Financial result, billion roubles.	31,1	21,7	9,7	19,0	40,5	74,0	112,7	31,1	21,7	9,7	19,0	40,5	74,0	112,7
Profitability of sales, %			8,8	5,6	12,6	15,6	14,7			8,8	5,6	12,6	15,6	14,7
Export, bln. dollars USA	5,2	5,5	5,6	6,8	9,9	11,3	13,2	5,2	5,5	5,6	6,8	9,9	11,3	13,2
Import, bln. dollars USA	3,1	3,6	4,0	4,7	6,4	8,2	10,9	3,1	3,6	4,0	4,7	6,4	8,2	10,9
Tax revenues in the budget, billion roubles.		19,6	25,7	25,7	26,0	47,5	42,8		19,6	25,7	25,7	26,0	47,5	42,8
Share in tax revenues in the budget of the Russian Federation, in %		1,1	1,1	1,0	0,8	1,0	0,8		1,1	1,1	1,0	0,8	1,0	0,8
Mid-annual number of PPP, one thousand people.	915	911	886	853	790	820	791	915	911	886	853	790	820	791
Monthly average salary of PPP, rub.	2615,4	3681,5	4647,9	5831,4	7159,5	8972,7	11033	2615,4	3681,5	4647,9	5831,4	7159,5	8972,7	11033
Degree of wear of fixed assets on the end of the year, %	60,9	60,2	58,3	57,0	53,5	49,5	46,2	60,9	60,2	58,3	57,0	53,5	49,5	46,2
Investments into fixed capital, billion roubles.	18,5	26,8	29,7	38,7	51,0	75,8	78,6	18,5	26,8	29,7	38,7	51,0	75,8	78,6
Emissions in the atmosphere of the polluting substances departing from stationary sources, one million t.	0,4	0,4	0,4	0,4	0,4	0,35	0,37	0,4	0,4	0,4	0,4	0,4	0,35	0,37
Volume of dumping of sewage in superficial reservoirs, billion cubic meters.	1,28	1,184	1,303	1,246	1,126	0,99	0,93	1,28	1,184	1,303	1,246	1,126	0,99	0,93



Drawing 1: Structure and structure of a complex of chemical production in 2013, %

The probability of success of technological development in many respects depends as on external conditions (market condition etc.) and from adaptation of the chemical companies to tendencies on internal and the world markets.

The solution of problems of development of the chemical companies is impossible without increase of their investment appeal at the expense of decrease in risks and rates of a gain of chemical production not less than 5 % a year. Therefore the state support of development of the

chemical companies and corporations on the basis of growth of their efficiency and deeper processing of raw materials and materials at the expense of application of IT technologies [8] is necessary.

The chemical complex covers chemical productions and productions of rubber and plastic products (Drawing 1) [10].

The chemical industry is highly privatized. So, in a number of subindustries there are large corporations. It is "SIBUR Holding", "LUKOIL-Neftekhim", "Tatneft",

Table 5: The Characteristic of innovative development of the industry and the chemical industry of the country [1, 13].

Year	Output of products, million roubles.	Volume of innovative production, million roubles.	The general (capital and current) costs of the industrial enterprises of innovations, million roubles.	Investments into fixed capital, million roubles.	Share of innovative production, % ((gr.3/gr.2) *100 %)	Naukoyemkost, % ((gr.4/gr.2) *100 %)	Ratio of expenses for innovations and investments, % ((gr.4/gr.5) *100 %)
Whole industry							
2006	4763000	154626	49910,3	448215	3,2	1,05	11,1
2007	5881000	183000,9	60999,9	581755	3,1	1,04	10,5
2008	6868000	207151,1	81677,3	655262	3,2	1,28	12,5
2009	8498000	315603,5	99539,2	795925	3,7	1,2	12,5
2010	11209000	435122,2	115292,6	948652	3,9	1,03	12,2
including: chemical and petrochemical industry							
2006	296371	16739,9	3648,0	18521	5,6	1,2	19,7
2007	347460	17950,5	8338,8	26768	5,2	2,4	31,2
2008	374010	19026,6	4566,8	27663	5,2	1,8	16,5
2009	453565	19864,6	7343,6	36258	4,4	1,1	20,3
2010	571186	32761,6	7444,7	44970	5,7	1,3	16,5

"PhosAgro", "EuroChem", "Acron", "Amtel" and others on which over 60 % of the mineral fertilizers, about 56 % of polymeric materials, from 65 to 82 percent of separate types of SK, 88 % of automobile and 97 % of truck car tires [8] are issued.

Consumers of chemical production are practically all branches of a national economy. The structure of chemical branch includes over 1000 large and medium-sized industrial enterprises and about 100 scientific and design organizations, experimental plants. The chemical companies are placed practically in all federal districts of the Russian Federation. The chemical companies received the greatest development in four federal districts which share on volume of chemical production makes in Volga (43,5 %), Central (24,4 %), Siberian (11,2 %) and Southern (10,4 %) [11].

The chemical industry is characterized by high territorial concentration of production that substantially promotes development of separate regions of the country. Nevertheless, in structure of a chemical complex of Russia the essential share of the Russian market is occupied by the corporations having no more than two enterprises.

The volume of shipped production of the chemical companies in 2009 made in the actual prices of 1242,8 billion rubles, for a share of chemical production 75,5 % and for a share of production of RTI and plastic products – 24,5 % were necessary. For export about 40 % of made chemical production of low repartitions are shipped.

The chemical industry has huge economic value for the country. In it more than 820 thousand people, including in chemical production – about 639 thousand people are occupied.

The enterprises of the chemical industry are the main center of application of new knowledge, innovations and high technologies, that is of great value (over 3,5 %), defined as the relation of expenses for research and developmental works (Research and development) to a gain of volume of production of branch (enterprise). In Russia for the last 20 years essential reduction of number state and increase in non-state design, design and design and survey establishments and the organizations that makes negative impact on development of a chemical complex of the country is observed. The quantity of the created *advanced* technologies during the period from 2006 to 2013 in Russia was reduced by 7,4 %; *the new* – for 5,4 %; *the essentially new* – for 16,7 %; *the patents created with use* increased by 8 %; *possessing patent purity* – for 12,6 % [1, 12].

Branch indicators of innovative development of the industry and the chemical industry of Russia are given in Table 5 for 2006-2020 years [2].

For ensuring stability of economic growth it is necessary to stir up innovative activity, that is:

- Creating strategy on the basis of definition of priority branches and complexes;
- Developing new system of statistics – indicators of an assessment of dynamics of research activity;
- Creating structure of a chemical complex (creation of corporations, including transnational).

CONCLUSIONS

The research carried out in this article allows to formulate the following conclusions:

- For the last 20 years the share of innovative products in gross domestic product of the Russian Federation decreased that led to reduction of the scientific organizations and the enterprises, weakening of material base and the corresponding shots, increase in import of innovations [14].
- Problem of attraction financial, technological and manpower is an obstacle for development of domestic economy according to the innovative program.
- Absence of technological base in the chemical industry owing to efficiency of export of production of low processing within the last 20 years. Despite it, in the chemical industry there is a potential and resources for development.
- Program of development of the chemical complex, the Russian Federation developed by the Government, can be realized only under condition of modernization of economy of Russia as a whole. The state support, increase of investment appeal, decrease in risks, input of new capacities and creation of competitive productions, introduction of new technologies, deeper processing of raw materials and materials, adaptation to tendencies of the internal and external markets [2] is necessary for development of the chemical companies.
- Chemical industry is highly privatized. In a private property there is a most part of chemical production and production of RTI and plastic products. The enterprises of the chemical industry are the main center of application of new knowledge, innovations and high technologies, however the majority of design, design and design and survey establishments and the organizations are in private hands that makes negative impact on development of a chemical complex of the country [9].
- Consumers of chemical production are practically all branches of a national economy. The chemical industry is characterized by high territorial concentration of production that substantially promotes development of separate regions of the country. The chemical industry has huge economic value for the country.
- Analysis of innovative development of all industry and chemical including, testifies about an insignificant share of innovations in production and a low scientific value of production. Activization of innovative activity will allow to modernize economy, to provide sustained economic growth and to deduce the chemical industry on a new step of development.

REFERENCES

1. Ivanovo, B., 2011. Modernizatsiya economy and innovative process / B. Ivanovsky - the INION of the Russian Academy of Sciences, pp: 174.
2. Strategy of development of the chemical and petrochemical industry of Russia for the period till 2015 <http://www.minpromtorg.gov.ru/ministry/strategic/sectoral/6>.
3. Krivov, V.D., 2011. Innovative development of Russia: strategy, resources, legislative decisions / EL Krivov. - Office of the Federation Council of Federal meeting of Russia, pp: 108.
4. Dots over "and". A place of Russia in world innovative economy <http://regruss.ru/198/>.
5. Weekly monitoring «Innovative development of Russia» <http://www.i-regions.org/association/news/ratings/7000/>.
6. Problems of innovative development of the Russian enterprises http://www.rae.ru/use/?section=content&op=show_article&article_id=7784511.
7. Missing
8. Statistics of innovations in Russia http://www.gks.ru/free_doc/new_site/business/nauka/pri13.pdf.
9. Statistics of innovative development of Russia http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/science_and_innovations/science/.
10. Priorities of modern innovative development of Russia http://morvesti.ru/archiveTDR/element.php?IBLOCK_ID=66&SECTION_ID=1601&ELEMENT_ID=12948.
11. Program of development of a chemical complex to 2020 <http://www.minpromrb.ru/upload/news/2013.02/gprogram.pdf>.
12. Milner, B., 2010. Innovative development. Economy, intellectual resources, management of knowledge / under the editorship of B. Milner. M: Infra-M, pp: 624.
13. System innovations as a condition of formation of economy of a sustainable development - De-Po, 2012. pp: 326.
14. Kevin Roebuck, 2011. Innovation Management: High-impact Emerging Technology - What You Need to Know: Definitions, Adoptions, Impact, Benefits, Maturity, Vendors/Kevin Roebuck. - Tebbo, 248 roubles.

00. On the glade. In Russia there is a place for innovations. <http://www.poisknews.ru/theme/publications/6423/>.
00. Thomas H. Davenport, 2006. Strategic Management in the Innovation Economy: Strategic Approaches and Tools for Dynamic Innovation Capabilities / Thomas H. Davenport, Marius Leibold, Sven Voelpel. Wiley VCH, 444 roubles.