



# DEVELOPMENT OF THE INNOVATION COMPONENT OF RUSSIA'S ECONOMY: THE PROSPECTS AND ROLE OF ECONOMIC POLICY

## MAIN CONCLUSIONS

- Currently, the innovation sector in Russia is extremely insignificant compared with the general scale of the economy.
- The key element of the innovation sector of the Russian economy is at present represented by research units of foreign corporations that rely on intellectual outsourcing.
- The main problem that hinders development of the innovation sector of the economy is the lack of demand for innovations in the domestic market.
- The Russian economy can develop successfully without the implementation of an innovation-based growth scenario.
- A paramount objective of Russia's economic development is to modernise industrial capacities, which will promote demand for innovations.
- For dynamic innovation-based development of the economy, crisis-related challenges need to emerge.
- Currently, oil production and energy have come to be the most innovation-intensive sectors of the Russian economy.
- It is in energy sectors that crises are most likely to emerge in the foreseeable future, which will provide practical incentives to innovations.
- The fuel and energy complex can serve as the locomotive of innovation-based growth of the entire economy; this agrees with the perception of Russia as an energy superpower.
- The innovation-based scenario of economic development cannot be implemented without state support as part of an integrated policy aimed at supporting and encouraging innovations and providing for the formation of a national innovation system.

## TABLE OF CONTENTS

WHAT DOES RUSSIA NEED INNOVATION-BASED GROWTH FOR .....	3
POTENTIAL FOR INNOVATION-BASED GROWTH .....	6
PROBLEMS AND SPECIFICS OF THE INNOVATION-BASED SCENARIO OF ECONOMIC DEVELOPMENT .....	10
ROLE OF FUEL-BASED ENERGY SECTOR IN RUSSIA'S INNOVATION-BASED ECONOMY .....	16
GLOBAL EXPERIENCE AND THE FORMULA FOR INTEGRATION OF RUSSIA'S INNOVATION SECTOR INTO THE GLOBAL ECONOMY .....	19
THE STATE'S POLICY OF INNOVATIONS SUPPORT .....	23
SOCIOCULTURAL AND GEOPOLITICAL ASPECTS OF INNOVATION-BASED DEVELOPMENT OF RUSSIA .....	28

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The Shell Group supports this research project that is called upon to represent the vision of leading experts, members of the business community and government authorities of prospects for formation and development of an innovation-based economy in Russia.

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**The material presented below is the result of an attempt by the Interfax-CEA team of experts to 'average' expert opinions as part of a unified integrated concept to reflect development prospects of an innovation-based economy in Russia. The most impressive opinions of the study participants are presented as separate insets in the body text.**

## WHAT DOES RUSSIA NEED INNOVATION-BASED GROWTH FOR

### Absence of innovation-based development is fraught with loss by Russia of leadership positions in the global economy

To Russia, development of an innovation-based economy is an urgent priority because in terms of its economic development Russia is 1-2 stages behind leading countries (stages 5-6 in developed countries and stages 3-4 in Russia). E.g., developed economies are dominated by biotechnologies, nanotechnologies, information technologies, etc., whereas the domestic economy is still in the industrial stage. If this situation continues the gap in economic development will inevitably widen and Russia will be fated to end up in secondary roles in the global labour distribution structure. At the same time, Russia positions itself as a peer in the group of developed countries (G8) and the innovation project is needed to secure this position.

**Russia's world leadership can be achieved only through innovation-based growth**

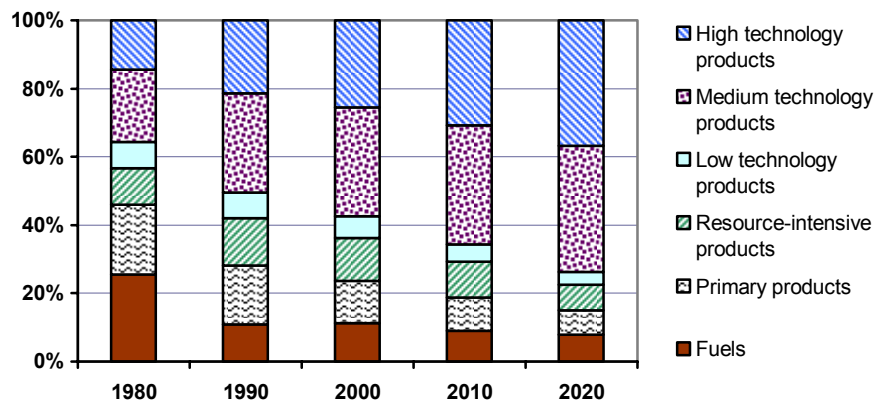
**Russia's lost profits from the innovation gap amount to \$1.214 billion a year**

Already 75-90% of GDP increase in the developed countries of the world comes from growth in the innovation sector while in Russia this figure is still as low as 10%; this affects the overall efficiency of the economy. E.g., according to the existing estimates, Russia's lost profits from the innovation gap amount to \$1214 billion a year.

**Russia will have to compete very hard with other energy-producing countries**

The share of fuels and raw materials in global exports is on the decrease and is predicted to fall below 10% by 2020. Therefore, resource-based development means to Russia not only losing importance in the global economy but also having to compete very hard with other producing countries with much more favorable conditions for the extraction of minerals.

**PRODUCT STRUCTURE OF GLOBAL EXPORTS IN 1980, 1990 and 2000 AND FORECAST FOR 2010 AND 2020 (AS PERCENTAGE OF THE VOLUME OF GLOBAL TRADE)**



Derived from: UNCTAD. Database 2003, Trade Structure by Product.

**Domination of resource-based sectors in the economy is fraught with economic dependence of Russia on other countries of the world**

Currently, Russia is a raw materials appendage to the global economy, an unpromising position in the context of depleting natural resources. Dependence on raw materials is fraught with the economic dependence of Russia on other countries of the world.

Another negative effect of Russia's innovation gap is the decreasing competitive strength of Russia's economy. E.g., while Russia ranked 58<sup>th</sup> in terms of competitiveness in the world in 2001 it went down to 61<sup>st</sup> in 2003 and 79<sup>th</sup> in 2003.

**Innovation-based growth will make it easy for Russia to enter new global markets**

Moreover, if Russia plans to enter new global markets it is innovation-based growth that can give it such an opportunity because innovations involve the creation of new products, which means the creation of new markets, and creating new markets and



**Russia lacks managers for implementing the innovation-based development project**

taking up leading positions in them is easier than trying to secure a footing in existing markets with fierce competition.

**Duality of the Innovation Circuit**

In the context of relevance of innovations, two aspects of innovation technologies can be distinguished, the scientific and technological aspect and the investment and promotion aspect.

The current situation in the country consists in that there are 'raw' ingredients for the successful development of the economy, such as natural resources, appropriate technologies and growing effective domestic demand. But there are no 'cooks' to mix all those ingredients, put them in the oven and turn them into finished food products. This is the question asked by businessmen who create the investment infrastructure.

Until such work is started, the main beneficiaries of Russian developments will be foreign companies that buy up, wholesale, Russian patent developments at giveaway prices and implement them in their home countries.

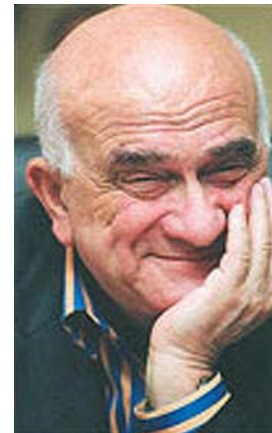
**Russia's breakthrough growth can be achieved only through innovation-based development**

**GDP can grow only if there is the necessary influx of investments that can assure innovation-based growth**

According to the existing estimates by the Center for Development, the success of the Russian economy requires that investments in fixed capital grow to 28-30% of GDP while currently this figure stands at 18%. This applies not only to innovation sectors; the more difficult conditions of minerals extraction require that investments in fixed capital grow, which obliges resource-based branches of the economy to increase the influx of investments. On

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- An innovation-based economy is the next inevitable stage after the agrarian and industrial stages (where China and India still are).

The demand for innovations in Russia is high enough; however, domestic manufacturers currently prefer to buy technologies that have been proven in the West, this not being associated with high risks.

The potential for market reforms in Russia has just begun to be realised and at this stage we need to introduce technologies that are already generally accepted in the world. China and India have travelled this path. But with time the demand for innovations developed in our country will grow.

A resource-based pattern of economic development is possible but is dead-ended. At the same time, the absence of 'challenges', largely contributable to favourable hydrocarbons prices, hinders the growth of demand for innovations.

Currently, 'old' branches of production in the world are moving over to developing countries with which we cannot compete in terms of cheap labour. Therefore, the path of China and India is unacceptable for us.

We must preserve the existing branches but, as concerns development, must stake on new branches of the post-industrial economy.

Russia has a high but extremely fragmented scientific potential. It is necessary to create large and up-to-date centres of science and education.

**Expensive labor, harsh climate and administrative burdens are indicative of the lack of prospects for development of cheap manufacturing in Russia on the model of China**

**Russia needs to switch from the growth pattern of catching up with Western economies to that of outrunning growth**

the other hand, it is the development of the innovation sector that can materially enhance the investment attractiveness of the Russian economy.

The well-being of Russia's economy is currently assured primarily by the exceptionally high prices of energy resources, which makes it highly vulnerable should conditions in the global fuels market deteriorate.

Expensive labor, harsh climate and administrative burdens are indicative of the lack of prospects for the development of cheap manufacturing in Russia on the model of China. These factors are also indicative of the absence of evident advantages for a dramatic leap in economic diversification. It is innovation-based growth that can raise the Russian economy to a qualitatively new level.

Moreover, Russia needs to switch from the growth pattern of catching up with Western economies to that of outrunning growth.

At the same time, Russia should not rely on the possibility of innovation-based development exclusively through acquisition of innovation technologies abroad because we are normally sold

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- The assimilation of the West's advanced technologies is desirable, naturally, and indeed essential. But we must not lose sight of the fact that we will mainly be sold yesterday's technologies, not the technologies that make for competitiveness in world markets today.

There are question marks over state policy for investment in the innovative economy: \$130 billion has already been made available for the first phase in nanotechnology, and that is comparable with the entire budget of the Russian Academy of Sciences. At the same time no priority has been set for the various areas of development within this innovation sector. Just as in other fields, the areas that should be given priority are the ones in which Russia has already taken some steps down the road.

We are an energy super-power, and energy remains a priority. So the development strategy for the Russian economy is split between innovations and the fuel and energy complex. The latter is drawing in significant investments to the detriment of innovative sectors. Statistics show that 55.7% of Russian capital investment in 2006 went into the minerals extraction industry and metallurgy, and just 7.3% into engineering, while accumulated foreign investments in the fuel and energy complex and metallurgy by 2007 represented 58.4% of the total, with only 4.3% in engineering. It is unlikely that this capital investment distribution can be adjusted for the better.

This is particularly the case because we are forever accepting new obligations to supply gas – to Europe, to the Far East – and we are building expensive pipelines (along the bed of the Baltic Sea, the length of Siberia, and so on). To fulfil our international agreements we need to make vast investments in fuel extraction. We will need \$935 billion just to maintain the current potential of our fuel and energy complex up to 2030; and, as natural resources are used up, extraction conditions become more difficult, and the relevant investment amounts grow.

Raw materials companies have little interest in the development of science, as the quality of their product remains pretty much the same and has no problem in remaining competitive. Most of their R&D work is linked to reducing minerals extraction costs and transport outlay. But this sort of research has little to do with cutting-edge technology.

**The innovation-based scenario of economic development is a breakthrough one in contrast to extensive development**

obsolescent technologies.

The innovation-based scenario of economic development is a breakthrough one in contrast to extensive development but is, however, associated with the necessity of structural changes in the economy. In addition, innovations should be interpreted fairly broadly including in the light of management, which is highly relevant to Russia.

## POTENTIAL FOR INNOVATION-BASED GROWTH

**The high potential of Russia's innovation sector is witnessed by the fact that foreign corporation research centres have set up in the country**

### Signs of Innovation Potential

The fairly high potential of Russia's innovation sector is witnessed by the fact that research centres of major international corporations have been actively set up in Russia in recent years.

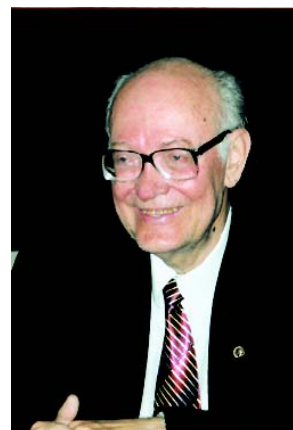
Many Russian innovation solutions are already widely used in the world, not only at the level of technological developments but also as final products.

**Russia has many ideas and theories but very few practical applications**

Russia has tangible advances in nanotechnologies and other promising innovation areas, many ideas and theories but very few practical applications. On the whole, there are quite a few promising developments and technologies that could be implemented into real

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- The formation of an innovation-based economy is coupled with a change of paradigms in the analysis and forecasting of Russia's future the way for whose transformations was paved in works by Kondratieff, Sorokin and Bogdanov.

As far as the development of demand for innovations is concerned, of primary importance are the position and actions of the state because market mechanisms alone cannot trigger large-scale changes in an innovation-based development of Russia, because the market cannot, by self-regulation, forecast and plan its own development over rather long-term periods, which is necessary for development of innovations. The exceptions can be only major transnational corporations including the Shell Group.

An important role in the development of innovations is played by the human (personnel) factor, i.e., education, science, engineering staff.

Russia must aim at developing exports of innovations. Tourism is also an innovation business where lost profits are comparable with profits from the military industrial complex.

A crisis-related challenge to the development of innovations is associated with the transition to the 6<sup>th</sup> economic stage. The relevance of an innovation-based breakthrough consists in the inevitability of a trade balance surplus in 10-13 years following which the state will have fewer possibilities to provide financial support to investments. Russia must aim at fitting in with the changing structure of the global economy.

The generational change including that of political elites will inevitably result in future authorities being more receptive to innovations.

**For innovation-based growth, there is a need to create links between enterprises in the innovation sector**

innovation products. Most developments have been left from Soviet times but they are still valuable today. Even these technologies, if implemented, can significantly improve the country's economic indices. The main problem is the lack of skills for implementation and product launch. In this respect, the gap is so wide that it is impossible to do without foreign experience. It is necessary to adopt experience by all means. The purchase by GAZ of an British minibus manufacturer is an excellent example of movement in this direction.

There is a need to create a national innovation system within which innovation products would be created from the stage of ideas to the stage of practical implementation. To this end, it is necessary to establish links between enterprises in the innovation technological sector, which have been severed 15 years ago. At the same time, it is not always necessary to aim at restoring the old pattern of links. Participation of investors including foreign ones creates a new framework of such links.

**There is a need to create state centres for consolidation and processing of innovation projects**

There is a need to create state centres for consolidation and processing of innovation projects and bringing them to the production stage. These centres must also organise work with investors.

There exists the problem of patents. E.g., one problem for the patenting of Russian innovations consists in the lack of adequate experience and legal support, resulting in patents being easily circumvented by competitors. The state must come to the rescue, by financing legal support to Russian innovators.

#### **Problems of Science and Education**

**There are very few prolific middle-aged scientists in academic institutes**

The main problem of Russian science is that of personnel. E.g., there are very few prolific middle-aged scientists in academic institutes; they left the country in the difficult 1990s and are working in foreign universities or private corporation research centres. Most of them have quite successfully assimilated and have no incentives for returning to Russia. At the same time, the situation in Russian institutes is beginning to improve little by little; with increased financing young scientists are beginning to join institutes but it is still too early to speak about a qualitative change in Russian scientific personnel. The problem of the lack of personnel for continuing scientific traditions remains relevant and can even be aggravated. There is a need to enhance the prestige of engineering professions, which does not depend on wages alone.

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- In Russia, there are many interesting developments at the level of theoretical science but extremely few at the level of industrial implementation, which is highly deplorable.

There are abundant natural resources, enough competent specialists but no innovation managers.

There is a certain scientific potential but the collapse of production in the 1990s resulted in the lack of demand for applied research (innovations) that must be carried out by sectoral applied research institutes. Currently, fundamental science is required to carry out applied research, which is ruinous for fundamental science because scientists are required to do something for which there is in reality no demand. The state does not know what to do with science.

There is need to encourage applied research in firms and at enterprises.

**In determining priorities for financing by the state, there is need to place emphasis on the possibility of the introduction of scientific developments in production**

**Funds of private corporations must predominate in the structure of investments in science**

**The scientific potential of Russia is quite low**

Science is extremely alienated from production, which holds back development of the applied branches. During implementation of practical applied projects associated with launch of new products, there is a tremendous gap in comprehension of objectives and tasks by scientists and investors. E.g., while the business plan, commercial profit, etc. are top priority ideas to investors it is the scientific interest that is of primary importance to scientists. It is possible to try to remedy the situation by placing emphasis, in determining financing priorities, on the introduction of scientific developments in production; it is this approach that must become the indicator for financing by the state. The most relevant task is to develop such innovation technologies that can be brought to final use in Russian conditions.

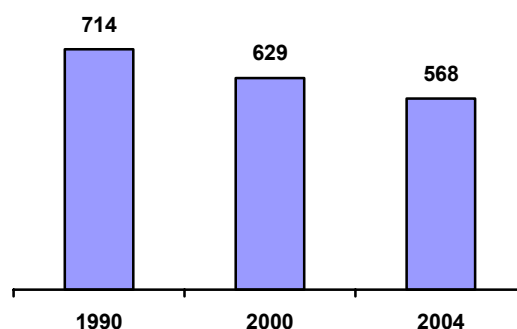
The state dominates in the structure of investments in science while in an innovation-based economy funds of private corporations must predominate, as witnessed by the experience of developed countries. In assessing the efficiency of funds allocated from the state budget for support of domestic science, many experts are of a negative opinion. The misfortune of academic science is that often to administrations of institutes, when spending funds, the important question is how to spend state funds rather than the result. According to the existing estimates by the Center for Development, the number of R&D workers in Russia compared to West European countries is out of agreement with amounts of financing.

A significant obstacle to universal development of innovations is the collapse of the sectoral research and development complex. The personnel strength in industry research centres is consistently falling.

On the whole, the scientific potential of Russia is quite low; Russian science is alienated from Western science; Russian scientists are not familiar with modern trends and cannot correctly choose the vector in the development of innovation technologies.

Institutes of higher education do not graduate niche specialists that the economy needs. The situation will change if institutes of higher education will train specialists at the request of individual enterprises.

#### **Personnel Strength in Sectoral Research Institutes (thou.)**



**The real applied science potential has been preserved in research institutes of natural monopolies**

At the same time, assessments of the scientific potential must not be overpessimistic. E.g., the real applied science potential has been preserved in research institutes of natural monopolies. The scientific potential is distributed among scientific structures of the Academy of Sciences and institutes of higher education and venture enterprises (small enterprises). Frequently, staff members of academic institutes work also in commercial structures where they





**Russia's advantage as concerns innovation-based development is the strength of the scientific school and specifics of the Russian mind, this being the ability to single out global tasks**

**High revenues from exports of natural resources may assure a quite acceptable level of population welfare**

**At the same time, Russia cannot avoid attempts to implement the innovation-based scenario**

carry out successful applied research that they are not interested in revealing to their institutes' administrations, which gives rise to perception of the collapse of applied science.

For increasing efficiency of the innovation sector of the economy, scientists must make a choice between pure science and practice. Commercialisation of science is badly needed.

Russia's main advantage as concerns innovation-based development is the strength of the scientific school and specifics of the Russian mind, this being the ability to single out global tasks. However, the lack of a clear understanding as to what Russian science is does not allow an unambiguous conclusion about the high innovation potential of the economy.

### **Alternative to Innovation-Based Growth**

The need for innovation-based development of the economy has been discussed for more than 4 years already and the experts that were optimistic about prospects for the innovation-based scenario in the beginning are now turning pessimistic.

The inertia scenario of Russia's economic development is also quite acceptable; it is simpler and less risky, and may assure a good level of revenue for the population. E.g., high revenues from exports of natural resources may assure a quite acceptable level of welfare of the population that has been steadily declining in recent years, which means that per capita GDP can grow even given stable GDP indices. In parallel, associated branches, such as finance, trade, construction, etc., can develop. The industry will solve the problem of modernisation and import substitution little by little.

The innovation-based scenario is not unavoidable for Russia's economy where money can be earned in a more prosaic way. Today, the most important task for the state is to create conditions for preserving the existing foci of the innovation sector.

It would be ideal if the inflow of revenues from oil sales entailed growth in other non-competing branches of the economy that are not related to exports (trade, construction, etc.). But this can happen without innovations.

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- A rapid economic growth is possible only if the innovation-based scenario of economic development is implemented.

Socio-economic stability is the basis for the development of an innovation-based economy, this factor being more important than investments, taxes, legislation.

High oil prices guarantee socio-economic stability.

It would be appropriate to begin with development in those innovation areas that already exist rather than tackle new areas.

Locomotives of growth in the innovation sector may be the aerospace industry and energy.

It is not necessary to aim at success in the entire innovation sector of the economy. E.g., Japan failed to succeed in the space industry and this is not a negative aspect for Japan's economy.

**The inertia scenario of development is also fraught with risks similarly to the innovation-based one**

At the same time, Russia cannot avoid attempts to implement the innovation-based scenario of economic development but this must not be an end in itself or an alternative to the inertial path of economic development.

At the same time, the inertia scenario entails certain risks, too. E.g., according to some experts, oil production in Russia may fall sharply starting from 2020 and gas production, from 2030 and this means that the resource-based scenario of economic development cannot assure a sufficient level of population welfare and will also inevitably lead to national cultural degradation and territorial disintegration of Russia. It is highly probable that Siberian regions will fall under the control of China, western regions will gravitate towards European values and the south, towards the Muslim East.

### **The Military-Industrial Complex Plays a Subordinate Role in the Development of the Innovation Sector**

**The cold war was an innovation challenge to the Soviet Union's economy**

In the times of the Soviet Union, the innovation parity of our country with the developed countries of Western Europe and the USA was achieved mainly owing to the military-industrial complex (MIC). In many respects, it was attributable to the fact that, as early as in those times, the USSR's MIC had to compete with Western companies in the field of innovations, which promoted the emergence of advanced developments. At the same time, it is necessary to take account of the impact of the Cold War factor that was a global challenge to the Soviet Union's innovation-based economy, formalised in support from the state and the overall moral mood of Soviet citizens, worrying about the security of their motherland.

**In 10 years, the MIC may lose competitiveness**

Currently, the MIC is still competitive, mainly owing to developments from the Soviet past, but the situation will change in 10 years because this branch is isolated from the rest of the economy and past resources will run out. Human resources are running out, too; the old generation of specialists retires while the new generation does not arrive.

**Conversion of the MIC is limited by requirements to civilian and military technologies**

On the whole, the existing potential of the MIC still allows a certain conversion of innovative technologies to civilian uses but such conversion is rather limited because the most important in this industry are characteristics of products (speed, accuracy, damaging power, etc.) rather than cost. It turns out that military innovations cannot be used in civilian production because of unwarranted high costs, which reduces the competitiveness of end products.

**The significance of the MIC in the global economy is falling**

The global economic realities are such that the industrial and military power of states begins to play a '10<sup>th</sup> role' in determining the world's leading countries. At present, science, modernisation, education, health, etc. are moving to the forefront in this context and this means that the MIC plays a subordinate role in the development of the innovation sector of Russia's economy.

The MIC may once again make active demand for innovations and significantly influence the overall development of the economy if the subject of confrontation between powers arises again; however, this scenario of development is undesirable.

## **PROBLEMS AND SPECIFICS OF THE INNOVATION-BASED SCENARIO OF ECONOMIC DEVELOPMENT**

### **Absence of Crises-Related Challenges Hinders Development of Russian Innovations**

The worldwide experience and the history of Russia show that real innovation-based transformations of economies took place

**A crisis-related challenge is required for innovation growth**

exclusively in the presence of serious problematic conditions (1914, World War II, etc.). Innovation-based development requires confrontations, threats, etc. This is precisely why Russia in the Soviet years was a leader in the field of innovations, with the MIC being the epicentre of innovations from 1950-1960s; in other words, the Cold War was the motor of innovations for the economy in the times of the Soviet Union. A similar picture can be observed in the history of the USA; Silicon Valley was a response to the Soviet nuclear and space programs.

**Russia has now no acute need for innovations**

In its time, the USSR was on a par with the West in terms of innovations but starting from the 1990s Russia has no manifest innovation challenges despite the existing environmental problems, fuel dependence, etc. that are undoubtedly problems but do not require to be solved in tight timeframes or the mobilisation of efforts of the entire economy.

Moreover, high prices of hydrocarbons in the global market assure a stable influx of petrodollars to Russia, which provides a quite favourable economic background and obliterates the need for innovation-based transformations in a context of sufficient population welfare level.

**Depletion of resources, environmental problems, biotechnologies, energy saving are global innovation challenges**

On the global scale, the innovation circuit at present includes problems of resources depletion, environment, biotechnologies, energy saving. To Western Europe, the main motor of innovations are environmental problems, the Kyoto protocol, terrorism control.

**Breach of the Innovation Process**

The problem of the lack of demand for innovations has a historical origin and is directly related to the problem-ridden 1990s. At that time, the collapse of the economy entailed a more than 5-fold fall of investments in the development of innovation technologies. However, those times are past and now the situation has begun to improve.

**Russia's backward industry needs modernisation rather than innovations**

Production capacities, outdated owing to the economic cataclysms of the 1990s, cannot generate demand for innovations, being more in need of *modernisation*. Therefore, to stimulate demand for innovations, emphasis must be placed on investments in equipment renewal. Decreased imports of basic technologies may encourage development of Russian innovations but this requires that legislative barriers be installed by the state.

The demand for innovations is mainly formed by enterprises engaged in intermediate processes rather than by end consumers of products, meaning that a modernised economy will generate the bulk of demand for innovations.

**Technological backwardness creates a 'perverted' demand for innovations**

Moreover, technological backwardness creates a 'perverted' demand for innovations, resulting in that technologies that would be meaningless for modern production but are relevant in Russia are being developed. The potential for market reforms in Russia has just begun to be realised and at this stage we need to introduce innovations that are already generally accepted in the world. China and India have travelled this path. The demand for innovations does exist in Russia but domestic manufacturers currently prefer to buy technologies that have been proven in the West, this not being associated with high risks.

**The most relevant approach for Russia consists in the introduction of quasi-innovations**

To Russia, the most relevant task now is not the creation but rather the introduction of innovations (introduction of those existing in the world). At the same time, obsolete industrial assets are an advantage as concerns development of innovations because renewal of assets can take place exclusively on the basis of new scientific and production capacities.

**The emergence of new technologies may determine trends in modernisation of the**

The inevitable decline of the foreign trade surplus will entail a decreased influx of capital, which means that the economy should be modernised as soon as possible.

It might be that assessments of prospects for an innovation-based economy should be based on emerging supply rather than on the lack of demand. The emergence of new technologies may determine trends in modernisation of the economy.

With time, demand for domestically developed technologies will grow. After Russia's economy achieves parity with Western economies in terms of 'saturation' with innovations, demand for domestic developments can be expected to emerge. But for this, industry and agriculture need to achieve a certain level.

**Low demand for innovations is associated with the disturbed innovation process**

The problem of low demand for innovations is to a large extent associated with the disturbed innovation process. E.g., in the times of the USSR there was an innovation pipeline that conveyed innovation ideas from the stage of emergence to the stage of embodiment into a real product and marketing. In the absence of the innovation circuit, it is highly risky to engage in innovations and introduce them in own production capacities.

The state can help solve the problem of low domestic demand for innovations by structuring it through improvements in the information environment.

### **Innovation Outsourcing and Growth of Domestic Demand for Innovations**

**The USA and Europe generate the bulk of demand for Russian innovations**

Currently, the USA and Europe are the main sources of demand for Russian innovations. It is major private corporations from these countries that are now actively establishing their research units in Russia, forming the backbone of Russia's innovation sector of the economy. E.g., while in the past foreign companies for the most part invited domestic specialists to join their 'home' R&D units now, owing to development of communication facilities, it is cheaper to set up research units in Russia, which also does not complicate competition among specialists in their domestic market.

Following foreign companies, domestic manufacturers also begin to set up research units, being compelled to assure

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- As concerns the problem of the lack of demand, it is not worth concentrating on the local market alone; the global market is quite capable of stimulating development of Russia's innovation sector.

The global market can offer both capital and production capacities for the development of Russian innovations. E.g., it is quite possible that Russian innovation companies will place orders for components in China and other developing countries.

The state must guarantee return of investments in venture projects to foreign investors.

FEC must be supported and its efficiency must be increased but it cannot generate innovation-based growth all by itself.

Only the innovation sector can guarantee high GDP growth rates.

Large foreign companies closely watch the development of Russia's innovation sector, especially as regards small business, buying up all that is of interest.

Close integration of Russia's and China's innovation-based economies is possible.

The main problem of the innovation process is converting ideas into products.

**Admission of Russia to WTO will promote development of innovations**

competitiveness of their own products, which will be especially facilitated by admission of Russia to the WTO. Therefore, the domestic demand for Russian innovations will be created by sectoral leaders.

**Crises in Russia's economy are unavoidable and will be inevitably followed by real innovation-based growth**

The state must facilitate the introduction of best global business practices; however, special conditions must be created for this. E.g., obstacles to development of leaders in branches of the economy must be eliminated and for that the state must support exports and entry of domestic companies into the global market.

The analysis of economic development mechanisms permits the statement that crises in the technological sphere of the Russian economy are unavoidable and will be inevitably followed by real innovation-based growth in response to the innovation challenge.

The demand for innovations will grow and the innovation-based scenario of development is unavoidable because there exist the will of the state, pressure from science and the growing interest on the part of business, which together must yield a positive result.

**Promising Areas for Development of Russia's Innovation-Based Economy**

Among promising areas for development of an innovation-based economy mention should be primarily made of areas that are supported by the state and are described as 'strategic', such as nanotechnologies, nuclear energy, space, information technologies.

**Large-scale state investments in support of nanotechnologies do not entail high risks**

Large-scale state investments in support of nanotechnologies do not entail high risks because such investments are not intended to be in venture businesses but rather in infrastructure projects that will inevitably pay back if the diversified part of the innovation sector associated with nanotechnologies is efficient.

The second, by importance, contribution to the growth of the innovation sector will be made by technologies for deeper conversion of raw materials, such as oil, gas, wood, metals and other minerals.

**The food industry is the most modernised one**

Owing to the specifics of the market at the present moment, there has emerged an industry in Russia that, in terms of equipment modernisation, is ahead of all other spheres of the economy. This is the food industry. Although all the development and technology centres of this sphere of the economy are located abroad the very fact of introduction of state-of-the-art technologies is a powerful lever for launching innovations in this sphere.

The military-industrial complex that slowly but steadily increases demand for new technologies will stimulate innovations in mechanical engineering.

The building boom (supported by the state) attracts new (so far foreign) technologies to the Russian market.

**Russia has an established environment of highly skilled programmers**

Russia has an established environment of highly skilled programmers. This was facilitated by:

- ✓ Availability and wide spread of computers and access to Internet;
- ✓ Technical orientation of the higher education system;
- ✓ Affordability of software owing to poor copyright control in Russia. Russian programmers are known to become familiar with new software and development tools faster than their Western colleagues on average because they have access to cheap pirated copies.

High skills and a creative approach to solution of complex tasks distinguish Russian programmers in such creativity-intensive areas as the writing of games and viruses.

### **Specifics of Russian Priorities**

#### **It will be hard for Russia to keep leadership in nuclear technologies**

Currently, Russia is a leader in nuclear technologies but it is not clear how this leadership can be kept because the long-term cycle of personnel reproduction has been interrupted. It turns out that even if we have a certain advance in some innovation areas it is not clear how this advance should be developed in the future.

#### **Breakthrough technologies may emerge in conservative branches of production**

Promising areas of innovations are biotechnologies and nanotechnologies as related to human health because it is human health and prolongation of life that are a primary incentive to the global innovation process.

#### **In determining development priorities, it is necessary to calculate the synergy effect**

A specific feature of the Russian path of innovation-based development may consist in the emergence of breakthrough technologies in conservative branches, such as nanoconcrete, biotechnologies in oil production and powdered coal combustion.

In determining promising areas for the development of innovations, there is need to form a network of related projects and to calculate the synergy effect. It is based on these considerations that innovations in all sectors of the economy should be developed.

The high potential for innovations in the MIC is still preserved from the Soviet times but is extremely difficult to assess, especially as concerns availability of dual-purpose technologies.

#### **Russian public companies fear innovations**

### **Public Companies Fear Innovations**

Currently, Russian publicly traded companies fear the introduction of innovations, and this can affect their market capitalisation. E.g., there are apprehensions that the introduction of innovations is fraught with high risks. Especially bearing in mind that real economic gain can be obtained not earlier than in 10 years. Such apprehensions can be relieved only when companies build a positive practice of innovation introduction but this takes quite a long time, too.

#### **Venture projects do not take root in Russia**

At the same time, the transformation of Russian companies in the eyes of investors must be in the direction of international standards; a successful company must spend a certain portion of profits on investments in innovations. Therefore, in presenting an integral strategy of the company's development, due attention must be given to R&D matters.

### **Obstacles in the Investment Market**

The development of the innovation sector of the economy must be based on the implementation of a multitude of venture projects that do not take root in Russia because return on investments in such projects is 30-35% and allied risks make them unattractive to investors against the context of 40% profitability in the trade and construction sectors.

A venture capitalist at the time of investment in a promising project must clearly know who can buy his business later, which makes success of the domestic innovation sector dependent on ties with the international capital markets.

### **The State as an Obstacle to Innovations**

A high State share in the economy has a less than best effect on its efficiency and impairs the competitive environment, which ultimately holds back innovations because one principal incentive to innovation activities is the need to improve



**A high State share in the economy has a less than best effect on its efficiency and impairs the competitive environment and holds back innovations**

competitiveness of products. An institutional reform of the economy is needed to solve this problem.

The practice of state regulation in the resource-based sector indicates that private ownership of oil and gas assets is extremely unstable, which does not facilitate *growth of investments* by business owners in innovations that can pay back only after a fairly long period during which there are high risks of loss of business. The voluntarism of the authorities as regards the licensing of energy production makes the industry focus on instant profits without having a desire to develop innovations and create demand for them.

**Stability of the state is a prerequisite for innovations**

The state's trend to assure stability of the state is a prerequisite for innovations; therefore, administrative reform of the state must be continued in order to increase certainty in the economy.

There is a danger that state subsidies in the innovation sector will give rise to a welfare mentality, decrease the competitiveness of Russian developments and hold back development of the innovation sector.

### **Risks of the Innovation-Based Scenario**

**Innovation-based economy is fairly risky but risks are justified**

An innovation-based economy is rather risky. For example, after the invention of the computer, which served as an incentive for rapid innovation-based growth in the USA, the economy was stagnant for about 20 years but the leap that took place made up for all that. Such is the inevitable essence of an innovation-based economy that must be accepted and that may assure the global leadership of the national economy.

**Support of innovation rhetoric at the highest state level helps make information on innovation opportunities more accessible to the business community**

Political statements about the need to diversify the economy contribute to the formation of an overall background of attitude to innovation companies. The long-term development strategies of the regions to the year 2020 necessarily describe routes to diversification of regional economies and specific areas for introduction of innovations. This provides a positive signal to entrepreneurs and investors, stimulating interest in 'strategic' areas of innovations.

Awareness raising for companies and the entire business community, support of innovation rhetoric at the highest state level help make information on innovation opportunities more accessible

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- An alternative to the innovation-based scenario is the need to modernise the economy. E.g., the depreciation coefficient of 78% of industrial fixed assets exceeds 55%.

The state can create demand for innovations by itself, for example, by purchasing state-of-the-art technologies for education.

There is the problem of the lack of transparency and public control in the spending of state funds allocated for innovations.

So far, big business is not ready to develop innovations because the return is possible only in 15-20 years, which generates high uncertainty and may affect the level of market capitalization of companies.

It is important to Russia to participate in the value chains of international corporations; this is a priority for the economy as regards creation of own products.



to the business community. This becomes the subject of discussion in analytics, printed press, TV and at conferences and other events for businessmen.

By becoming acquainted with the specifics of the innovation and introduction process, heads of companies become more prepared for constructive work with investors, raising credits and contacts with major partners.

The allocation of large-scale state funds for development of certain areas in the innovation sphere will help improve the mechanisms for control over spending of state funds. With time, the quality of management of state funds may be improved and lead to the emergence of real developments in these branches.

In reality, only the innovation-based project of economic development is capable of assuring the successful development of Russia's economy. At the same time, the riskiness of innovations generates riskiness of the entire innovation process, which means also the riskiness of Russia's future. Unfortunately, innovation-related subjects are associated mostly with the spread of talk rather than real processes and, therefore, the outlook for the future is rather pessimistic.

**Riskiness of innovations generates riskiness of the entire innovation process, which means also the riskiness of Russia's future**

## **ROLE OF FUEL-BASED ENERGY SECTOR IN RUSSIA'S INNOVATION-BASED ECONOMY**

### **Crisis in the Energy Sector as an Incentive to Large-Scale Innovations**

It is extremely difficult to solve the problem of the lack of demand for Russian innovations in the domestic market because there are no manifest crisis-related challenges in the country that can generate such demand. At the same time, the situation may change because an energy crisis is very likely to emerge in Russia, which will be a real innovation challenge.

The main problem for the Russian economy and the housing and communal sector of the country consists in the mounting imbalance between the growing consumption and supply of electricity and heat energy. The Soviet margin of safety is running lower with every year owing to the aging of generating equipment while new commissioned power plants are not sufficient to meet the

**Energy crisis can call forth innovation-based growth**

**DAN S. MEDOVNIKOV**

**Innovations Department Editor at *Ekspert Magazine***



- The modern Russian energy sector increasingly clearly displays traits of an impending systems crisis: national energy consumption exceeds generation, energy mechanical engineering cannot solve the task of the rapid commissioning of new capacities, gas production from major fields is on the decline, long-term degradation of the innovation program of the domestic gas monopolist and oil sector, the growing proportion of production of 'fat' gas, and the growing gas shortage in the domestic market. Moreover, Russia's economy is extremely energy-wasteful; production of GDP takes twice as much energy resources in our country as in most developing countries.



**Imbalance between the growing demand and supply of electricity and heat energy is mounting**

**Technologies for efficient use of produced resources are not being developed**

**A global energy-environmental revolution will take place before 2030**

**The fuel and energy sector will become the epicentre of innovation-based development**

**The financial and institutional resources of FEC in the context of the current management role of the state may significantly advance this sector in the field of innovations**

growing demand of the economy. The situation is close to critical. Export-oriented strategies of energy producing companies (both private and state-owned) only aggravate the situation. The most important technological problem of Russia's power sector consists in the use of obsolete inefficient and environmentally unsound low-efficiency technologies for the combustion of crude hydrocarbons.

Currently, technologies for the efficient use of produced resources are not being developed in our country; we cannot efficiently combust gas, refine oil, etc. We for the most part only produce oil. For example, in gas transportation use can be made of energy turbines to generate additional power but proper incentives are lacking and Gazprom does not use them.

Moreover, the energy crisis in Russia that may take place in the next few years will be followed by a global energy-environmental crisis that will trigger an energy-environmental revolution, tentatively by 2030. It is necessary to modernise the Russian economy in time before prices fall, oil and gas reserves are depleted or the global economy switches to alternative energy sources.

The innovation-based path implies increasing energy supply, which means that it is important to develop the fuel and energy complex as the foundation of innovation-based growth.

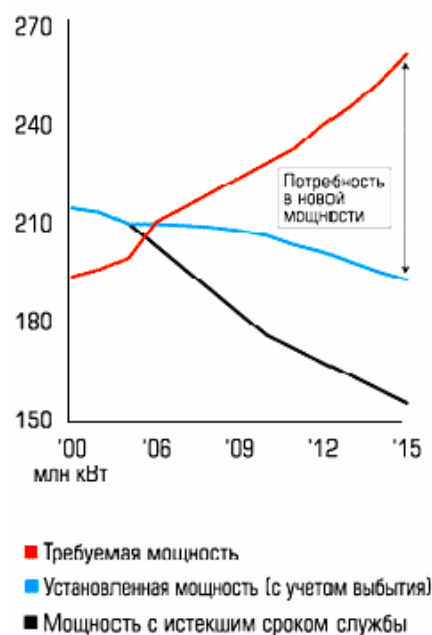
The fuel and energy complex (FEC) may become the epicentre of innovation-based development of the innovation sector of the Russian economy; moreover, such innovation breakthrough in the FEC has already started. The experience of the National Innovation Corporation is instructive, with the experience of cooperation between the state, business and science being highly fruitful.

**The FEC as the Locomotive of Innovations; It Is in This Sector that the Growth of Russia's Innovation Sector May Start**

Russia as an energy superpower requires innovations in the fuel and energy sector. The financial and institutional resources of FEC in the context of the current management role of the state may significantly advance this sector in the field of innovations. Currently, we are witnessing a concentration of resource-based industries in the state sector of the economy, which permits the state to receive stable budget revenues over a long term and, therefore, to support other innovation-based branches of the economy.

Oil producing companies may generate demand for innovations that will spread to related branches.

**Capacity Shortage in Russia**



Sources: RAS Energy Research Institute, *Ekspert Magazine*

**The resource-based sector and 'first conversion' branches are the most powerful branches of the Russian economy; it is in these branches that the highest innovation activity is observed**

The resource-based sector and 'first conversion' branches are the most powerful branches of the Russian economy; it is in these branches that the highest innovation activity is observed. With the barriers that the state may establish to purchases of Western technologies, a real and stable innovation environment may be formed in these sectors in our country.

### SHARE OF ORGANISATIONS THAT CARRY OUT INNOVATIONS (%)



Source: SU-HSE, Statistical Digest "Indicators of Innovation Activities: 2006"

**The energy sector lays claim to become the locomotive of development of an innovation-based economy**

The FEC's innovation challenge can be extremely useful even if it does not trigger an innovation boom in the entire economy. E.g., Russia may be an absolute leader in the world in the field of geology and minerals exploration. Russia is capable of successfully exporting innovations including those in the fuel-based energy sector. E.g., the Gas Research Institute exports technologies to Venezuela.

As priorities in development of innovations, it would be appropriate to support production of power equipment capacities because orders can be obtained for several years ahead owing to specifics of this market.

The energy sector lays claim to become the locomotive of development of an innovation-based economy. E.g., in 20 years resources will start to deplete and it will be necessary to develop difficult fields, which will require relevant technologies and will create demand for innovations.

The high share of the state in the extractive industries may guarantee demand for Russian innovations as distinct from purchases of technologies abroad. At the same time, the participation of the state in the infrastructure energy sector acts as a constraint on the efficient development of the economy as a whole.

### Dutch Disease

**High oil prices create good conditions for discussions about innovations but do not promote their development**

If Russia had no oil and there were not extremely favourable prices for energy resources in the global market there would be no discussions now about the need to develop an innovation-based economy. However, high oil prices create good conditions for

**Excessive influx of investments means that it is improper to assert that FEC draws off investments from other branches of the economy**

**The state's policy that holds back profitability of the oil and gas sector encourages investors to switch to other branches of the economy**

discussions about innovations but do not promote their development. The problem of the oil sector is that 80% of produced crude is exported; therefore, the industry does not work for Russia's economy.

Exports of raw materials is our competitive edge and the resource-based economy acts as a safety net for Russia's future. At the same time, the resource-based sector employs as little as 10% of the population, which means that we need to develop other sectors, too.

The existing excessive influx of investments means that there will be enough money for all branches and that it is improper to assert that the FEC draws off investments from other branches of the economy. The growth of venture funds is comparable with investments in the oil sector, which means that it is not correct to say that the FEC draws off investments.

The resource-based sector is capable of generating a high demand for innovations. For example, metallurgy is a high-innovation industry. At the same time, the economy as a whole rather than its individual branches must be innovation-based; this is the key problem.

The state's policy that holds back the profitability of the oil and gas sector encourages investors to switch to other branches of the economy; it would be lucky if these are innovation technologies. This is witnessed by direct investment funds that are being created. Therefore, the economy is more diversified.

Pressure from the state on the FEC holds back the influx of long-term investments into the FEC because it generates for investors long-term risks associated with the state's policy.

## **GLOBAL EXPERIENCE AND THE FORMULA FOR INTEGRATION OF RUSSIA'S INNOVATION SECTOR INTO THE GLOBAL ECONOMY**

### **Specifics of Innovation Subjects**

Taking account of the fact that development of innovations is normally a response to certain innovation challenges, frequently

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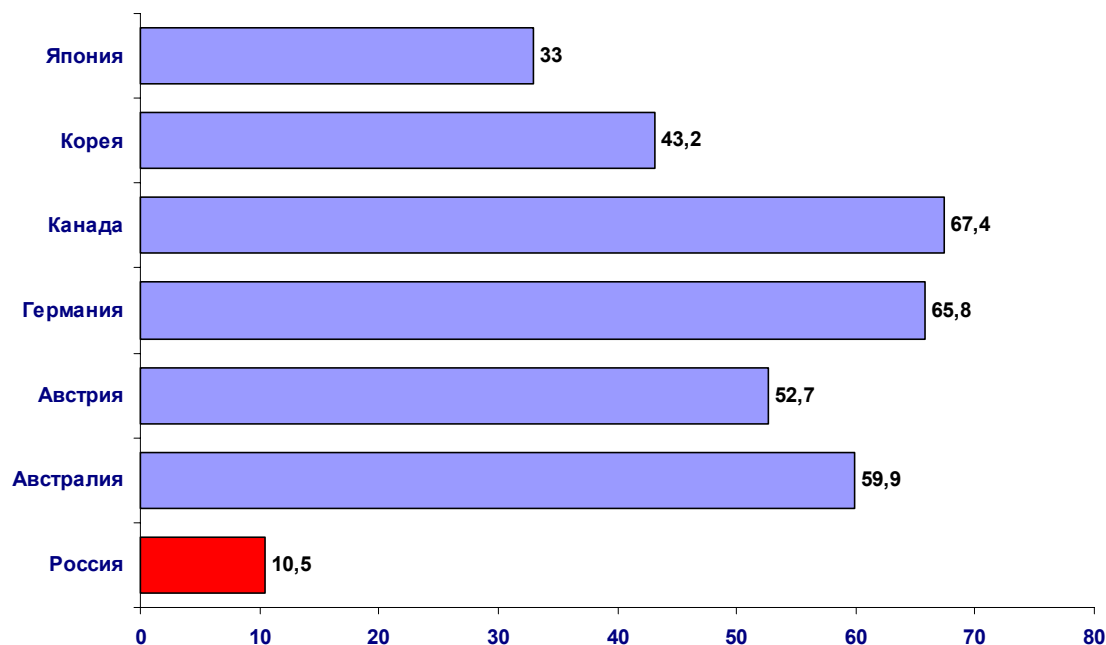
- Now all participants in the Russian market are being so intimidated by dependence on raw materials that diversification becomes a priority not only for federal and regional authorities. This involves companies that are closely related to the FEC and other raw materials.

However, the high degree of vertical integration of companies in the FEC, multiplied by inefficient state management, is a significant obstacle to innovations. Outside, private, and small companies have no opportunity to provide services to FEC companies. At the same time, oil and gas companies have no real internal incentives for the introduction of innovations. Political statements do not materialise in those companies. A typical example is the use of associated gas by oil producing companies. Russian oil producing companies flare about 10 billion cubic meters of associated gas a year. This is attributable to both the monopolistic position of Gazprom that does not want to allow this gas into its pipelines and the necessity to modernise producing equipment or to install additional equipment.

triggered by crisis events, innovation-based models of the development of different groups of countries significantly differ as regards the direction of innovation developments.

E.g., of primary importance to the development of countries are problems of energy-saving and terrorism control while to developing countries, the problems of the environment and potable water, etc, are important.

## SHARE OF ORGANISATIONS THAT CARRY OUT INNOVATIONS IN INDUSTRY (%)



Source: SU-HSE, Statistical Digest "Indicators of Innovation Activities: 2006"

**More typical of Russia are innovations in 'midway' technologies associated with mechanical engineering**

Russia does not belong either to the group of developed countries or to third world countries; therefore, Russia does not fit into the specific range of innovation-related problems of these groups of countries. More typical of Russia are midway technologies, such as mechanical engineering, etc.

Innovations are possible not only in hi-tech branches (biotechnologies, nanotechnologies, etc.) but also in low-tech branches (minerals production, agriculture).

### Russia as a Global Intellectual Centre

It would be ideal if Russia became an intellectual centre for the global innovation-based economy but this is a distant prospect and something to strive for.

**Russia becomes an intellectual outsourcer for developed countries**

At present, large foreign corporations are setting up their own R&D units in Russia but business centres proper are located abroad. Russia is becoming an intellectual outsourcer for developed countries.

**Development of technologies (patents) without industrial implementation carries no promise**

The problem of this path of development of the innovation sector consists in that the economic effect will be achieved abroad rather than domestically. Development of technologies (patents) without industrial implementation carries no promise because foreigners are disposed to buy Russian scientists rather than Russian patents.

The most important indicator of success of the innovation-based model in a country is the volume of the innovation market. In



**Nevertheless, the main pace in the application of the full cycle of innovations is set by the USA**

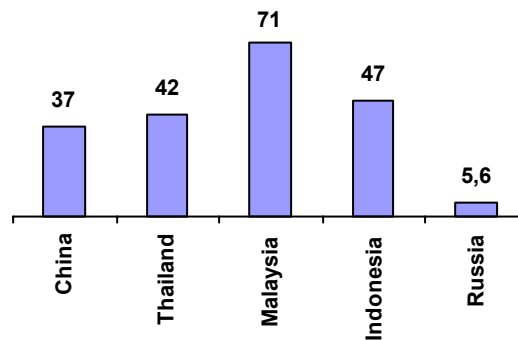
terms of this indicator, the USA is the sole leader. It is important to take account also of the experience of mentally close countries (Israel, France) or countries with which long-term close ties exist (India). Nevertheless, the main pace in the application of the full cycle of innovations is set by the USA. It is important to maximally expand cooperation in experience exchange, to adopt investment technologies, knowledge in market analysis and all other areas that make up the cycle of innovations development and introduction.

**Integration of Russia in the Global Innovation-Based Economy**

**Rapid growth of the innovation-based economy in developing countries is attributable to established cooperative ties with transnational corporations**

Rapid growth of the innovation-based economy in developing countries is primarily attributable to established cooperative ties with transnational corporations. In this respect, of use is primarily the experience of Southeast Asia countries (Korea, Japan, Singapore, Malaysia, Thailand, the Philippines).

**Share of Hi-Tech Products in Exports (%)**



**Russia does not yet in fact take part in value chains of global manufacturers**

The desire of global transnational corporations to assure the high quality of components produced in developing countries has urged them to transfer state-of-the-art technologies, corporate culture, education, etc. to such countries, thus assuring high rates of innovation-based growth. Unfortunately, according to the existing statistics, Russia does not in fact take part in value chains of global manufacturers yet.

Close integration of the national innovation sector into the global economy will mean that demand for Russian innovations will come mainly from foreign companies and will depend on the economic policy of foreign states.

**To Russia, it is important to create new markets rather than enter the existing ones where competition is extremely high**

To Russia, it is important to create new markets rather than enter the existing ones where competition is extremely high. Russia should aim at large-scale introduction of innovation technologies, being a step ahead of developed countries, which would be easier done from scratch.

**INNOVATION FORMULA FOR INNOVATION-BASED RUSSIA:**  
intellectual outsourcing for international corporations + development of innovations in the resource-based sector + drive to enter foreign markets + relocation of industrial cycles to developing countries (e.g., China).

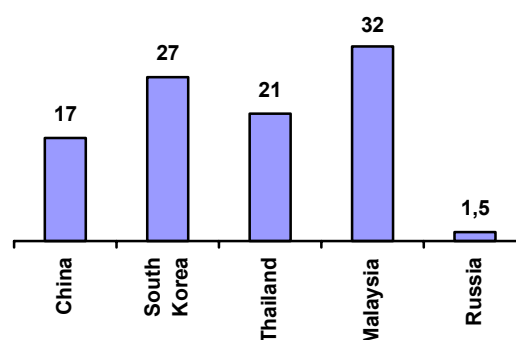
***The state must organise a company for analyzing the global experience in stimulation of innovations.***

## Finland

**The experience of Finland may be the most useful as regards the development of the innovation sector of the economy**

The experience of Finland may be the most useful as regards the development of the innovation sector of the economy. E.g., Finland succeeded in turning, within a rather short period, the resource-based sector of timber into one of the most advanced and innovation-intensive sectors, confirming the possibility of an innovation-based transformation of the economy on the basis of primary industry.

**Share of Components in Exports (%)**



On the other hand, Finland managed to successfully move ahead in innovation-based development of the telecommunications sector owing to successful stimulation by the state of small venture businesses and the creation of interest on the part of major corporations (NOKIA).

## Israel

**The innovation-related experience of Israel is an experience of rapid formation of an innovation sector integrated into the global economy**

The innovation-related experience of Israel is an experience of rapid formation of an innovation sector integrated into the global economy and relying on the creation of own innovation technologies. Israel succeeded in integrating into the innovation-based economy of the USA where strong support from the state exists. I.e., high external demand for innovations determined the structure and encouraged development of the national innovation sector.

## India

**In India, there is strong state planning and orientation to the domestic market**

In India, there is strong state planning and orientation to the domestic market. The cultural specifics of India, manifested in the segregation of the society into castes, permitted a stable post-industrial economy to be built. Another competitive advantage of India consisted in wide knowledge of English among the population, which encouraged the relocation of call centres of many global corporations into the country. Unfortunately, Russia has no such advantage.

## Kazakhstan

**Kazakhstan in the most successful country in the post-Soviet space as concerns development of innovations**

Kazakhstan in the most successful country in the post-Soviet space as regards development of innovations that takes place owing to the purposeful program of the state to the year 2015. So far, no medium-term strategy of innovations development can be observed in Russia.

## USA

**Extremely useful is the experience of the USA in the creation of the National Program of Innovation Business Support**

According to the existing estimates, the growth of the economy of the USA by 50% is attributable to innovations whereas in Russia this figure is as low as 15%. The main reason for such alignment of forces is the high concentration of intellect in the USA,

**The USA aggressively supports domestic manufacturers in foreign markets, which stimulates growing demand for innovations**

something no country in the world can compete with. The reason lies in the special conditions of innovation activities in the USA.

Extremely useful is the experience of the USA as regards stimulation of innovation-based development using the National Program of Innovation Business Support. The program provides for contests of innovation projects that, according to the existing statistics, are won by 1 project out of 13. The winner receives a grant of \$100,000. Based on the results of analysis of how the grant was used the company can expect to receive another grant of \$500,000; thereafter, if successful, the company can obtain a multimillion credit to launch the product. In this context, there should not be too much concern about corruption expenses, because they are justified by the results of economic growth.

The USA aggressively supports domestic manufacturers in foreign markets, which stimulates growing demand for innovations.

### **Japan**

The example of Japan shows clearly that absence of minerals is a real incentive to development of the manufacturing industry rather than vice versa.

In Japan (like in South Korea), there are large corporations that determine benchmarks for development of an innovation-based economy, whose role in Russia can be played by Gazprom.

**The experience of Japan is instructive also in that the national culture of consumption generates high demand for innovations exactly in the consumer sector**

The experience of Japan is instructive also in that it is in the consumer sector that the national culture of consumption generates high demand for innovations. For example, it is customary in Japan to replace household appliance every two years, which stimulates emergence of new innovation goods in this sector. For a product to be sold, consumers must be convinced that the product in question is really innovative. In addition, introduction of demand for innovative products must take place at the level of the population's lifestyle.

### **Southeast Asia**

Demand for innovations in Southeast Asia countries was created by developing ties with transnational corporations. In Malaysia, such integration process permitted a leap into the postindustrial society, bypassing the industrialisation stage.

**In Russia, unlike Southeast Asia countries, assembly production capacities of global manufacturers do not take root**

In Russia, this scenario is hampered by the absence of development of national innovations. E.g., the standard cycle of foreign assembly production capacities in Russia lasts two years. After that, failing development of the product line abroad, new technologies emerge while demand for outdated products falls and production is phased down. A way out can be found through support of small business and state support for component producers.

**The path of innovation-based development of Southeast Asia countries is not relevant for Russia**

At the same time, the existing trends in distribution in the global labour market permit the conclusion that the path of Southeast Asia countries is not relevant for Russia; labour in Russia is too expensive.

### **Australia**

The experience of Australia is useful as regards support of individual resource-based branches of the economy against the background of proportions of the economy, science, as well as some cultural aspects, that are similar to those in Russia.

## **THE STATE'S POLICY OF INNOVATIONS SUPPORT**

### **Current goals of stimulation of innovations by the state**

✓ ***Education (economic, legal) for a wide range of specialists involved in innovation-related activities. These are***

*scientists, businessmen, state officials, etc. This includes not only higher education but also advanced training, courses, seminars.*

- ✓ *Support of professional associations and unions as an environment for exchange of experience and information.*
- ✓ *Enhancement of the technical and environmental inspection system. Currently, this system does not promote innovations and use of resource-saving technologies, being just a cause of unproductive costs for business.*
- ✓ *Facilitation of creation of a consultants environment. One trend in this area is to develop a system of open contests for consulting services to state-owned companies. At present, a consulting project financed from the budget makes independent consultants only smile knowingly. This situation in no way helps improve the professionalism of market participants.*
- ✓ *Tax stimulation of introduction of energy-saving and environmental technologies.*
- ✓ *A considered policy in respect of duties on imported hi-tech equipment. Currently, the state is taking steps in this area to reduce duties.*
- ✓ *Commercialisation of intellectual property.*
- ✓ *Clearer separation of roles of the state as the creator of infrastructure and business as the main locomotive of innovations.*
- ✓ *The state can help domestic innovation companies access international capital markets for IPOs.*

#### **Stabilisation Fund**

The huge funds of the state received as rent on natural resources must be spent on renewal of the economy and industry, which will stimulate demand for innovations.

E.g., existence of a large stabilisation fund creates a point of bifurcation for the Russian economy that may transform into an innovation-based one.

It is advisable to spend funds from the stabilisation fund on development of an innovation-based economy rather than invest them in low-yield securities of foreign states as happens now, especially bearing in mind that the external debt of quasi-state-owned borrowers (Gazprom, etc.) has exceeded the volume of the stabilisation fund.

#### **Duties and Lobbying**

A paramount objective of the state is lobbying of interests of the national innovation sector in the global market. Lobbying of interests of the domestic producer is the primary function of the state. At the same time, in reality we often can observe the anti-globalist tendencies of our state. E.g., in the context of the national project, 'Health', state funds were used to buy obsolete foreign equipment while similar equipment could have been produced domestically; while imported medicines and Russian-made generics hold a high share in the pharmaceuticals market.

The state has now abolished all duties on imports of equipment if there is no similar equipment in Russia but there is the problem that in the absence of customs duties the technologies imported are less than the newest, calling for introduction of new duties. This state of affairs does not encourage the development of state-of-the-art domestic technologies; Russia must look after

**A large stabilisation fund creates a point of bifurcation for the Russian economy**

**Lobbying of interests of the domestic producer is the primary function of the state**

**Russia must look after technological sovereignty or else developed inventions will inevitably leak abroad, without a tangible effect for Russia's economy**





**Development of innovations must be stimulated by a national innovation system**

technological sovereignty or else developed inventions will inevitably leak abroad, without a tangible effect for Russia's economy.

**National Innovation System**

The state must create incentives for the development of innovations. Development of innovations must be stimulated by a national innovation system that, unfortunately, does not exist yet. An innovation infrastructure must be formed in the context of the national innovation system:

- organisations that facilitate the establishment and development of innovation companies (business incubators, technoparks, coaching centres, special zones, etc.);
- consulting organisations (market reviews, preparation of business plans, strategies of development, patent research, competitive advantage studies, audit, legal matters, etc.);
- technology transfer centres;
- hi-tech stock exchanges.

The state must stimulate (also by taxes) those targets of the innovation system that do not need or do not imply commercial investments, e.g., patenting.

**Foresight and Strategic Planning**

It is extremely important and helpful that the state has highlighted the subject of innovations. Currently, the state displays high interest in and has formulated a definite position on the objective necessity of development of the innovation sector, which must be corroborated by relevant support.

The state must perform primarily the strategic function of planning and stimulation of innovations. The market cannot engage in long-term planning of economic development; its objective is to gain instant profit. Therefore, the 'market's hand' cannot all by itself remedy the situation of Russia's economy and intervention by the state is inevitable.

**The state must perform primarily the strategic function of planning and stimulation of innovations**

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- It is possible that agriculture may become the epicenter of development of innovations in Russia because without innovations this sector is doomed to die.

An interesting incentive for development of the entire innovation complex may be provided by development of the transportation infrastructure. For example, the development of transit services for Russia agrees with its territorial opportunities and also inevitably ties in with many innovation sectors, e.g., space, because without satellite monitoring and coordination of transportation it is impossible to assure efficient functioning of transportation arteries.

As regards oil production, this is already now the most innovative sector of the economy.

Extremely relevant for Russia is the experience of the innovation-based development of Canada and Australia owing to similarity of the territory, industry and science. Instructive is their experience of support of medium-size business as regards awareness-raising on promising innovation trends.

The experience of the USA is not readily applicable to Russia because innovations in the USA are in many respects somehow or other related to the MIC, and the military budget of the USA is incomparable with Russia's military budget.



**For implementation of the innovation-based scenario of economic development, foresight is needed**

For implementation of the innovation-based scenario of economic development, foresight - long-term planning of economic development - is needed to allow the understanding of what will happen in the future and proactive development of promising technologies in order to avoid wrong steps in the new turn of development of the global economy.

**There must be a minister of innovation-based development in the government**

So far, Russia has no scientific and technological programs and no centre of decision-making on innovations at the state level, no clear understanding as to what trends in the innovation sector must be developed. For example, there is no clear understanding as to why emphasis was placed on nanotechnologies. Moreover, nanotechnologies are a very broad notion, incorporating many absolutely unrelated technologies. There must be a minister of innovation-based development in the government who would coordinate the totality of matters relating to innovation-based development, abolishing thereby the current competition between ministries.

**The main criterion of expediency of innovation projects must be their profitability**

The innovation development mechanism implies that the state determines development priorities and private business supplies demand for innovations.

The state must determine priority development trends in the innovation-based economy and support them. The main criterion of expediency of innovation projects must be their profitability, which will ultimately make this sector attractive for investors in the context of the extractive industries and solve the problem of asymmetry in redistribution of investments between the innovation sector and 'classical' branches of the economy. In determining state priorities in development trends of the economy (innovation-based economy), there is need to clearly understand what place in the global labour distribution system Russia lays claim to.

#### **State Subsidies, Support and Regulation**

**Financing of global investments is the exclusive task of the state**

Current innovations in activities of Russian enterprises must be financed by business; at the same time, financing of global innovations is the exclusive task of the state. Further, it must be

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- There two polar opinions as regards the determination of priorities in the development of innovations with reference to nanotechnologies. First, nanotechnologies are the basic technology of the future, which means that investments in their development entail low risks. Second, nanotechnologies are, in the words of the physicists, a rather controversial trend. It is logical to heed to the opinion of subject specialists.

It would be best, therefore, if state investments were not channeled into a small number of priority technologies (which is highly risky) but were broadly spread to all innovative technologies; thereafter, conclusions concerning the efficiency of results would be made and amounts of state subsidies could be adjusted to the benefit of a smaller number of investment areas.

The innovation-based scenario of economic development for Russia is premature; the investment scenario must be implemented first.

The effectiveness of the implementation of the innovation-based scenario of economic development may become apparent only after 2020 and, at the same time, a positive result is not guaranteed, which means that the innovation-based scenario is dangerous both to the state and to the economy.

As a negative experience of the introduction of innovations, the example of Japan and Korea in aircraft construction or that of the USA in manufacturing of LCD monitors can be cited.

presumed that the inevitable problems of corruption are not a significant obstacle because ultimately money reaches promising projects whose successful implementation justifies corruption expenses.

At the same time, the state support of the innovation sector must not be limited solely to subsidies and investments. E.g., the state can hold competitions of the business plans of innovation companies, with winners to receive support as regards the elimination of administrative barriers.

**Non-monetary instruments of innovations stimulation may turn out to be the most efficient**

Moreover, it is non-monetary instruments of innovations stimulation that may turn out to be the most efficient. For example, technoparks that are created must develop on a commercial basis, i.e., what is needed are primarily tax privileges rather than direct subsidies that stimulate corruption. The state must develop the private-state partnership, which will permit the sharing of existing risks in projects with business and the attraction of additional investments.

The state can exercise technological regulation of the activities of private companies by adopting appropriate laws. For example, in Japan the state obliged companies to spend 5% of earnings on R&D, which stimulated development of innovation-oriented research in the private sector. Moreover, the state can determine the necessary trends in innovations development for business, e.g., by obliging oil companies to spend certain funds on bioethanol research.

**The state must provide tax privileges to those who implement the breakthrough strategy**

For successful innovation-based growth, a state strategy encompassing the totality of objectives, mechanisms for the implementation of plans and financing is needed. At the same time, a system of market incentives, including differentiated taxation, is required. It is necessary because enterprises are in unequal conditions: innovation enterprises are less stable and face more risks. The state must provide privileges to those who implement the breakthrough strategy.

**Extremely important is a competent antimonopoly policy to assure normal conditions for competition**

There is need for market regulation mechanisms to reveal the innovation potential of companies, for example, the grains market where the stability of companies is excessively dependent on the level of prices. Extremely important is a competent antimonopoly policy to assure normal conditions for competition without which an innovation-based economy cannot develop.

### **Investments**

**As regards stimulation of the influx of private investments in the innovation sector, creation of the necessary regulatory framework is still a topical issue**

As regards stimulation of the influx of private investments in the innovation sector, creation of the necessary regulatory framework is still a topical issue. E.g., the regulatory framework for venture funds is not optimal (closed unit investment funds), which does not allow avoidance of the problem of double taxation for investors. A venture fund in the form of a closed unit investment fund is suitable only to the state while to a private investor the most suitable form at present is an ordinary partnership, though there are disadvantages because of poor legislative backing.

**The state can also refinance banks against bonds of innovation companies**

An important problem in the development of innovations consists in that private venture funds begin to finance projects only at the stage of introduction rather than at the stage of idea development (this stage must taken care of by business angels).

It is necessary to create several reputable large state innovation centres that would act as guarantors of small venture projects, which can also take the shape of financial liability.

The state can also refinance banks against bonds of innovation companies.



## SOCIOCULTURAL AND GEOPOLITICAL ASPECTS OF INNOVATION-BASED DEVELOPMENT OF RUSSIA

**Russia aspires to be a centre of power in the world, which is explained by the necessity of preserving the territorial integrity. At that, positions of leadership can be retained only by developing an innovation-based economy**

**An efficient innovation-based economy is possible only in an environment of freedom that implies freedom of creativity, enterprise and competition**

### **Assurance of Territorial Integrity of Russia is a Challenge for Development of an Innovation-Based Economy**

Russia aspires to be a centre of power in the world, which is explained by the necessity of preserving territorial integrity. Further, positions of leadership can be retained only by developing an innovation-based economy. E.g., according to the estimates by the Center for Macroeconomic Analysis and Forecasting, the existing political and geopolitical factors require that Russia has as a minimum 5% growth in GDP, otherwise the threat of territorial losses will grow.

To develop demand for innovations, strong external incentives are needed and such incentives are global threats to future integrity of Russia.

### **Liberal Values and Freedoms are the Prerequisite for Development of Innovations**

An efficient innovation-based economy is possible only in an environment of freedom that implies freedom of creativity, enterprise and competition. The Bortnikov Fund already functions on the model of the US national program for support of innovations but the results cannot be compared; it is not only the scale of subsidies which explains this. E.g., the absence of sufficient individual freedom has a negative effect on human innovation activities, which is well described in Solzhenitsyn's novel, *The First Circle*, where inmates of

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- One common problem all countries face is that higher education graduates study to play a part in the development of technologies that have already come into being; and this is in their interests, as it enables them to obtain an income for the foreseeable future, whereas engaging in innovative business is risky and offers far fewer prospects when compared with existing alternatives. BUT in other countries, for those who are willing to take risks from a young age and who are genuinely looking for something new, there is an infrastructure (taking this as an umbrella name for business parks, venture capitalists and so on) which is just as interested as the student in growing and fostering new technologies.

The quality of education in Russia is really quite high. It does, however, have aspects that tend to hold back innovative development. In the USA, for example, university professors have an obligation to engage not only in theoretical investigative work (which has to be borne out in terms of publications in the specialised literature, and more importantly still, a subsequent number of references to these publications made by colleagues in the same field), but also in applied subject matter, through the acquisition of research grants on a competitive basis and through interaction with the business world. In Russia, science is too much divorced from applications.

One successful example of an innovative Russian company is Kasperskii's Laboratory (antiviruses).

The problem with active state involvement in innovative projects is that it may reduce their efficiency. Meanwhile the current active stance being taken by the state in supporting the innovations sphere of development in the economy is giving entrepreneurs food not just for thought, but also for action, provided the state's deeds keep abreast of its words.

The state's number one motto should be: "We're trying to do better!"

a prison camp for scientists can think about nothing else but freedom.

Cultural problems of the society can significantly influence innovation activities. E.g., the crisis of the Japanese economy in 1990 was in many respects caused by the fact that a society based on feudal principles of organisation was unable to adequately respond to the challenge of information technologies (PC, Internet).

A similar crisis may affect the economy of China that after the stage of adoption of foreign technologies will face the necessity of creating its own innovations, which is problematic in the context of limitation of freedom.

**Russia already faces the barrier of the postindustrial society, which requires a new cultural paradigm based on the principle of freedom**

Russia also has its own cultural barriers and problems. India, China, Brazil are still formally at the industrial stage, which implies the possibility of development in the framework of the old cultural paradigm. At the same time, Russia already faces the barrier of the postindustrial society, which requires a new cultural paradigm based on the principle of freedom. However, the internal self-consciousness of citizens is in many respects determined by the totalitarian past. It turns out that the success of the innovation project in many respects depends on what is happening in the head of each individual citizen. There is need for consolidation of principles of responsibility, tolerance, solidarity and freedom. Censorship, including internal censorship, fetters innovative thinking.

**There is need for consolidation of principles of responsibility, tolerance, solidarity and freedom**

### **The Role of Cultural Values and Stereotypes in Development of Innovation Processes is High**

The resource-based sector of Russia's economy employs a comparatively low share of the population (15-20 million) that creates the basis of public welfare, which deprives the lives of other citizens of meaning. Such state of affairs is fraught with special cultural and sociological problems but also stimulates development of other branches of the economy, primary innovation-based ones.

**In Russia, there is need for development of the culture of trust that structures the economy and creates conditions for rapid innovation-based growth**

In Russia, there is need for the development of the culture of trust that structures the economy and creates conditions for rapid innovation-based growth. But for that a history of venture is required. E.g., there is need for a tolerant attitude to risk when unsuccessful projects indicate the experience of managers rather than put an end to their career. There is also need to develop the culture of personal competition, which will stimulate people to achieve success through creativeness and innovations.

**Activities in the field of innovations are accessible to all but, for this, cultural and economic barriers must be eliminated**

Human beings by their essence are disposed to intellectual activities, which must drive them to engage in innovations. Further, these must not necessarily be science-intensive branches of the economy, these can be also fairly simple spheres, such as styling design or handicrafts. In that way, activities in the field of innovations are accessible to all but, for this, cultural and economic barriers must be eliminated.

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