The Russian experience of stimulation of innovation activity of big companies

A brief results of case study of Russian state-owned companies

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Abstract—**The authors had inference that it would be possible to enforce for innovation in low-competitive environment national companies operate. That's why this paper based on the analysis of 20 state-owned companies of Russia. The data were collected from Innovation Development Programs (IDP) of Russian state-owned companies and by using content analysis and quantification as well as case study and the method of analogies and comparisons the authors prooved this statement. Thus, the state can effectively enforce companies to innovate.**

Keywords—**innovation activity, stimulation, enforcing, Russian experience, state regulation, big companies, state-owned company**

I Introduction

Nowadays, one of the main mechanisms for the Russian government to stimulate innovation activity is the participation of companies in the federal, regional and municipal programs, but this is not enough for the successful development of the economy in whole and for companies in particular.

In Russia due to historical, political, economic and institutional environment, big business is represented mainly state-owned companies, which provide up to 20% of GDP. Over the years the state companies showed a relatively low innovation activity as a whole, judging by these results as the quality of products and services, the share of the world market, patenting. Low motivation to initiate risk projects is a result of the industry and the lack of a competitive environment (natural monopolies), the availability of guaranteed income due to the stable state order.

So, in 2009 the Russian government introduced the Innovation Development Programs (hereinafter – IDP) for 60 large state-owned companies to stimulate innovation activity. This investigation, started by request of the Ministry of economic development of the Russian Federation[1], helps to answer the question wether it is possible to "force" for innovation in low-competitive environment by the example of large state-owned companies.

II Literature Review

A. Definition and classification of innovation and the theory of innovation activity

General aspects of the development of the theory of innovation formed by prominent representatives of foreign and domestic science schools [1],[2],[3],[4],[5],[6],[7],[8]. Classification of innovation concepts is supplemented of epochal innovations (by Nobel Prize-winning economist Simon Kuznets) and the definition of anti-innovation that is innovation which is not directed forward but back into the past [9].

General issues of government regulation and control were described by various management foreign school e.g. Ansoff I. (1989), Meskon M. (1984), Porter M. (1979), Mintzberg H. (1973), McGregor D. (1960), Mayo G.E. (1927), Taylor F.W. (1890), Fayolle H. (1870) and others (range of problems associated with the management of organizations, management functions) [10], [11], [12], [13], [14], [15]. Common questions of management, governance and management are investigated representatives of Russian management schools such as Gvishiani D.A. (1930), Kozlova O.V. (1950), Gerchikova I. N. (1977), Lvov D.S. (1990), Utkin E.A. (2001), Kushlin V.I. (2004), Raizberg B.A. (2013) and others (the organization of management, government regulation, organization theory) [16], [17], [18] and [19].

Analysis of the studies of the above-mentioned authors showed that along with a fairly deep elaboration of questions there are debatable and in some cases contradictory approaches to the definition and interpretation of the essence of innovation, innovation activity and state regulation in this sphere.

So, under the stimulation of innovation activity we mean the set of forms and methods of motivation of businesses to innovate to improve the competitiveness of products (services). For completeness, the new definition is necessary to consider the criteria for classification of forms and methods of stimulating innovation.

Analysis of international experience ([20] and [21]) to support innovations showed that the majority of countries that have aim to stimulate innovation activity in the country use a strategy that includes the following main points:

- Promotion of fair competition (to create the conditions in which innovation becomes a necessary

part of the development strategy of the company. In such circumstances, firms to survive in the market must move to innovation development).

- The development of information infrastructure, international relations as well as the human capital of the country as one of the main factors, not only the creation, but also the diffusion of innovation.

- Improvement of the investment climate in the country as well as a comprehensive financial support of the state, including the financing of various targeted programs of grants and subsidies.

Although the main objectives of the strategy in many countries are the same, the methods of implementation of these points each state has its own.

For many years the programs of state support of innovation were applied by many countries. As result countries based on this strategy have achieved quite successful outcomes. But achieved goals of the programs are not always consistent with the objectives of the country's economy and investments, which is a reflection of the fact that the policy of the state missed a lot of its capabilities [22].

B. The Innovation Strategy 2020 of Russian Federation

According to "Forecast of scientific and technology development of the Russian Federation in the long term" [23] there is currently no reason to talk about large-scale technology breakthroughs in the industry or intensive development of research and development. Predilection to business innovation, particularly technology, remains low. In 2007 the development and introduction of technology innovations carried out in 2485 the enterprises of the domestic industry (9.4% of the total). This is below the values typical for Germany (73%), Ireland (61%), Czech Republic (41%). The first in the ranking of the top 100 companies in the world in absolute value investments in R&D in 2013 spent for these purposes by €850 million to €7.5 billion, including the largest number of these companies are engaged in the pharmaceutical and automotive industries where the lead is still the USA (see figure 1).
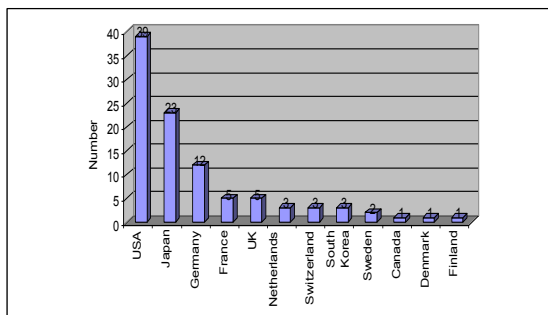

Figure 1. Number of world companies-engines of innovation development

Innovation activity of enterprises is significantly constrained by institutional environment. It is typical of almost all economic activity (industrial production (including small businesses) and the service sector) and all forms of innovation (technological,

organizational and marketing). Innovation activity is inherent to most large economically prosperous enterprises with sufficient financial, human and intellectual resources. Obvious success is demonstrated in high-tech industries. Their innovation activity exceeded 30%, which is close to the European average. In this case, it's important not only more developed scientific capacity, availability of qualified personnel, high intensity of innovation costs and focus on foreign markets, but also some support from the state in its various forms. However, due to the limited volume of production of these sectors have had limited impact on the innovative "quality" of the Russian economy as a whole.

In recent years, the priorities of innovation activity of domestic enterprises has steadily shifted from the intellectual (scientific research) to the practical, innovation stage of the innovation cycle [23].

The authors of the study concluded that a breakthrough will have to engage in those companies that provide the major part of the GDP which is state-owned.

III Empirical Analysis

A. Methodology and Approach

For the data analysis this study used content analysis and quantification as well as case study and the method of analogies and comparisons [17], [19].

For this study the data were collected from 60 Russian state-owned companies located in different strategically important economy's sectors: the defense industry, aerospace, aviation, shipbuilding, transport and energy infrastructure, oil and gas extraction.

In order to create incentives to boost innovation of the state-owned companies, use their potential as a source of demand for knowledge and technology to other actors of the Russian innovation system, the state has decided that state-owned companies would elaborate IDP. This initiative in Russia was gotten an informal definition of "enforcement to innovate".

Before proceeding to the immediate response and the discussion of the effectiveness of the mechanism of the IDP in the form in which it was implemented in practice, it is proposed to determine what should be the general logic and rationale for the initiative "enforcement to innovate". In other words, it is necessary to identify the types of innovation actions which the State should demand from these companies, and to prove their legitimacy and necessity.

For it is proposed to introduce a "coordinate system" in which it is possible to describe the different goals, motives and interests of the two main actors of IDP: management of companies and their owner on behalf of the state.

Namely, it is possible to divide the motives and activities as follows:

- by the criterion of term to benefit from resources - into short-term (associated with the operation of existing resources) and long term (involving investment in the future renovation and expansion of the resource base and markets);

- by the criterion of the primary beneficiary - into private (beneficiary - the company) and public (beneficiary - society or external to the company's stakeholders, such as universities, small and medium business).

Using this terminology, we can say that the management of the companies (not only public but also private) are usually aimed at meeting the short-term private interests that are obviously accompanied by maximum exploitation of the existing resources entrusted to him, such as human and capital (equipment) or other (e.g. administrative) resources. On the contrary the shareholders of companies are more focused on long-term goals that require investment in the development of these resources. Actually, because of this opposition of the management and the owner-government interests the IDP should have become a tool for the reorientation of state-owned companies from short-term to long-term goals to satisfy owner-government needs.

IDP should incorporate resource development companies in all directions, namely, human - through increased investment in training and retraining of personnel, capital - through large-scale modernization and renewal of fixed assets, as well as "smart" i.e. formalized stock (including patents, know-how) and unstructured knowledge - through investments in R&D.

The second point is related to the reorientation in terms of beneficiary: namely, since the state is the owner of the company, it has the right to include in the IDP requirements to a greater extent correlated with the interests of society and of the external environment rather than with the private interests of companies. Such are the demands of the development of external innovation environment (higher education institutions, research organizations, small and medium-sized businesses).

Thus, the overall focus of the survey, it is obvious, should be placed on those areas of the companies for which they do not have sufficient intrinsic motivation, i.e. actions that benefit the long-term and/or having as beneficiaries are external to the subjects. This assertion refers to the overall framework and logic design requirements for state-owned companies.

B. Assessment of the effectiveness of initiative of Innovation Programs

The methodology of elaboration of IDP defined the concept of "passive innovation", comprising one or more of the following indicators:

1. The development of technologies as they become commercially available, the creation of new products in the future as a response to similar future products of competitors;

2. Non-essential or formal changes in management;

3. The restriction of commercial and partnerships with affiliated firms, departments and friendly organizations (small and medium business innovation and education, scientific and research institutions);

4. Substantial backlog of planned KPI values on the level of the best world analogues.

To determine the impact of the development of IDP the analysis of the implementation of IDP was conducted on mismatches with above-mentioned indicators.

For each features has been graded on a scale of 0-2, where:

0 - indicates compliance with the company's passive innovation development, i.e. the lack of results of IDP;

1 - indicates partly compliance with the passive innovation strategy of the company, i.e. the presence of only partly results of the IDP;

2 - a mismatch with the company's passive innovation strategy, i.e. the presence of significant positive results of IDP.

Examples of such analysis across multiple companies show below.

C. Case study of companies

Energy company "A"

1. The company is implementing a number of projects that are ahead of the world level in the industry. This is largely determined by tough climate conditions of functioning of the Company's buildings. However, the bulk of the projects correspond to the level of competitors. Evaluation - 1.

2. A number of changes occurred in the company in innovation management (e.g. specialized departments for Innovation, Innovation Committee, the expert network, stage-gate system for project management). Evaluation - 2.

3. The number of new partners has grown significantly in the implementation of IDP. Evaluation - 2.

4. The company lags behind a number of performance indicators, such as labor productivity (specific number of workers per unit of fixed assets). However, this is due to the traits of state regulation and safety requirements. Evaluation - 1.

Average for the company - 1.5.

Diversified engineering company "B"

1. The company has a significant specificity, since performs a large number of R&D within the framework of public procurement. Some of them have a promising nature and level exceeding analogues. The company plans to increase the share of R&D to revenue ration up to 8 times by 2020. However, more than 50% of technologies are outdated because the company do not have the resources to close the gap on them. Evaluation - 1.

2. A number of changes occurred including the establishment of specialized units for Innovation, the system works with intellectual property, cross-sectoral innovation center working with advanced technologies and cross-sectoral technology for the benefit of several business units. Evaluation - 2.

3. The Company is actively using the "open innovation" tools, attracting new partners. Evaluation - 2.

4. There is a substantial gap from the international engineering companies' degree of efficiency, productivity. Despite the plans to increase productivity for more than 2 times the performance level of analogues will not be achieved. Evaluation - 1.

Average for the company - 1.5.

Automotive industry "C"

1. In view of the long period of low investment in R&D company significantly lagged behind the best world analogues and is competitive only in the low-cost market segment. The company in recent years actively has been implementing the transfer of foreign technology, the purchase of know-how. In addition, it is implementing a number of its own initiative projects, including the hybrid cars. Evaluation - 1.

2. No significant changes have occurred, the management system of product and technology development is preserved. Evaluation - 0.

3. The number of new partners increased insignificantly: the company is working with established partners from the local production cluster. Evaluation - 1.

4. At the time of development of IDP it was significant lagged by KPI. But IDP shows that reduction of the gap is able to achieve. Evaluation - 2.

Average for the company - 1.

IV Findings and Conclusion

On average the 20 companies analyzed score was 1.2. This means that innovation is more likely of active character and IPD provides a deviation from the previous track of company's development strategy, i.e. IDP may be an effective instrument of state innovation policy.

Moreover, analysis of the industry average cost of R&D and distribution of companies within industries led the authors to the following conclusions. Owing to the IDP managed to significantly increase investments in R&D. As a result, they approached the level of the world's leading peers and/or competitors by the indicator as R&D/revenue ratio (see table I).

TABLE I.   R&D INTENSITY IN RUSSIAN COMPANIES BEFORE AND DURING IDP COMPARED TO WORLD LEADING COMPANIES

Sector, company name (example)	Total R&D/revenue ratio, %		R&D/revenue ratio, % (excluding R&D financed from federal budget)		R&D/revenue ratio, % for companies-analogues and competitors
	2010	*2013*	*2010*	*2013*	*2012*
1.Engineering-and-electrical goods	7.7	12.1	1.8	3.7	
ROSTEC CORPORATION	2.8	10.3	1.3	4.0	UNITED TECHNOLOGIES (4.1), SIEMENS (5.8)
2. Space systems	51.4	51.6	7.6	11.6	
NPO ENERGOMASH	28.7	28.9	5.1	12.7	SAFRAN (8.1)
3. Aircraft manufacturing	11.7	11.1	3.2	1.6	EADS (6.4), BOEING (3.6)
4. Shipbuilding	3.7	9.9	1.5	2.7	
UNITED SHIPBUILDING COMPANY	0.5	6.3	0.2	1.7	HYUNDAI HEAVY INDUSTRIES (0.4), CHINA SHIPBUILDING (1.2)
5. Automobile manufacturing	0.8	1.7	0.8	1.6	
AVTOVAZ	0.7	2.2	0.7	2.2	TOYOTA MOTOR (3.7), FORD MOTOR (4.1)
6. Oil and gas extraction and mining	0.2	0.3	0.2	0.3	
ROSNEFT	0.2	0.4	0.2	0.4	ROYAL DUTCH SHELL (0.3), TOTAL (0.4)
ALROSA	0.03	0.39	0.03	0.39	RIO TINTO (0.3), BHP BILLITON (0.1)
7. Power generation and electrical grid	1.3	1.7	0.6	0.8	
FEDERAL GRID COMPANY	0.9	1.1	0.9	1.1	ENEL (0.2), FINGRID (0.4), TERNA (1)
8. Transport infrastructure	0.3	0.7	0.3	0.7	
RUSSIAN RAILWAYS	0.4	0.5	0.4	0.5	CHINA RAILWAY (1.4)
9. Telecommunication	0.1	1.2	0.1	1.2	
ROSTELECOM	0.1	1.3	0.1	1.3	FRANCE TELECOM (1.9), AT&T (1)

Source: IDPs of Russian state-owned companies and own.

Typically, a large spread is due to the following factors:

1. This is a whole new industry, where all companies are innovative and spending on R&D and sometimes even more than the time to earn. They are small, and implement product development, and which are entering the market. A typical example is a branch of biotechnology, to a lesser extent - the development of software. This may include a small group of new companies in the automotive industry are engaged in the development of pilot cars.

2. Within each sector there is a general background of the companies spending on R&D as much as needed to maintain competitiveness. Generally, it is quite large companies, have long operating in the market, with a large volume of revenue. Share, which they spend on R&D depends on the tech industry as a whole. E.g. mining companies spend on R&D on average no more than 0.5% of revenue, and in the chemical industry is about 3%.

3. In every traditional industry there is a group of companies who spend much more than the average. This is due, as a rule, the implementation of some special large-scale developments within the definition of an innovative idea. Although technically these companies are located inside the traditional industry, they often engaged in the newest area of development (e.g. the German chemical company Nanogate spends on R&D almost 50% of revenue. As the name implies, in the traditional chemical industry is engaged in nanotechnology).

In general, the spread even within the same industry says that there is no single approach to determine the effective volume of R&D funding.

Surveys of top managers of domestic manufacturing enterprises on the evaluation of the technology level of production showed that only 10% of the companies comply with the best foreign analogues, another 20% has the average level of foreign competitors, another 20-25% - the best domestic samples, 45% of businesses technology level requires substantial modernization. According to the Russian legislation under innovation means all investment activities, including banal renewal of fixed assets, it is interesting to make a comparison as in investments in general and separately for R&D.

The majority of the companies, with the exception of the actual scientific and production, investment in R&D is less than 10% of the investment programs.

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