

Principles of Corporate Sustainability in Russian S&T

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Abstract

The share of hi-tech corporations in Russian S&T is not large. The substantial reason for the fact is that the Russian R&D model created under the administrative economy is very inert. The development of hi-tech corporations with modern management models inside has to be an important part of the elaboration of a multipurpose approach to the R&D model restructuring. Main principles of the approach should be related to the aim of achieving a balance condition in the three-polar scheme "corporations – mechanisms – policies".

Possible solutions of the problem should be specified in respect to peculiarities of an internal corporation structure. From this point of view, it could be distinguished at least two types of corporations: (1) an R&D subdivision is part of an industrial (or financial and industrial) com-

pany and (2) an R&D entity is a substantive institution (for instance, federal S&T centers).

For both forms corporative sustainability closely correlates to evolution of a multipurpose organizational model. The model is considered to be a system of internal entrepreneurial networks, combining financial, industrial, and S&T links. R&D is supposed to be the core element of this model. Also, availability of a corporative adaptation strategy, which allows optimizing the decision-making process in accordance with changing economic conditions, is one of the most substantial characteristics of the model.

Ensuring corporative sustainability in Russian S&T is one of the most important issues of the federal government activity. The first reason for it is that the government is conducting a wide-scale restructuring of both industry and S&T with the tendency towards establishment and reinforcement of vertically integrated companies. The second reason is connected to the necessity of new approaches to reforming of the existing administrative S&T organizational model.

Institutional S&T model in the administrative economy.

A negative character of the model displayed in organizational barriers existed between research institutions and industrial enterprises. Less than 10 per cent of all S&T organizations were integrated into industrial companies. The rest ones were substantive institutions affiliated to the branch ministries. Most of them were centers responsible for technological change in relative branches of the former Soviet economy. Yet their isolation from industry had made the commercialization of R&D results almost impossible.

Moreover, the S&T institutions' management could hardly be effective because of its rigid hierarchical principles and over-centralization.

Evolution of S&T organizational structures.

In the first place, R&D market modernization process had impact on integrated S&T formations like so-called scientific-industrial integrated companies (SIIC). Their appearance in the 1970s was due to the necessity to overcome the barriers between S&T and industry within the administrative economic system. In a case of SIIC, a research institution (or design office [bureau]) was given a leading status. The status meant that the institution was responsible for both R&D performing and serial production (on the R&D ground).

An evident virtue of SIICs' activity was taken into account during market reforms, when the government initiated an elaboration of an optimal regulation model adapted to huge S&T organizational structures. The market modernization of S&T sector was based on an approbation of different management mechanisms so that the complicated S&T organizations would be adapted to new market conditions with the minimum of losses.

The most important point of the managerial reform was the abolition of state ownership monopoly.

The other institutional changes, in which SIICs were involved, closely correlated to property alterations. The changes were going on in the following sequence (Gokhberg et al. 2000):

- transition from the traditional huge organizations towards developing organizational networks consisting of substantive enterprises of various institutional forms (joint-stock companies, private firms, cooperatives, etc.);
- emergency of mobile scientific-industrial corporations and affiliated industrial corporations whose mobility depends on R&D production demand;
- disintegration process resulting in formation of substantive disintegrated units;

- introduction of contract system in relations between subdivisions;
- privatization on the base of establishment of joint-stock companies where the government maintains a state control.

These changes caused transformation of the administrative type SIICs into an associative type of S&T corporations.

The positive point of S&T restructuring was that research, design, and technological subdivisions of SIICs obtained new advantages under new institutional conditions. They became legally substantive units. The new legal status gave them advantage: 1) to sign contracts (including R&D contracts) independently; 2) to plan R&D and production activities according to a market situation; 3) to adjust all stages of a research-production cycle right up to the stage of sales.

Besides positive moments of S&T restructuring, there were negative points of introduction of the scheme mentioned above. First, wide-scale establishing of joint-stock companies with the state control diminishes the investing potential of companies.

Second, at the beginning of the privatization, valuation manuals were not available in S&T. The method of expenditure calculation used for companies' privatization had essential losses from the point of view of S&T restructuring aims.

As a result, SIICs restructuring was significantly less effective than expected.

Internal managerial policy of S&T corporations.

To a great extent, corporative sustainability depends on availability of adequate mechanisms that could adapt a corporation behavior to the changing economic conditions without delay.

At present, many hi-tech organizations meet serious problems connected to their production demand constraints. In contrast to a distributive

system of the administrative economy, modern S&T corporations' efficiency strictly depends on their choice of right strategy as well as their ability for producing goods that meet market demand.

In modern Russia, most corporations base their adaptation strategy so that it should be oriented to the innovations market.

The other serious problem, which most corporations have, belongs to production techniques. The problem is conditioned by poor organizational skills of production managers, on the one hand, and underdeveloped diversification, on the other hand.

An inert character of the basic structure of formation of SIIC type corporations is an obstacle in ensuring all chains of the technological cycle "research–production–commercialization". In fact, a SIIC type structure was a symbiosis of two different systems. On the one hand, it was a "research–production" system, and on the other hand, a "production–consumption" system. As the managerial mechanism had to deal with both systems, a problem connected to rational choice of resource utilization strategy was inevitable. The difficulty was that two autonomous resource strategies competed. One was aimed to perform R&D, and the other was aimed at serial production.

Undoubtedly, a conservation of this contradictory managerial mechanism reinforces disharmony between the different sides' interests within a corporation. That is why relative balancing solutions should be elaborated in the three-polar scheme "corporations–mechanisms–policies".

Also, there are difficulties of an external character, diminishing corporation sustainability. They are conditioned by the low capacity of the national S&T market and the relative low S&T demand. In the first place, it is connected with the shortage of investments in most industrial

branches such as, for instance, machinery and equipment, which is traditionally an important consumer of R&D results. Besides, it should be outlined that the federal budget financing considerably diminished in the 1990s. Statistical data on applied R&D organizations shows that the share of the federal budget financing for these organizations declined from 46 per cent in 1997 to 35 per cent in 1999. However, in 2000 this index grew up to 42 per cent due to a number of newly settled federal goal-oriented programs such as "National Technology Basis", "Stimulation of National Production Competitiveness", "R&D Priorities in Science and Technology Development", and others (Goudkova 2002).

Step by step under the new conditions, S&T corporations orient their activity to commercialization of their R&D results. In this direction, measures are as follow (Popov 1994):

- R&D marketing of international and national hi-tech markets;
- R&D performing with due regard for new production and demand trends in order to create competitive serial production techniques;
- sales management of hi-tech products as well as non-profiled production goods (as a result of diversification);
- using certain part of received profit as an investment in the area of perspective R&D performing, including fundamental R&D [basic research];
- approbation of new legislative, managerial and economic mechanisms under the market economy conditions.

The introduction of the new mechanisms is based on financial strategy changing. Frequently, its ground consists of a combination of the budget and credit financing. It could be illustrated by an example of one of the Russian S&T corporations – SIIC "Vector" (Box 1).

Since market reforms began in Russia, the international source of R&D financing significantly

arose. In 1999, share of international financing in gross R&D expenditures was equal to 17 per cent; in 2001, the share was 9 per cent. Most part of international financing (up to 75 per cent) was intended for R&D subdivisions of S&T corporations (CSRS 2000).

S&T corporation commercial success for those who sell their technologies abroad strictly depends on corporative competence. The positive experience available in this field makes it possible to draw up some conclusions about necessary conditions of R&D commercialization (Gokhberg et al. 2000).

Box 1

Before 1991, “Vector” corporation was a typical Soviet SIIC which had its own production subdivision. The only financial source for the organization was the state budget, and its S&T activity was under the strict state control.

At present, SIIC “Vector” has the status of a federal research center (FRC) and includes specialized subdivisions that receive financing from different sources (Sadakhchiev 1997). The SIIC includes:

- subdivisions financed on the mixed basis. One part is the federal budget allocations, whose share is 80 per cent. The other part is private financing received according to signed contracts;
- autonomous subdivision independently shaping contract portfolio;
- auxiliary subdivisions, partially autonomous and partially subsidized from the SIIC’s central office.

Due to the state loans and state investing in technological base development, SIIC “Vector” developed a number of new production capacities. For instance, among them a production subdivision for immunology preparations could be mentioned, which is a unique production on the Russian territory.

As a rule, searching for potential clients, corporation managers have to pay their attention to the following questions:

- Does the offered corporation development (technology, product) obtain a principal novelty?
- Is there a niche on the hi-tech market, which could be filled up by that corporation development (technology, product)?
- Has a potential client demand for investment or reconstruction?
- Has a potential client ecological or other constraints for its production?

If positive answers to these questions are received, then the corporation has a good chance for R&D commercialization. But sometimes, Russian S&T corporations have to give significant abatements to their clients because of some additional risks such as political instability (actual

before 2000), legislative obstacles (due to fast changing in legislation), and some others.

R&D units in industrial corporations.

Russian hi-tech sector development provides for modernization of the state regulatory system on the ground of establishment of modern substantive corporations, where R&D subdivisions play a significant role, such as concerns, inter-branch corporations, and federal S&T centers. The established corporations have included branch S&T organizations of aviation, industrial equipment, machinery, and some other industrial branches. Most corporations achieve their sustainability due to a multistructural principle. On this base, they maintain formerly composed connections between S&T and industrial units of different industrial branches, including defense industrial complex organizations.

At the beginning, a mechanism of activity of such concerns was based on the combination of market orientation of reforms and available state regulatory rules. The state share in joint stock of the corporations was 51 per cent. But often, the corporation signed state contracts, according to which they received state share stocks in trust for three years. So, in fact, corporations became quite autonomous in respect to the state regulation.

Nevertheless, they received a number on incentives from the Russian government. To a certain extent, the incentives ensured a financial stabilization in the corporations. First, there was envisaged a goal-oriented state support right from the federal budget. Second, the government allowed the corporations to invest the state share stock dividends in technical reconstruction of corporative production. Most of the corporations strictly needed such investments as they had uninterrupted technological cycles of production. Third, the corporations received territories (landplots) of their location as corporative property.

R&D units in financial-industrial groups (FIG).

Most actively, a process of FIGs' establishment was taken place in hi-tech branches of the Russian economy such as machinery and equipment, aviation, and electronics.

Branch R&D organizations could be included in FIGs only if they could ensure production competitiveness both national and international markets. Particularly, it concerned R&D organizations of the electronics and aviation branches, where there was provided Russian breakthrough on the world space technology market.

Research organizations included in FIGs could be divided in two groups. The first one consists of R&D organizations that specialize in technology improvement for industrial enterprises with

a short-term and middle-term innovation cycle. The second group includes R&D organizations, which supply R&D results for enterprises with one-and-the-same-type production of a complicated innovation cycle such as aviation, nuclear industry, and radioelectronics.

Available experience shows that this is the most effective way for R&D organizations and industrial enterprises of different branches, connected by the same technological chain, to join vertically integrated FIGs. FIGs of this type achieve their sustainability due to co-operation of adjoining R&D organizations, some of which are oriented to elaboration of new complicated innovation products, and others are specialized in improvement of composite goods production.

FIGs' investment projects represent a serious financial source for applied R&D. But it should be mentioned that the financial part of most Russian FIG's is of a small scale. That is why in most cases investment projects are oriented to an improvement of available technological base of production rather than to introduction of distinctly new technology and products.

Lack of "break-through" projects for FIGs is a negative factor that plays against FIGs' competitiveness. Although "break-through" projects could provide for FIGs a significant long-term increase efficiency, they still remain beyond their priorities.

Federal S&T centers (FSTC).

The Russian government adopted a decree establishing FSTCs in the middle of 1999. The FSTCs' formation was related to determination of the following tasks. First, to develop hi-tech markets with opening new niches of innovation products and technologies. Second, to provide development of a hi-tech sector of the economy with performing outstanding R&D results. The list of prior hi-tech branches was worked out

according to the technological forecast up to 2010.

The FSTC formation model is based on integration of a leading R&D organization, large industrial enterprises, design offices [bureaus], innovation enterprises, and high education institutions. A new integrated structure can apply for the FSTC status if it complies with the following conditions:

- – R&D commercialization experience in cooperation with industrial enterprises, banking sector, and high education institutions; also, experience should include successful projects of innovation products or processes used in serial production;
- – experience in training of research and engineering personnel, and certification of goods and services.

FSTCs can work within any economic and organizational mechanism, which they choose. In most cases, relationships between FSTC partners are based on a contract system. The system covers distribution of resources, financial responsibility, property rights protection, and payments for performed works.

At the same time, FSTCs receive the federal budget support. On the competitive base, FSTCs can win federal financing that is foreseen within:

- federal goal-oriented programs;
- S&T priorities of the federal level.

The federal budget financing gives FSTCs an opportunity to carry out innovation projects as well as to perform R&D within federal goal-oriented programs.

Another type of the government support of FSTCs provides a goal-oriented financing in order to develop experimental and research equipment and high R&D capacity productions. This kind of financing is granted by the Federal State Investment Program.

FSTCs achieve their sustainability due to a rational combination of the governmental support and corporation management decisions. Decisions have a strategic character and cover such directions as: S&T level analysis; hi-tech marketing; and product market forecasting.

S&T multipurpose organizational model (STMOM).

Corporative sustainability closely correlates with the evolution of a multipurpose organizational model that combines S&T and production management. The model is based on interrelation between the following main elements: S&T and production capacities, financial and trade capitals, and various forms of ownership. Each of the elements represents a particular center, providing a decision-making process for the relative strategy. Interconnections between the elements are ensured by a system of internal entrepreneurial networks, combining financial, industrial and S&T links.

R&D is supposed to be the core element of the model. In fact, the S&T block of the model represents a new quality of R&D organization as an organic part of an industrial corporation. Besides performing R&D, it also has functions of ensuring pre-production stage and technological base development.

A STMOM's efficiency is determined by rational combination of R&D strategy centralization and short-term management decentralization within a corporation.

This organizational scheme has evident advantages, such as autonomy and responsibility of corporative subdivisions, interest in results of their activity, and flexibility in strategies adapting to a market conjuncture. At the same time the R&D centralization delegates to the S&T subdivision a function of horizontal and vertical adjustment of various subdivisions' activities.

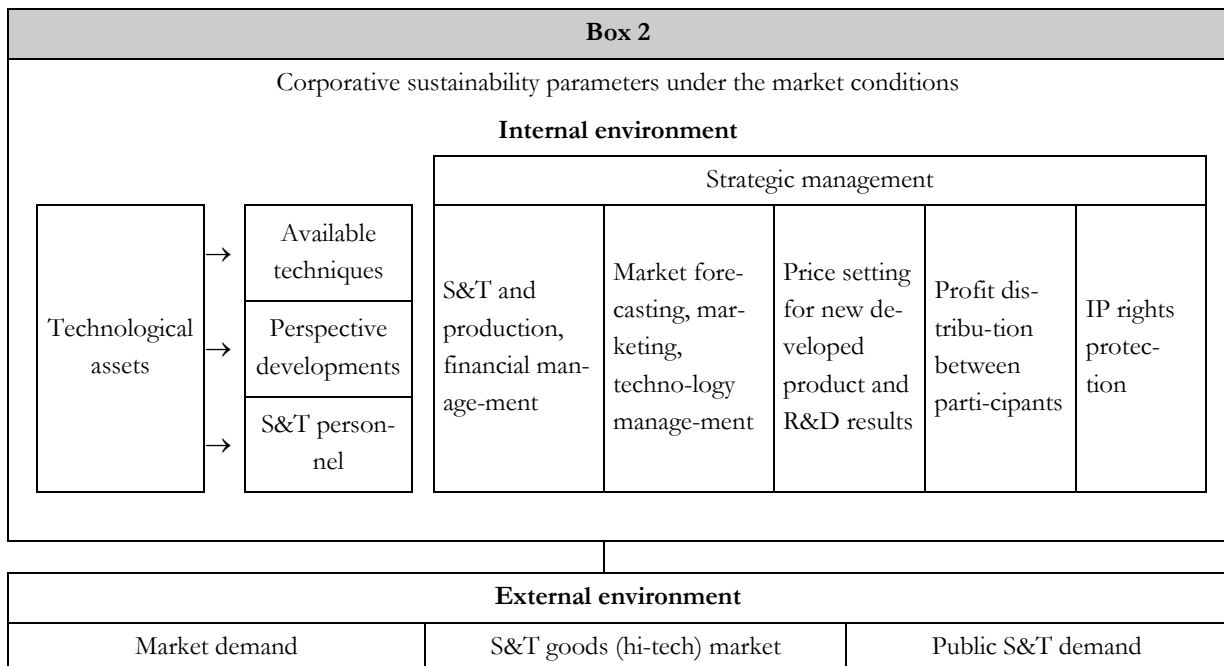
Rules of subdivisions' behavior have to submit to general internal principles: 1) strategic goal-orientation and 2) ensuring of a continuous technological cycle "R&D–production–commercialization". Thus, the organizational evolution reflects a tendency of combination of market and administrative management within a corporation.

When estimating a corporation capacity, role of its technological and S&T resources increases considerably. It shows that corporation competitiveness is based on a high-technology ground rather than on the traditional combination of productive resources. But a process of new technologies creation is connected to availability of relative S&T and production capacities as well as increasing R&D expenditures.

Among general parameters characterizing corporate sustainability one should mention techno-

logical assets and a managerial method that is applied in a corporation (Box 2). Technological assets are determined by human capital, application of new technologies, and perspective R&D that are available in the corporation. The higher a level of technological assets, the better chance of market success has the corporation.

A corporative adaptation strategy is limited by R&D performing and hi-tech goods demand. However, commercial activity within a S&T subdivision should be considered as one of additional financial sources for corporative R&D performing rather than a mean of current returns receiving. This kind of commercial activity helps to achieve certain flexibility of both S&T personnel and technology management, and an adaptation to a market conjuncture.



The role of each innovation cycle closely correlates to shifts in public demand. It impacts on corporative management strategy, such as financial policy, R&D and production strategies, IP protection, structural policy, revenue distribution policy, etc. In other words, strategic manage-

ment issues cover all fields of internal corporation functioning.

As for an organizational mechanism, it must be a mechanism stimulating innovation entrepreneurship. Also, corporative efficiency is determined

by concentration of resources according to its priority, availability of successful innovations, application of information society opportunities, flexibility of personnel management, etc.

Intellectual property management.

IP management, which includes protection of IP rights and efficient utilization of IP objects, is one of the most important parts of strategic corporate management.

A peculiarity of the Russian IP market is that the state property rights prevail in the S&T area. According to the Russian legislation, IP prerogative belongs to the state as much as it concerns R&D financed from the federal budget. An exception is made for those privatized S&T organizations where federal IP was included in the corporation assets.

IP evaluation. IP evaluation plays an important managerial role, especially in intangible assets accounting, internal S&T auditing, corporate merges and ownership changing, tax payments optimization, property lawsuits, etc.

There are different approaches to IP evaluation, such as expenditure, market price, and revenue-based approaches (Pipiya 2001). An application of one of the methods depends on an evaluation purpose.

The evaluation is inevitable for IP commercialization process. In this case, a *revenue-based approach* should be applied. Within this approach, depending on an applied method, the following quantitative assessments could be received: (1) IP prerogative of patents; (2) IP application of know-how; (3) IP revenue distribution between an IP owner and an IP purchaser or an IP investor.

Besides, the approach is used for evaluation of (1) assets (patents, licenses) showing stable return, (2) IP investment value in the case of fixed assets formation, (3) IP prerogative portfolio

included in an investment project, (4) know-how property rights application.

IP management at each stage of an innovation cycle closely correlates to an *IP prerogative portfolio formation*. As Russian S&T corporations in aviation, transportation, and energy equipments tend to be forced out the hi-tech markets by their foreign competitors, purchasing IP prerogatives for patents is on agenda. For instance, in 1994 share of foreigners in Russian patenting was equal to 15.6 per cent, and in 1998 the share arose up to 23 per cent (CSRS 2002).

In spite of its certain character and some peculiarities, the process of IP prerogative formation for patents is closely connected to elaboration of short-term goals within the general corporate S&T strategy. It comes out from the fact that patenting is one of the main parts of R&D commercialization. But the patenting capacity for commercialization is considerably low. Commonly, only 3 to 5 per cent of the amount of patented technological solutions are commercially successful. The rest part is used only as a basis for further R&D performing and could be considered as corporate goodwill. Besides, the patent portfolio could be used as an instrument of the manufactured goods market regulation.

IP portfolio formation is the final stage of corporate S&T activities in the research-production cycle. To avoid making mistakes in IP portfolio formation, the patenting process should be initiated at early stages of the cycle. Also, it helps to diminish investment risks in hi-tech goods production.

In conclusion, it should be outlined that for the purpose to achieve corporate sustainability in S&T area, the government S&T policy must be harmonized with the state structural policy. It is determined by the common character of both policies and is reflected in their goals. They are as follows:

- stimulating both national and international competitiveness of Russian industry, and increasing share of hi-tech branches in the economy;
- restructuring inefficient enterprises receiving state budget subsidies;
- stimulating integration and establishment of competitive companies;
- finishing the privatization process of inefficient objects of state ownership.

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