PROBLEMS OF COOPERATION BETWEEN RAILWAYS AND SCIENTIFIC ORGANIZATIONS

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ABSTRACT

The business needs innovative products, but it doubts the competitiveness of scientific organizations (including university-level industry organizations). The analysis of the contradictions of the interests of science and business in modern Russian conditions is carried out. The shortcomings of scientific organizations (research institutes and universities) are revealed in terms of conformity of their efforts with the conjuncture of innovative inquiries. The key factors that limit the interaction of science and business in carrying out research and development work are identified. An alternative model of cooperation between scientific organizations and business transport enterprises is proposed, based on the expansion of communications and the organization of technological brokerage, taking into account the mutual interests of both sides.

Keywords: university and academic science, business, transport, research, competitiveness, technological brokerage, innovative infrastructure, cooperation, partnership.

Background. *Many scientists and specialists state today a rather significant gap between the expectations of the scientific community and business in relation to each other. Evidence of this, for example, may be the reduction in the volume of R & D financing at railway transport enterprises: if in 2011–2013 the ratio of R & D expenses to revenues from core activities was 0,51 %, then the target for 2016 was set at 0,48 %, which in absolute terms appears to be a significant reduction with a marked decrease in revenues from core activities. The statistics also shows that the volume of scientific research conducted under contracts with railway transport enterprises has fallen, not only in branch higher education institutions, but also in affiliated and dependent joint-stock companies – the reformed industrial research institutes.*

Objective. *The objective of the author is to consider problems of cooperation between railways and scientific organizations.*

Methods. *The author uses general scientific methods, comparative analysis, evaluation approach, economic assessment method.*

Results. *As the analysis convinces, a stable «vicious circle» has formed: on the one hand, the business «does not believe» in the ability of domestic science to produce competitive, useful and effective scientific results, since the development of the scientific and technological base in the process of market reforms has constantly been underfunded, the average age of scientists and researchers has sharply increased, and in recent years, there has been a reduction in international scientific contacts – that is, according to business, academic and university science are objectively incapable to discover discoveries and inventions that correspond to the current level of scientific and technological progress. On the other hand, the scientific community quite rightly blames the big business, which really has the opportunity to finance a full cycle of scientific research, unwillingness to introduce scientific results into production, the desire to buy ready-made technological solutions in the form of approved, and if necessary, certified materials, components, equipment, information systems, etc.*

Choosing between the risk of investment in pioneer (without analogues in the world, able to form global competitive advantages, but not at the stage of immediate use) scientific and technological developments and the risk of losing leadership positions at the global level (with a possible retention of leadership, or at least in the long run, in the absence of analogs in the world, capable of forming global competitive advantages, but not brought to the stage of immediate use) according to industry trends at the national level), business leaders logically prefer the second solution, acting on the principle «bird in the hand is better than two in the bush». As a result, for example, in railway transport, the costs of research and development over the past five years do not exceed 5 % of the financing of the innovative development program, the remaining funds are spent on the purchase of technologically «mature» new equipment and materials, mainly from foreign suppliers. And although in terms of import substitution enterprises of the Russian railways include contract clauses on localization of production, nevertheless, we are not talking about their own scientific and technical developments, but only the adaptation of imported technologies to the existing industrial and manufacturing base.

Often between the final consumer and scientific organization there is a «third force» – businesses that have to master new techniques as a result of R & D. For rail transport these are primarily enterprises of transport engineering. In this case, producers of material and technical resources should be confident in the readiness of the end user to purchase new equipment on conditions that allow them to pay back the costs of its development and production development, whereas neither the scientific organization nor the consumer itself can give such guarantees: a scientific organization, like generally, present «raw» in terms of business results of scientific and technological activities, and competitive procurement conditions, the final consumer may be forced to buy an alternate, i.e. cheaper and proven technology solution.

For example, the development of the original Russian rolling stock and its implementation on the railway network require not only more significant start-up costs, but also a long process of development and certification of new equipment. While imported samples are actually due to the high seriality of their production and cheaper, and more quickly mastered in operation. In addition, foreign suppliers are ready to work under standard contracts of a full life cycle, which significantly reduces the risks of unscheduled losses, as well as expenses for capital and current repair of rolling stock.

Do not forget the other: a new scientific and technical solution may not correspond to obsolete technological regulations and requirements that the consumer is guided by when organizing competitive procurement. Let us assume that some technological regulations and standards introduced by the Ministry of Railways of the USSR continue to operate on the railway transport. As a result, the supplier of the end user appears to be weakly interested in the implementation of the results of scientific and technical activities and refuses to participate in the financing of research.

The inadequacy of funds in conducting a full cycle of research and development with obtaining a result ready for implementation inevitably affects the quality of scientific and technical activities and further widens the gap between domestic science and business. In these conditions, a fundamentally different alignment of their mutual relations is required, a maximum convergence of interests of all participants in the innovation process. It is necessary to accept the assumption that they act based on the rational interests of their enterprises and

organizations and the desire to ensure maximum effectiveness of their activities.

Specificity of scientific organizations is that for their effective functioning they must find the optimal proportion between fundamental and applied research, since, experience shows, without progress in basic research, the potential for the development of applied research is quickly exhausted.

At the same time, the effectiveness of basic research is generally considered as recognition of new knowledge obtained in a scientific organization (for example, citation or availability of public awards for scientific achievements, etc.) and backed up by registration of intellectual property rights for their own development. At the same time, the first contradiction arises between science and business: in order to ensure their own competitiveness and future economic security, business enterprises try to either «classify» the scientific results obtained or limit the right and aspiration of scientific organizations to publish and patent their achievements.

At the same time, scientific organizations should attract sufficient resources to develop their scientific and technical potential: acquisition of modern scientific equipment and experimental materials, content of laboratory research complexes, attraction and preservation of competent scientific personnel and specialists, provision of information support, etc. It turns out that scientists and researchers should be prepared to compromise on the publication of scientific results and registration of intellectual property rights, but for this science itself must «see» the commercial potential of its discoveries and distinguish among them the most promising for commercialization.

Thus, either in the structure of scientific organizations there should appear divisions capable of accompanying the results of research and development with the aim of their commercialization, or in the infrastructure of scientific, technical and innovative activity, the institute of technological brokerage should realize the development that implements the following main functions:

– identification of possible areas for applying the results of research and forecasting the timing of their completion to the stage of implementation;

– development and implementation of a strategy to promote the results of research in business, the search for effective methods, forms and tools of innovation;

– development of a balanced policy on the results of intellectual activity, a reasonable choice between their publication (presentation and promotion in the scientific environment) and commercialization with limited access to new knowledge;

– formation of approaches to financing and attraction of non-financial resources for the further development of research and development (including models of public-private partnerships);

– preparation of commercial proposals for using the results of intellectual activity in business and legal support for their transfer;

– presentation of the results of scientific and technical activities to business and their commercial promotion in the high-tech market, initiation of joint implementation of innovative projects or transfer of rights to intellectual property.

Without development of the institute of technological brokerage in the field of science, the opportunity to break out of the existing «vicious circle» of distrust between science and business is significantly complicated. On the other hand, business should become more open to scientific organizations: they need to provide access to the strategies of scientific, technical and innovative development of business, to give clearly formulated principles and priorities of cooperation in the field of technology. An updated version of the innovative development program of the holding Russian Railways, a strategy for its scientific and technological development, and a number of functional strategies that are made available to scientific organizations can be considered as an example of increasing the openness and transparency of their scientific and technical policy.

It is important for scientific organizations not only to prepare technical proposals in advance, but also to estimate the expected economic efficiency from their promotion in business, for which it should indicate the planned scale of implementation, the depth of penetration of technologies into the company, etc. This task can be solved based on medium-term plans for implementation of the innovative development program, long-term strategic development program, general scheme for development of the industry and other planned targets.

In addition, business should be aware of the latest achievements of science and technology, responding more sensitively to new technological opportunities both in the form of revising the regulatory framework and technological regulations, and adjusting its own development strategy, taking into account the achievements of scientific and technological progress. Companies are required to have reliable communication channels for dissemination of new knowledge, including scientific and practical industry conferences initiated by business, exhibitions of scientific and technical achievements, scientific and technological competitions, virtual means of constant communication (technology platforms, forums, high-tech exchanges, etc.). In any case, the business should receive innovative products «first-hand» (which reduces the response time to permanent technological challenges) and become more receptive to the initiatives of the scientific community.

Conclusion. *Only on the basis of harmonization of mutual interests and development of a common creative infrastructure (such as the institute of technological brokerage), strengthened by effective means of communication and dissemination of new knowledge, business and science (academic and university) will be able to overcome the gap that has arisen and ensure fruitful cooperation and partnership.*

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