94 Steps to Success

Without the use of specialized equipment, it is extremely difficult to achieve results in modern science. Unfortunately, the situation regarding scientific equipment in our country is far from perfect. This concerns not only the quality of instrumental resources in our research institutes and universities, but also the process of purchasing scientific equipment. The vice-chancellor of M.V. Lomonosov Moscow State University, Alexei Khokhlov, in an interview with Konstantin Kiselev, the director of the project Science and Technologies in the Russian Federation, speculates on this eternal problem of the Russian research and design sector.

Alexei Khokhlov

Konstantin Kiselev:
Alexei Removich, to what extent is the quality of scientific equipment and its timely purchase an eternal problem for Russian science?

Alexei Khokhlov:

– I do not think that it is an "eternal" problem. Of course, in Soviet times there used to be similar problems, relating to the prohibition of importing high-technological equipment. Therefore, in some cases we had to design instruments ourselves, and in other cases simply copy the best examples of western scientific equipment. There was definitely a lack of equipment, but it did not result in any catastrophe. Moreover, in a number of fields, such as nuclear physics, low-temperature physics, quantum mechanics, nonlinear optics, and material science, our equipment was unique and was exceptionally advanced. It corresponded to the scientific tasks that were imposed by the economic structure at the time.

After the USSR's collapse, there was a substantial gap in financing of science and technologies for about a decade. During this period, we were more concerned with preserving the institutes and laboratories and paying salaries to our scientists, rather than buying an up-to-date microscope (although we tried our best to do so). It was not until 5 years ago that we had the opportunity to purchase modern, high-quality, expensive equipment for all foreground directions of development of science and technology. More so, centers were established in which unique installations could be shared.

However, I consider it premature to say that our science has been adequately equipped with up-to-date technology. For example, if one compares the equipment in Russian research institutes and that in analogous foreign institutions, such as the Max Planck Institute in Germany, it would be of a much higher standard and more modern in Germany. Foreign laboratories in the leading countries have been better equipped in comparison with Russian ones.

– And does this also mean that German science is ahead of Russian science, in terms of the quality of research?

– Of course, good equipment and results are closely related. Only articles on studies that were carried out on modern equipment are acceptable for publication in scientific journals with good impact factors. The absence of modern equipment means that you will not be able to publish your article in a highly rated journal.

However, the connection is not absolute. Some countries have excellent financial opportunities and equipment, but no scientific schools (such as the Arab oil-producing countries), in which the situation with publications is far from perfect, since these countries lack their own scientific traditions. They may achieve some results thanks to their discipline, diligence, and the

scientific 'stars' they invite to their countries; however, it is difficult for them to catch up, in the absence of their own scientific foundations and the permanent development of the aforesaid. Another factor that has to be taken into consideration is that science is international, and it is possible to pursue one's own ideas on somebody else's equipment.

– Probably this accounts for why foreign scientific organizations (namely American and European) that have modern scientific equipment gladly use theoretical studies made by Russian scientists. Sometimes a series of experiments is carried out using these theories. The results obtained are of global exposure, yet the author of the idea only gets an initial quotation in the article.

– Of course, such situations may occur. However, it is not a tragedy for science and even for the scientist who invented the particularly brilliant theory. In Russia, there never has been a great quantity of good equipment. A similar situation existed in the 21st, as well as the early 20th century. If one peruses the biographies of outstanding Russian scientists of that time, he will discover that the majority of experimental studies by Mechnikov, Vernadskii, and even Mendeleev were carried out when they worked abroad. We are theoreticians rather than practitioners; the theoretical part of Russian science has always been better developed as compared to experimental science.

Modern "Big" science is science of large-scale collaboration. Russian experimentalists partially work on their own equipment and partially implement their hypotheses on the equipment of foreign institutes and universities, in partner laboratories (provided that they possess good ideas).

Meanwhile, in recent times the state has acquired the possibility to purchase modern equipment. In most cases, this equipment comprises the most necessary modern instruments. Starting from 2004, a good deal of new equipment has been purchased for Moscow State University. Today, we purchase it as well, but within the framework of the Program for the Development of MSU.

– Does it cover the entire range of equipment, from an oscilloscope to an expensive force microscope? Do Russian manufacturers cover a certain part of scientific demand?

– Yes, it covers the entire range of equipment – from simple apparatuses and reagents to installations. Some of the equipment is bought from Russian manufacturers and others from foreign ones. However, when it comes to large modern equipment (electron microscopes, chromato-mass spectrometers), we focus on foreign manufacturers. However, there are rival Russian manufacturers producing atomic force microscopes, for example. It all depends on the particular instrument.

– What is the procedure for purchasing expensive equipment at Moscow State University? By the way, what is considered expensive? Is it 100,000 rubles or 30,000,000 rubles?

– According to our legislation, all equipment that costs over 100,000 rubles requires a price quotation and that over 500,000 rubles entails inviting bids or auctions. What is the procedure for purchasing? We announce tenders and purchase equipment within the framework of a tender procedure.

The procedure is neither overly sophisticated nor burdensome; provided that the financing of purchases is made periodically. However, as we receive the money by the very end of the year, we have to perform it in a hurry, which is not good.

– How are the demands formed for scientific equipment at Moscow State University?

– It depends on the particular situation and on the financing source. Money is received by a certain group in the form of either grants or state contracts. There are contracts with firms, with provision of the money for purchasing equipment. In this case, the group decides for itself which equipment it should purchase. Most small equipment is purchased via this channel. There are also the centralized events. Thus, before the 250th Anniversary of Moscow State University, the government of the Russian Federation allocated means aimed at the purchasing of modern equipment. Each department submitted their requests, which were subsequently analyzed and then possibly combined. The university's administration then made the decision regarding which equipment should be purchased. The final decision was left to the rector of the university.

– You mean money plays a crucial role? Does receiving financial support mean that equipment can be purchased?

– Exactly. But in order to receive this support, our rector,V.A. Sadovnichii, expended a great deal of effort. Now, concerning the centers of shared use. The Ministry of Education and Science announced a competition between the centers of shared use, and the university filled out an application enumerating the large equipment that was necessary. The university won this request and subsequently the equipment listed was purchased. Now, the Program of Development of Moscow State University is engaged in it. The committee under the university administration has formulated the priority for the development of Moscow State University. This would be the purchase formation based on the demands of centralized development from research sectors (there are seven in total). Within each sector, the relevant scientists have been (and

are still in the process) of submitting requests for the equipment that they need. Once again, these requests are analyzed and generalized by the leader of the priority sectors; everything is then passed on to the university administration. The administration decides what can and what cannot be purchased, within the framework of the priorities for the current year. The final decision on what is to be purchased belongs to the rector. The requests within the framework of the priorities in development were formulated. The money that was received at the end of 2010 was mostly spent on two mega-projects of Moscow State University: for the modernization of our supercomputer "Lomonosov," the enhancement of its speed to 1.3 petaflops, and for designing the satellite "Lomonosov," which will be launched later this year (in honor of the 300*th* anniversary of M.V. Lomonosov). There is an entire complex of scientific tasks to be studied by this satellite. The remaining money will be spent on other priority directions of development. I think that the majority of the requests submitted in these directions will be implemented this year.

– Will the restructuring of Moscow State University associated with the centralization of management and organizational procedures have an effect on the purchasing of equipment?

– As concerns what I have just said, it will have no effect,since we are speaking about large purchases, which always go through Moscow State University as a single legal entity. Since Federal Act 94 has been adopted, tender procedures have always been fulfilled.

– What about small purchases? Will subdivisions be affected?

– There exists in the law a provision that there are certain nomenclature items of goods. Payment with respect to each item made by a specified legal entity cannot exceed 100,000 rubles. If the limit of the total number of purchases for each item is surpassed, competition procedures kick in . Even if the 100,000 limit was exceeded by 1 kopeck (a computer mouse was bought), it will be difficult to carry out the entire purchase. Since MSU is a very large organization, a problem arises. It is connected with the fact that there will be a need to group and use a competition procedure even for small purchases. We are aware of this problem and are actively searching for solutions so that the performance of scientific groups working in Moscow State University is not hindered. In particular, it is recommended that at the beginning of the year (when no money has yet been allocated), each department announce tenders with step-by-step selection for the maximally wide range of goods and services, according to a specified item of purchase nomenclature.

– How is it performed?

– It can be based on purchases made in the past year. We look through the catalogues and think of everything that may be necessary to us, and we determine the maximum cost of each item. The tender is then announced. Some large supplier wins the tender. They may compete during the tender. But since there is a step-by-step selection, what does it mean? The maximum amount of goods for each item is specified, but we may not select 100% at once. We can select only 80%, during the year, as we need it. When a department needs something, it turns to the winning company: "Kindly supply us with 20 paper packs and with 30 more tomorrow," etc. The company delivers the paper. The delivery time should be agreed upon in advance; the payment is made after delivery, monthly or quarterly.

– Do "miracles" happen at tenders? I mean the cases connected with Federal Act 94.

– Of course. Especially when the crisis struck, many companies appeared and began their destructive activity. The procurement department has methods to fight the companies that were established for such abusive practice.

Undoubtedly, Federal Act 94 is not suitable for the scientific sphere. However, on the other hand, I am going to recount an unpopular viewpoint. Research institutions do not function in a vacuum. When we say that the level of general culture and moral values is rather low in our society, why should the scientific sphere be an exception? Of course, there have been abusive practices. For example, several invoices are made for homogeneous groups of goods; or sometimes goods are purchased by a scientist from a company that is led by the same person. Sometimes such things may occur.

I would put it in another way: the revocation of Federal Act 94 should be conjugated with a general change in procedures and organization of analysis of research projects in the Russian Federation. Unfortunately, our current system is too formal. There are competitions of the Ministry of Education and Science and projects of the Russian Foundation for Basic Research. Of course, the reports are submitted; however, they are very formal. The most important thing is to implement certain items of the performance specification. If you do it, that is all.

– Of course, and it is almost impossible to find faults in it, especially if it is scientific work.

– For scientific work, it should be different. There should be a really good examination of everything that has been done, based on the actual achievements of the group. The achievements can easily be assessed quantitatively: the articles published during the work, in which journals they were published, and

what results were obtained. As soon as these facts are made the cornerstone Federal Act 94 becomes obsolete and wholly unnecessary. But in the existing case, you have committed some trifle; formally complied with all the requirements of the lot, submitted a report — and nobody can find faults against you. Such situations become a good source for various abusive practices. Essentially, the report should include information concerning what has been done. If a scientist has published ten articles in leading journals, which have been well-cited during these years, he is considered a winner. As it is well-known, success is never blamed. He has carte blanche to do as he wishes. He has achieved success. If there is precise control over what a scientist had done, the Federal Act becomes unnecessary. However, if the situation is the same as it is now, formally he did something, but in actuality he did nothing, then the Federal Act is needed. With such a situation as reported in the absence of Federal Act 94, the door is open for a dishonorable figure to pocket the money by creating invoices, each worth 99.9 thousand rubles. This money is usually paid not to his company, but to the one with whom he had already discussed everything.

– Since you hold a certain position in the Russian Academy of Sciences, it may be a suitable time to ask you about the procedure for the procurement of scientific equipment in this system. I understand that there is a special Committee that is responsible for instruments and equipment; a number of requests for scientific equipment are submitted to it.The requests are then analyzed and placed for tender. However, the winner of the tender is always an organization, Akademintorg, which was established by the Academy of Sciences as a unitary enterprise and is entitled to engage in business. There is rumor that Akademintorg marks up the broker's margin way too much, going into a huddle with the suppliers, and so on. Is it not a better idea to give the authority to research institutes of the RAS, since the Act on Science and the statutes of the Academy allow for the decentralization of the procurement of equipment?

– I consider Akademintorg to be an absolutely unnecessary organization. I am not familiar with the procedure of money transfer to the Russian Academy of Sciences. However, if this money can be transferred to an institute which can announce the tender itself (the scientists who actually work will be able to help to do it with due qualification), that would certainly be a preferable variant in comparison with one when a strange tender for a lot of equipment is held. I understand that Akademintorg plays the role of a large supplier. I can understand it when the question is regarding such things as supplying paper, other stationery, and even re-agents. However, when the question is supplying sophisticated equipment, each component being very specific, it would be easier to carry out this procedure in institutes, at a more qualified level. Moreover, the institutes are holding a lot of tenders because they need to purchase the re-agents and other supplies in accordance with Federal Act 94...

– You mean that the argument "There are no specialists in the institutes who can engage in complicated tenders" is unreasonable, since the institutes have already learnt how to do it?

– Yes, they have learnt how to do it, and even do so. There are tender committees in each institute. The argument is absolutely groundless. The equipment can be purchased without Academintorg. Frankly speaking, I do not want to make unsubstantiated statements, but I have information that there are no valuable experts. I do not comment on rumors, nevertheless these rumors do exist. When the question is supplying paper, let supplying companies do it. However, when the question is large equipment, the profit for the companies supplying it is considerable. An additional point is that the representatives of these companies in Russia may be tempted to establish special relations with the purchasing company, when such an opportunity exists...

– I think that it is quite easy to verify whether the rumors are true or not. To do so, an independent committee should be set up. It even could be set up in the Russian Academy of Sciences from other people who are not related to the tender procedure. For instance, to compose it of university professors who are Academy members. I am sure that they are erudite enough to manage to examine the invoices or product catalogues — it would be easier than proving the Newton's binomial formula.

– Of course. However, so far I have known only one case when the Academy of Sciences has asked people who do not belong to the Academy their opinion. It was the program of molecular and cell biology by Academician G.P. Georgiev. In fact, all the information was transparent and clear. Everything could be found online: why the grant was given or why it was not. Also, there is an opportunity to appeal: the calculations or interpretation of facts was incorrect. The appeals committee is mainly composed of professors of Moscow State University (and other institutions of higher education) who do not belong to the Academy of Sciences.

– During the interview, you mentioned the transparency of all procedures on several occasions. When speaking about the purchase

of scientific equipment, does it mean that you are an advocate of any procedure, provided that it is reasonable and verifiable (transparent)?

– You are right — each procedure (lots, projects, purchases...etc) should be subjected to the scrutiny of an external examination. Actually, the world scientific community quite frequently carries out various activities connected with external expertise. This expertise is always performed by people who are outside the system. For instance, I participate quite frequently in committees that inspect the scientific competence or activity of a certain European research institute or foundation.

– What about our foundation? There are inspection committees in the Russian Academy of Sciences, are there not?

– No, it is not very efficient. I participate in the activities of the American National Science Foundation and review the projects. I am frequently invited to the Netherlands, so that the International Expert Panel, rather than Dutch scientists, can evaluate grant applications. Therefore, I believe that it is necessary to integrate more actively into the world scientific community and attract foreign experts so that they can evaluate what is going on here. Probably, Federal Act 94 will become unnecessary in this case. A person would understand that even if he has fulfilled all the requirements of a project, his foreign colleagues will come, and they will see the nonsense that he has done and he will thus be ashamed. Probably, this could be a solution? Of course, an external evaluation of everything should be carried out. Then, it will be possible to eliminate many restrictions. ●