RUSSIAN PUBLIC OPINION OF THE KNOWLEDGE ECONOMY:

Science, Innovation, Information Technology and Education as Drivers of Economic Growth and Quality of Life

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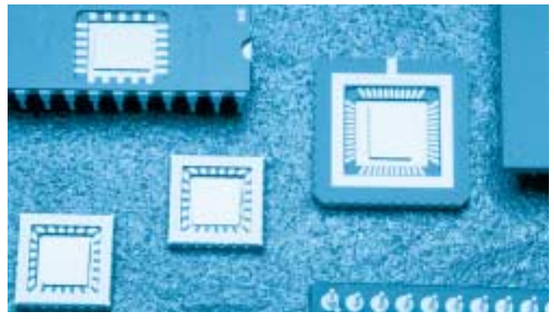

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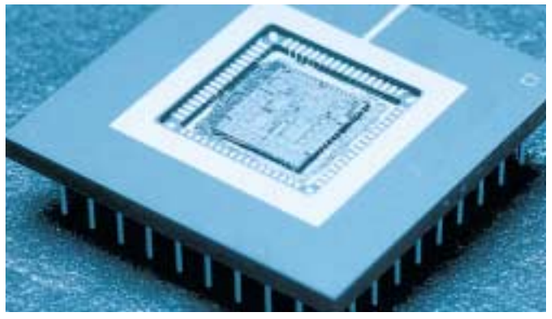

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INTRODUCTION

Russian science and technology in transition: a greater role for public opinion to come

Russia, with its long scientific tradition, has always been one of the major contributors to the world's knowledge. The extensive growth in R&D manpower and investment during the decades of the 21st Century had allowed the development of an extremely large R&D base, greater, in absolute terms, than that of many other industrially developed nations. The collapse of the Soviet Union and the transition to a market economy radically affected the national R&D system inherited from the former USSR. The R&D system developed in Soviet times had three special characteristics: it was very large; it was centrally directed, and it was government financed. These features were ill-suited to a market economy, so it was not surprising that the R&D sector underwent a crisis in the years of transition.

On the threshold of the 21st Century, Russian S&T is approaching a turning point in the long and arduous transformation from a centrally controlled and administered structure, to a national innovation system that is capable of operating effectively in market conditions. But to make this journey, a country needs more than a world-class stock of scientific knowledge, but also a set of capabilities to transform this knowledge into commercial results.

At the beginning of the transition period, initial expectations were high that the powerful S&T base, freed of the rigidities of central planning, would provide the basis for high-tech exports and economic growth. Like some other rosy hopes for transition, the prediction was too hopeful. Many parts of this sector still clung to the remnants of the centralised economy, while relevant and effective policies were lacking.

After ten years of lack of clear-cut public policies promoting market-oriented adaptation of the Russian S&T system, the well-known survival problems have been coupled with a new agenda referring to the challenges of a knowledge-based economy and globalisation. Such key issues, as human capital formation and mobility, learning processes and industrial upgrading, dissemination of information and communication technologies, have been increasingly vital. An effort is required from the whole nation, and its ability to respond will determine an answer to the question as to whether Russia will become a knowledge-driven society integrated into the global economy. The alternative could be unfortunate (Gokhberg, 2002).

In the contemporary world, science and technology is a driving force of social progress, and its role is continuously strengthening. In transition to the information society it is more than just a factor in production, it turns into a form of mass consciousness. This requires an increasingly higher level of the population's education and ability to perceive innovations, understanding their essence. Hence, it becomes important to disseminate certain scientific viewpoints of the world and a scientific mode of thinking In the course of the informatisation of society, scientific knowledge becomes more accessible to the general population, many scientific problems attract tremendous interest in all social strata, and images of reality, methods of cognitive activity, and models of behaviour are changing. In other words, under the present conditions, progress now depends not only on the level of advancement of S&T per se, but also on the depth of its penetration into the fabric of society itself, and the population's intellectual potential and its adaptation to qualitatively new trends of economic development. Therefore, adequate understanding of these issues is important to try to track the trends and to inform future policy making. The impact of S&T (innovation), information and communication technologies (informatisation), intellectual services (intellectualisation) and knowledge embodied in the workforce (education) makes the new economy.

These circumstances are especially topical for Russia. Changes in the technological basis of the economy and society are accelerating and, becoming global, threaten to reduce to 3rd World status nations that have not managed to adapt to the new structures. In this country, the danger is very real. The prestige of S&T has declined both at government level, which was reflected, for example, in the reduction of budget allocations during the 1990s, and also amongst the population. Science, which was regarded as the "rational core" of culture in Soviet times is increasingly replaced by mysticism and irrationalism; moreover, science is quite often blamed for the deterioration of environmental conditions and health of the nation, as well as the aggravation of social problems.

This leads to some important questions such as how far have these phenomena penetrated into different strata of society? Are they irreversible? Are there some opposite processes? Answers to these and other questions will help to identify ways to increase the prestige of S&T in the Russian society. It is hoped that the richest historical traditions of Russian science and education, and the integration of Russia into the global economy should help the population to adapt to worldwide informatisation trends and, with certain efforts, remove the threat of the country's transformation solely into a raw materials supplier for leading industrial nations. Moreover, at the present time, in the context of the search for new forms and mechanisms of functioning in the knowledge economy, a study of public opinion on S&T, innovation, information technology and education, is vitally important for policy-making and the social self-identification of intellectual communities.

Advanced industrial nations have been tracking changes in public perceptions of science for a long time under the impact of the above-mentioned processes, as well as the impact from immediate events related to the brilliant successes of S&T or, on the contrary, the tragedy of technogenic disasters. In the United States, polls on S&T have been carried out for more than 30 years; in Canada, Japan, and the EU Member States for 10–20 years. Their results

are regularly published in the US National Science Foundation reports "Science and Engineering Indicators" (National Science Board, 1991, 1993, 1995, 1998, 2000, 2002), and other similar editions (European Commission, 1994; Eurobarometer, 2001; Nagahama, 1995). Public opinion is taken into account by government bodies in the development and implementation of large-scale social programmes (for example, the reform of education in the United States in 1987–92) and those for S&T (space, environment, nuclear power, genetics). And in the last decade, it became obviously necessary to significantly intensify efforts to popularise science for the general public, e.g. in the area of scientific education, this extended from the revision of syllabi to the international exchange of high-quality S&T exhibitions, TV and video programmes, Internet experience, and creation of a global Science TV channel.

Surveys of public attitudes toward S&T in Russia: objectives and methodology

In Russia, national policies supporting dissemination and popularisation of S&T knowledge had been dormant for a long time. Only in the late 1990s did the government began to display interest in public perceptions concerning science and technology.

In 1995, the first pilot survey of the Russian public's opinions on science was carried out. It included just a few questions on the role of science in the world, and in Russia, the problem of brain drain, prestige of scientific activities, and assessments of the positive and negative consequences of S&T development (Shuvalova, 1996). Efforts undertaken by the authors to develop indicators measuring public awareness of S&T resulted in a methodology intended to reflect the specific features and problems of S&T development in Russia, and to ensure international comparability of data. On this basis, three surveys of public opinion on S&T were carried out in 1996, 1997, and 1999. Their results were presented in statistical data books (Russian Science and Technology at a Glance: 1996, 1997, 1999), in some major analytical publications based on survey findings (Gokhberg and Shuvalova, 1997, 1998) and in separate articles (Shuvalova, 2000a, 2000b, 2000c).

The 1996 survey became the starting point for regular monitoring of public opinion on S&T. Respondents were asked 35 questions concerning major aspects of the development of Russian S&T, and global, internationally applicable issues of the relationship between science and society. The questionnaire included some questions, implemented earlier in similar surveys world-wide, which allowed international comparisons of the results. The publication of the survey findings at the beginning of 1997 (Gokhberg and Shuvalova, 1997), presented assessments of the level of Russian S&T, working conditions of scientists in this country, opinions on the necessity of social support for them, the role of the state in regulating S&T activities, priority areas of R&D, and progress of basic research. Problems of confidence in science, prestige of S&T, and the social status of scientists were also considered, and assessments of the positive and negative consequences of S&T progress were provided. Particular attention was given to interest in science issues and availability of S&T information. An attempt was made to measure the level of scientific literacy of the population, on the basis of testing a degree of understanding of various major scientific concepts.

The 1997 survey used new indicators with the aim of obtaining a more detailed picture of the population's opinion on the role of S&T in shaping Russia's prestige in the world, the level of scientific research and the introduction of new technologies achieved in this country, the significance of technological innovations, and the contribution of S&T to increasing the economic and intellectual potential of the nation. An attempt was made, by polling the employed population, to reveal the real condition of the innovation process in Russia and its social consequences. A special set of questions was focused on the public attitude towards higher education (Gokhberg and Shuvalova, 1997).

In the 1999 survey, an attempt was made to disclose positive and negative trends in the formation of public opinion on science. As is well known, public opinion is in a state of permanent movement like oceanic currents. Some orientations strengthen, and subsequently the opinions expressing them become generally accepted. Particular traditional orientations become less significant, transform into an opposition or even fade away into nothing. Sometimes completely new problems arise suddenly and begin to excite public opinion, disclose the invalidity of traditional views, and make people form their attitude towards new phenomena, to defend their own points of view or to hold the opinion of a majority. In this connection, the methodology of monitoring public opinion on S&T needs to identify such changes. Therefore respondents were asked questions on such issues as their personal interest in science and their sources of S&T news; the prestige of professional scientific activities; the current state of funding R&D, innovation and education; and the positive and negative consequences of S&T development. The results pictured a gradually changing image of contemporary science in Russian public consciousness, where traditional, mainly positive, features and notions were supplemented by new ones emerging in the process of obtaining modern information on S&T, its achievements and problems.

The 2003 survey was devoted to a complex assessment of the characteristics of the new economy as they are perceived by the population, with a stronger focus on innovation, information and communication technologies, intellectual services and education. A brand new methodology was developed to measure behaviouristic aspects (for example, factors promoting or hampering respective needs and skills) and to monitor public opinion on the most critical issues.

The survey had two main objectives. The first was identification of positive and negative trends in the population's

attitude towards science, using certain indicators applied in earlier surveys, such as opinions concerning: government financing of S&T; priority areas of research; bans on some directions of scientific research; consequences of S&T development; assessments of the contribution of S&T to increasing Russia's economic and intellectual potential; the nature of personal interest of Russian citizens in science; demand for S&T information; and scientific literacy of the population. The second objective consisted in disclosing new orientations just taking shape in public consciousness and arising in connection with some outstanding recent advancements of S&T, as well as development of appropriate indicators. An important example is gene engineering, e.g. genetic modification and cloning that have been accompanied by wide-spread public debate and have split society into supporters and opponents of the wide application of the new methods.

A positive result of these debates is the increasing interest of the general population in S&T. Exactly at such moments, science can advertise itself in the most effective way (including search for investors), popularise its achievements, recruit supporters, and inform the masses. Therefore, it is very important to provide the scientific community and policy makers with an objective picture of the population's attitude towards science, coupled with recommendations concerning particular directions for concentrating efforts in S&T popularisation, as well as identifying the most receptive strata of the population and methods that would be the most effective.

Specific features of public opinion polls in Russia and other countries

In all the above five surveys on public awareness of S&T, respondents filled in questionnaires by themselves in the presence of an interviewer. The sample of respondents was representative for socio-demographic and regional groups by gender, age (16 years and over), educational attainment level, macro-region of Russia, and type of settlement. In 1995 (September), 2,392 respondents were polled, in 1996 (July) – 2,404, in 1997 (July) – 2,322, in 1999 (May) – 2,431, and in 2003 (May) – 2,107. Thus, the conditions of implementation of all the surveys were very similar, helping compatibility of the data series.

The present review includes survey data from the United States, Japan, and the EU nations. For analysis, it is necessary to take into account some differences in methodology in these surveys.

The population surveys in the EU countries are carried out with the use of standard omnibus questionnaires, and representatively sample on average 1,000 respondents from the age of 15 years and older for each nation. The surveys in Japan are based on direct interviewing. In the United States, surveys are conducted every second year (nearly 2,000 respondents) by telephone, whereas the sample is non-representative for territorial groups. It is interesting to note that, where the method of interviewing is used, especially in telephone polls, a respondent often feels bound to give a definite answer, even in a case of uncertainty, while in self-filling in a questionnaire the option *Don't know* is more easily available. Besides, direct comparisons between particular countries may be insufficiently correct because of a difference in the wording of questions as a result of translation.

Major conclusions

Surveys of Russia's population show that the importance of S&T for economic and social development is generally perceived. Russian citizens believe that the role of science in the world is growing, they indicate its significance for increasing the competitiveness of the national economy, recognise a high level of S&T development as a symbol of national prestige, and agree with the necessity of intensifying public funding of S&T. The image of science is determined by such features as the social relevance of scientific activities and the complicated nature of scientists' work. At the same time, while speaking about Russian science, respondents do not just state a decline in its status, but also view it as having become isolated from practice and technocratic in nature, and set their own priorities for scientific research, primarily oriented to social needs.

In the present image of science within the Russian population, it is possible to single out four most typical viewpoints, three of which are 'pro-scientific', and one which is recent, sharply negative, concerning the situation of S&T in Russia.

The first one is a very strong *paternalist orientation*. It was generated at the very beginning of the process of the institutionalisation of Russian science, and is supported both in the scientific community and in society as a whole. Its essence consists in ideas of a high degree of government regulation of scientific activities and a poor understanding of the autonomy of science. This orientation is best characterised by belief in restriction of the freedom of scientific research and the necessity of increasing government financing of R&D, as well as a sharply negative attitude towards the emigration of scientists. Such a viewpoint can be considered unfavourable with regard to the growth of private investment in S&T, which policy makers now expect as a means of rescuing Russian science under conditions of budget deficit. Besides, this orientation testifies to alienation of a majority of the population from science, while the latter is perceived as a domain occupied by an elite, close to the government. These notions are profoundly incorporated in the value orientation system of the entire Russian society, therefore their change will require tremendous effort, both from policy makers and the scientific community.

The second orientation, as strong as the first one, consists in a *syndrome of collapsing science*. It is in contradiction with the traditional faith in *powerful Soviet science, a symbol of national pride and a prestigious field of activity*, and splits the population into strata holding opposite positions concerning attitudes towards scientific careers, assessments of the level of Russian science, and reaction to the emigration of scientists. This viewpoint creates an unfavourable and rather severe climate, hampering the inflow of young professionals and, which is particularly important, investments in R&D. A change of this climate for a more favourable one seems to be an extremely complicated task.

These are the two strongest orientations that have almost no opposition.

The third one, *belief in science*, is displayed in the form of strong positions of scientism, hope for S&T in its applications, although not supported by personal cognitive interest. This orientation has a strong opposition in *scepticism* that, however, is not unfavourable for science.

Finally, the fourth orientation – *technicism* – also has a strong opposition in the form of *humanistic orientation* testifying to the expanding understanding of social functions of S&T.

It is important to note that the image of science is still far from being shaped. Only on several positions were respondents unanimous, with many survey questions displaying alternative positions, which proves that public opinion on these issues is still at the active stage of formation. Practically, for government S&T policy and the scientific community, it means that in public debates, some features of the image of science, for which there is no standard point of view, can be influenced more easily than those on which an opinion has been already shaped. Such influence is necessary because the pattern of the Russian S&T system is changing.

As far as the practical application of knowledge is concerned, the behaviour of the population demonstrates its poor orientation toward consuming innovative products and intellectual services, as well as toward increasing its own education and qualification level. The main explanation here is the low income of the majority of the population – many innovations advertised by mass media do not appear in their daily life. This situation imposes a key factor in shaping public opinion regarding new phenomena about which information is sometimes negative (for example, with respect to cloning). Another reason is that usage of new products and services has not yet become habitual, and a certain critical mass of users is necessary to create demand.

CHAPTER 1

PUBLIC INTEREST IN S&T

The problem of personal interest in science is closely connected to the increasing contribution of knowledge to economic growth. Conceptualising this problem, Jon Miller considers the population, first, as the *subject of production*, from which not only basic knowledge in S&T is required but also an ability for the continuous perfection of professional and technical skills. Second, the population is a *consumer* perceiving and using information on the functioning, safety, and efficiency of new products and technologies in practice. Lack of such abilities in a certain part of the population can become a factor hampering the creation and distribution of new technologies, hence the related economic growth. This problem is aggravated by the fact that changes in the technological basis of the economy and society proceed today rather rapidly and, becoming global, threaten backwardness to nations that have not carried out a timely transition to the new technological structure (Miller, 1996). People can fill in their "educational gaps" by taking some extra courses and through study programmes. It can also be done on a daily basis, when information is received and analysed, allowing a person to acquire new facts and skills but in such a way that he or she can study all their life. Naturally, to analyse and process information efficiently, a person needs a sound educational background. It is also much more difficult to deal with information which is of no interest to people.

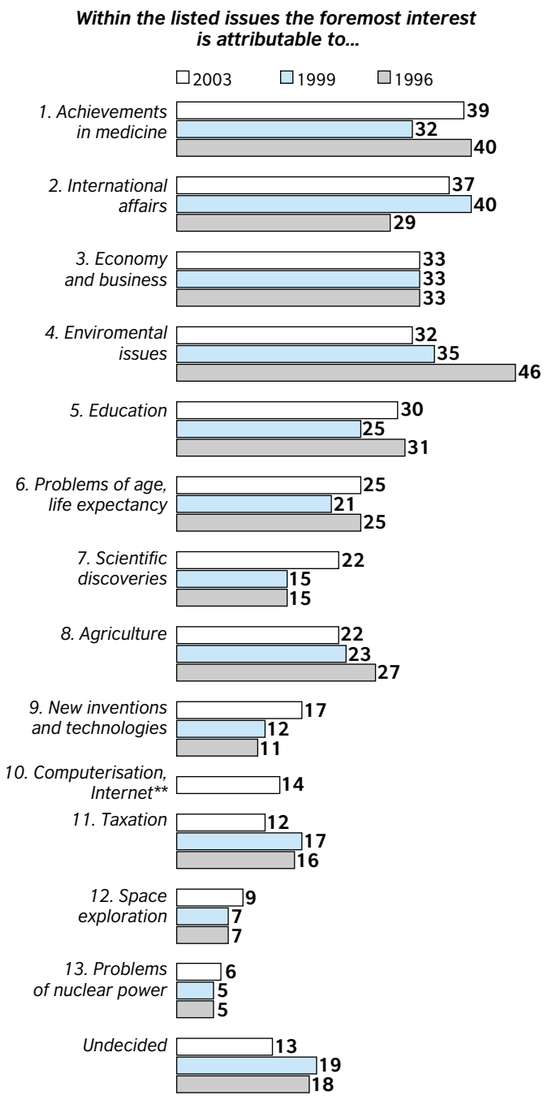
Primary factors determining the interest of people in specific research areas are the individual relevance of a given problem, and the amount and quality of available information. We shall consider these parameters measured on the basis of subjective assessments by the respondents, and compare them with objective data on the level of scientific knowledge of the population.

1.1. Attitudes towards S&T

It is quite natural that the foremost public attention is attracted by issues directly connected to people's everyday life, especially those that are regularly covered by TV and other media. The highest rating among various social, economic and political problems is attributable to the condition of the environment and achievements in medicine, i.e., scientific issues initiated by the vital interest of people (Fig. 1). It is possible to see here an intention to overcome gaps in knowledge related to world outlook (the human being, mankind's place in the ecosystem, the fragility of environmental systems, and life on the Earth in an epoch when the technological potential has reached such a level that civilisation can be destroyed). Such a turn towards a humanisation of outlook is quite understandable, taking into account that for a long time in Russia, information on the negative consequences of S&T progress and on environmental disasters had been concealed. This was because it

was feared that it could damage the image of the Soviet superpower and "communist science".

Fig. 1. Interest in scientific, social, and economic issues
(per cent of respondents)*



* The sum exeeds 100% because respondents could give several answers.
** An option "Computerisation, Internet" was offered to the respondents only in 2003 (1996&1999 questionnaires did not contain the option).
Sources: for 1996 Russian Science and Technology at a Glance: 1996; for 1999 – Russian Science and Technology at a Glance: 1999; for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

It is interesting to note that in 1999 and 2003 the interest in these subjects decreased to some extent, and respondents put international affairs to the fore. However, we considered this not to be a long term tendency, but instead a temporary displacement of interests as a result of *force majeure* (the 1999 and 2003 surveys were conducted at a time of political tensions and instability in Yugoslavia and Iraq). Nevertheless, the ease with which this displacement happened testifies to a rather superficial interest in environmental and medical subjects, at least for every tenth respondent – but the number of people interested in economic problems remains constant. In addition to this, the results of the latest survey have confirmed the finding that people have become less interested in environmental issues. The 1996 survey displayed 40% of respondents (1st place) with an interest in environmental issues, while in the 2003 survey the figure was only 32%.

Interest in scientific discoveries and new technologies per se is not very high. However, the results of the latest survey show an increase. In the last three years this number has almost grown by a quarter. Comparatively, the 1996 and 1999 surveys came out with 15% of the respondents interested in scientific discoveries, and the 2003 survey showed almost 22%. The figure for those interested in the latest technologies and innovations had comprised some 12%, and after three years it reached 17%. The rating of subjects far from the everyday life of the population (space exploration and use of nuclear energy) was still lower (7–9% and 5–6%, respectively).

The initially disclosed (in the 1996 survey) direct dependency of interest in *vitally important* scientific disciplines – ecology and medicine – for particular social groups, gender, educational level, age, and size of a settlement – were not confirmed in full. Many of those who declared more often than others their interest in these themes – persons with higher education, and residents of Moscow and St. Petersburg – have switched their attention to politics. The most profound and constant interest in these subjects is found among women, middle-aged respondents, and inhabitants of big cities, and least of all among men, young people, respondents with an education below secondary, and rural dwellers.

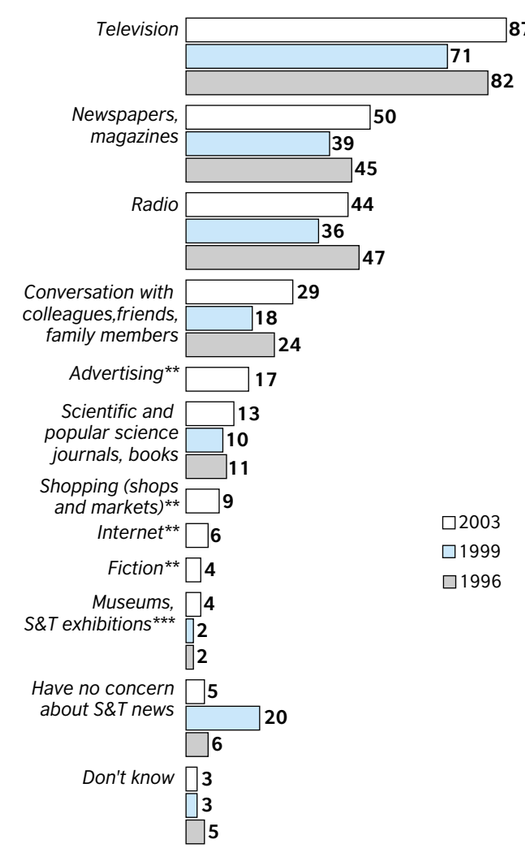
The highest ratings for scientific subjects of cognitive and technological nature are recorded with young people, persons with higher education, male respondents, and residents of big cities.

Cross-country analysis demonstrates that, in comparing S&T issues, in the USA and EU the first places are occupied by disciplines of vital importance – medicine and ecology (National Science Board, 2002; Eurobarometer, 2001). Although the last decade was notable for some decrease in people's interest in environmental issues, the importance of medical questions is still quite high (see, for example, National Science Board, 1993).

1.2. Sources of information about S&T

An overwhelming majority of respondents receive information on S&T achievements from the media (Fig. 2) – mainly from TV programmes (87%), newspapers and magazines (50%), radio programmes (44%) and the Internet (6%). Advertising is also seen as a source of information on S&T (17% of the respondents), shops and local markets (9%), and even fiction (4%). However, the above sources contribute to "passive" analysis only. More "active" in this respect are those respondents who discuss S&T news in a circle of friends and colleagues (29%), and especially those who use specialised sources, such as popular scientific publications (13%), S&T exhibitions, and museums (4%). Only 5% of the respondents declared that they are not at all interested in S&T news.

Fig. 2. Primary sources of news about S&T issues
(per cent of respondents)*



* The sum exeeds 100% because respondents could give several answers.
** 1996&1999 questionnaires did not contain the option.
Sources: for 1996 – Gokhberg and Shuvalova, 1997; for 1999 – Russian Science and Technology at a Glance: 1999; for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

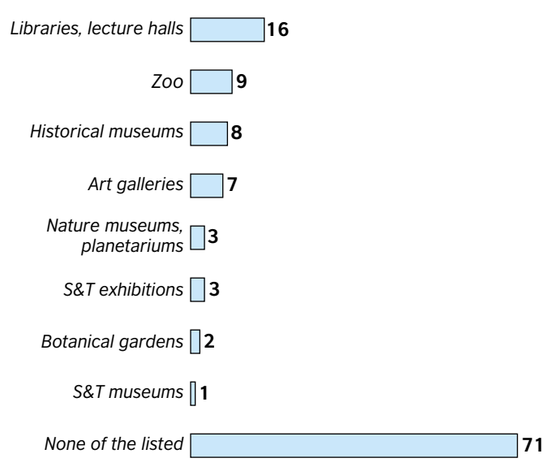
Among the respondents who are not at all interested in S&T news, there are more elderly people, persons with an education below secondary, rural dwellers, and women.

In contrast, the most active search in specialised sources is naturally performed by persons with higher education, men in general, young people and townspeople, and especially residents of Moscow and St. Petersburg. At the same time, young people devote more time than other social groups to discussing science news in a personal circle (each third young respondent), but residents of the capital city receive visual information in shops and local markets.

As regards specialised S&T exhibitions and museums, they appear to be inaccessible to the majority. Even metropolitan inhabitants and respondents with higher education seldom marked these sources. The inhabitants of other towns compensate for the deficiency of scientific information mainly by discussions with friends and reading publications.

It is noted with regret an extremely low attendance of other cultural and educational establishments. The most popular ones are libraries, visited in 1996 by 15% of respondents, and establishments such as zoos (9%). Science museums, planetariums, botanical gardens, and the like, are much less often visited (Fig. 3).

Fig. 3. Attendance of cultural and educational institutions
(per cent of respondents)*



* The sum exeeds 100% because respondents could give several answers.
Sources: for 1996 – Gokhberg and Shuvalova, 1997.

Such establishments are more usually visited by young people, persons with higher education, and women in general. There are territorial dissimilarities. Libraries are more often visited by rural dwellers, while townspeople prefer other cultural and educational establishments.

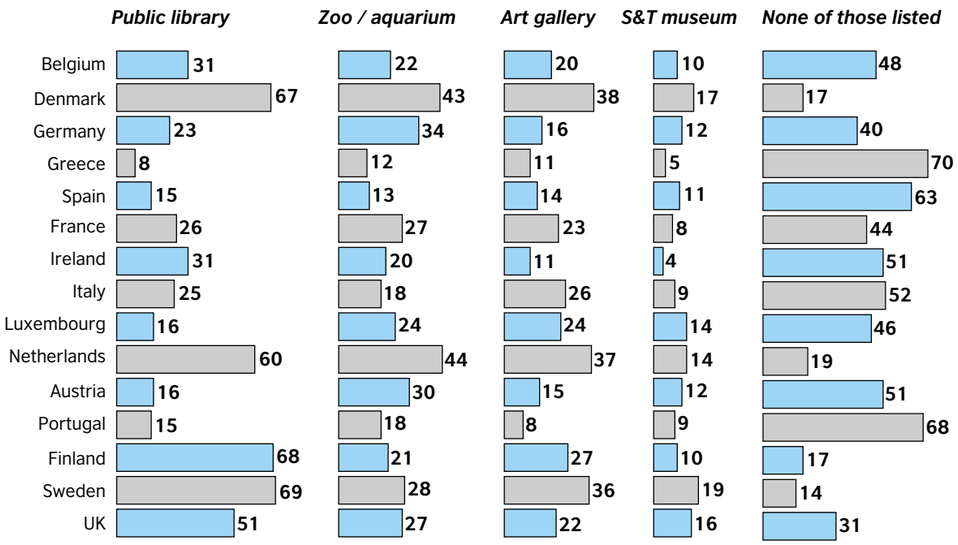
In many European countries, among cultural and educational institutions the most popular are public libraries and places for nature study – zoos and aquaria. Science and Technology museums are less popular (Fig. 4). The frequency of visits to these places varies considerably, and this is the result of different historic and cultural traditions, and also a matter of accessibility.

The highest frequency of visits has been registered in the four countries of Northern Europe – Sweden and Finland (these countries rank among the first in the number of people who visited public libraries in 2001 – 1/2 of the respondents), and also Denmark and the Netherlands (these countries lead in the number of visits to a zoo/aquarium). In these countries some of the mentioned places were visited by 81–86% of the respondents. The United Kingdom stays closer to the leading group – 69%. Next come Germany, France and Luxembourg (54–60%). In other European countries the number of visits is much lower (less than half of the respondents).

1.3. Need for S&T information and its accessibility

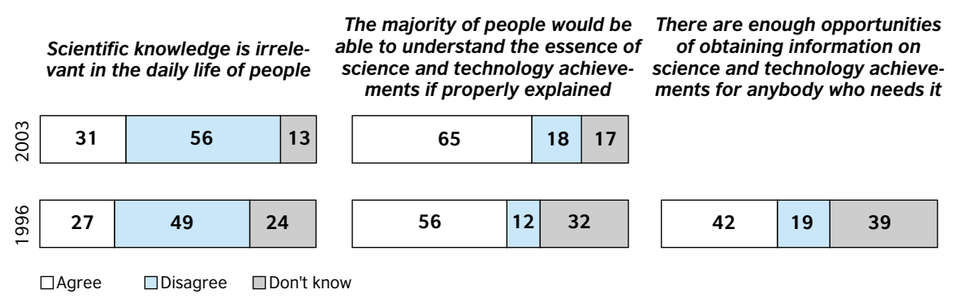
The previous section contains a conclusion about the rather narrow circle of information sources on science and technology for the majority interviewed. Nevertheless, it would not be quite correct to assess the need of Russian citizens for scientific information as low, just based on the range of available sources, since some of them, such as S&T museums and exhibitions, are not universally accessible. Moreover, this circumstance is linked at present with the small numbers of copies of S&T publications. As well as the "physical" inaccessibility of scientific information because of long distances within Russia, another probable reason is "intellectual" inaccessibility caused by poor quality and complicated presentation of this information. To understand the actual need for scientific information, respondents were offered three statements for comment (Fig. 5).

Fig. 4. Types of establishments visited during the last 12 months *(per cent of respondents per each country*)*



Sources: Eurobarometer, 2001.

Fig. 5. Demand for S&T information and its accessibility *(per cent of respondents)*



Sources: for 1996 – Gokhberg and Shuvalova, 1997; for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

As it turned out, more than half of respondents — 56% – believe that scientific knowledge is necessary in everyday life (in 1996 the figure was less – 49%); only one in three of the respondents – 31% – consider scientific knowledge unimportant. Similar answers were received from the UK respondents (59% agreed with the statement *It is important to know about science in my daily life*), the figure for the Japanese and the US respondents is larger (71% and 84% respectively) (National Science Board, 2002).

The self-assessment of intellectual abilities is rather high among the Russians: almost 2/3 of respondents (65%) have agreed with the statement that the essence of S&T can be understood by the majority of people, while only 18% have disagreed. In comparison with the 1996 survey the figures have changed, and now show a higher level of intellectual understanding of scientific issues (Fig. 5). Here, the viewpoints of the Russian and Japanese respondents have become similar – the number of Japanese people who support the accessibility of scientific information is 63%, although, the number of those who are still sceptical about the issue is much higher – 37% (Nagahama, 1995).

The importance of scientific information in everyday life was supported mainly by male respondents, young people, respondents with higher education and residents of capital cities.

Opinions vary considerably in terms of the possibility of obtaining scientific information. Only 42% of the respondents expressed confidence that there are enough opportunities to obtain information on S&T achievements for anyone who may require it. The number of abstentions is almost the same (39%). These respondents said that they had never searched for this kind of information. An opinion of respondents, who had found difficulties while searching for the necessary information, could be more indicative – the figure is only 19%. It is significant that, among highly educated people for whom S&T information is their "daily bread", there are many more unsatisfied persons – one in three. We can also understand Moscow and St. Petersburg residents, who are more definite with respect to having had a positive search experience, in comparison with other social groups. It is exactly these two cities, where the bulk of scientific knowledge has been concentrated.

The opinion of the Japanese respondents on this issue is quite the opposite – 76% of the respondents do not agree with the statement that there are enough opportunities to obtain information on S&T achievements for anyone who may require it, and only 23% are positive about the results (Nagahama, 1995).

In general, it is possible to assert that, the climate of opinions is still favourable enough for the dissemination of scientific knowledge, but that the real demand for it is insignificant. It also tallies with objective indicators of the level of scientific knowledge in the population.

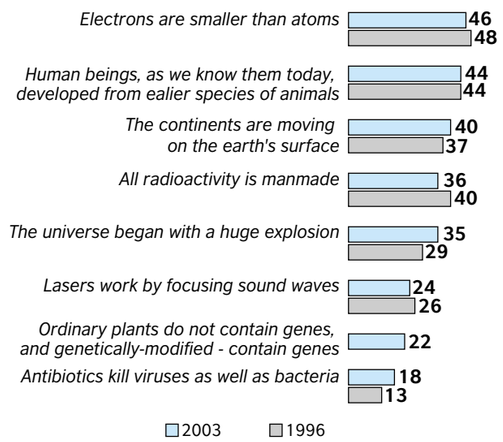
1.4. Scientific literacy of the population: perception of scientific concepts

The level of the population's education appears somewhat differently in the light of qualitative indicators, an important place among which is occupied by assessments of scientific literacy, i.e., the general level of scientific knowledge and understanding of scientific terms. Such indicators reflect not only the degree of acquisition of knowledge as a parameter of basic education but also an interest in the achievements of science as people's internal drive to improve their education.

Some tests were administered to determine how well people are informed about science. Respondents were requested to comment on eight statements of a scientific nature, worded in a simple form and reflecting fundamentals in different fields of science. Four of them were false and four were true (Fig. 6).

The findings inspire serious anxiety about the quality of education of Russian citizens. One in five respondents could not answer a single question correctly, one in six gave only one correct answer in eight. In contrast, all of the eight trial questions were answered correctly by only one in a hundred respondents. As presented by Fig. 6, none of the questions got even 50% correct answers. The top results were obtained concerning the theories that had long been part of secondary education: those of atomic structure (46%) and human beings' origin (44%). Less respondents could answer the questions on the continental drift theory (40%), theory of radioactivity (36%), theory of the universe's origin (35%), and quantum theory, i.e., on the nature of lasers (24%). The minimum of correct answers fell in biology – only 22% of the respondents answered this simple question about genetics, and on the virus theory (effect of antibiotics) only 18%. This question was perhaps the most confusing because it required a negative answer, which is psychologically more difficult. Besides, many people based their answers on personal experience of treatment for acute virus infections, in particular influenza. However, as far back as in the 1960s, the Soviet "Popular Medical Encyclopaedia" stressed that antibiotics were necessary only in danger of complicated infection resulting from active bacterial attack on a person already impaired by influenza.

Fig. 6. Understanding of some scientific theories
(the percentage of correct answers, per cent of respondents)



Sources: for 1996 – Gokhberg and Shuvalova, 1997;
for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

The respondents' knowledge has not significantly improved in seven years. However, there have been some positive results, mainly in two areas: the number of the respondents who answered correctly the question about the origin of the universe and the influence of antibiotics has increased (by 6 points), although knowledge on radioactivity has deteriorated (by 5 points). The results for the radioactivity issue may be due to the fact that the population has lost interest in the outcome of the Chernobyl disaster. The same may hold true for the apparent decrease in interest in the environmental problems (see section 1.1 above).

According to the survey findings, social groups are strongly differentiated by the level of scientific knowledge. Naturally, the highest level of scientific knowledge was demonstrated by persons with higher education. However, an analysis of their answers both in 1996 and 2003, has highlighted two alarming factors.

First, almost one-third of this group said the statement that human beings had developed from earlier species of animals was false (28%). However, this is probably not a matter of gaps in their education, but instead a disagreement with the scientific theory in principle. As it has turned out, a half of respondents with higher education consider themselves religious believers, and they are the ones in the survey who most often doubted the evolutionary theory of human beings' origin. This indicates that scientific atheism, a central belief of the former Soviet system, is shattered even amongst highly educated citizens, which means a decline of confidence in science at the level of socially accepted world outlook.

Second, a real gap has been found in the understanding of antibiotics' impact on viruses. Only one-fourth of respondents with higher education gave the correct answer, more than one third of them maintained that they were interested in the achievements of medicine. Such data testify that even highly educated respondents' basic knowledge is insufficiently profound for the understanding of new information in the realm of medicine, including the cases when it concerns their own health.

Territorial differences also turned out to be essential between urban and rural residents. All scientific theories under review are less familiar to rural residents; the level of knowledge among residents of small towns is just slightly higher. In general, there is a direct link between the status of the place and the level of scientific knowledge of the people inhabiting this place. The most vivid example is the question from genetics – metropolitans gave 35% of the correct answers, residents of other big cities – 26%, residents of towns of middle range – 20%, residents of small towns – 16%, village people - 14%.

There are some gender differences as well – men are in general more competent than women, especially in those fields the knowledge of which we identified as indicators of endeavour for raising their own intellectual level, i.e., theories of cognitive nature. Women displayed a level of knowledge almost equal to that of men in the theory of evolution as well as on the mechanism of antibiotics' effect.

Age differences were also very significant. Young people aged 16–24, fresh from school and college, gave much more correct answers in comparison with other age groups. The only exception was the question about the origin of the universe and the influence of antibiotics. All the middle-aged respondents gave almost similar answers. But respondents in the age group of 55 years and older, whose secondary education had been impeded by World War II and the post-war devastation, did worse in their answers than the rest. It is worth mentioning, that the 1996 survey showed almost the same level of knowledge of young people and middle-aged people. A conclusion was drawn about the stagnation of the educational system and its inadequacy to the challenges of the 21st century. Future surveys will show whether we can call improvements in the knowledge of youngsters a positive trend or not.

In comparison with citizens of advanced industrial countries, Russians are quite well informed about atomic structure (Fig. 7). As regards the questions about the origin of human beings and the universe, the answers in this country are approximately at the same level as in the United States, although experts estimate the latter case as rather low, explaining it by contradictions with the Bible; so the idea of whether we should use these test questions at all is being discussed (National Science Board, 2002, p. 7–11). The Europeans more often accept the evolutionary theory of human beings' origin, but the highest level of knowledge in this field was demonstrated in 1991 by respondents from

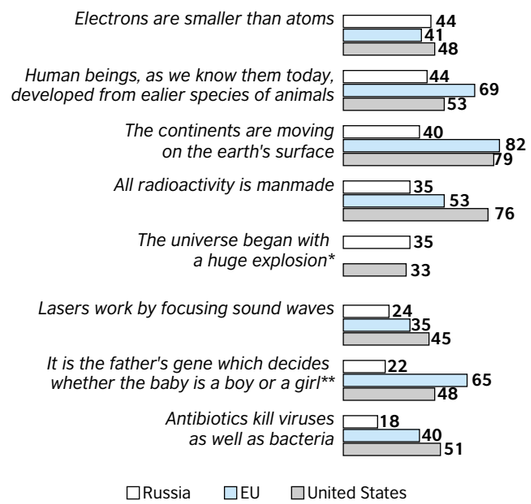
Japan (74% of correct answers), whose religious traditions do not contradict the theory of human beings' origin from earlier species of animals (Nagahama, 1995).

The level of knowledge about the nature of radioactivity indicates "vital" interest in the problem, excited by the wide diffusion of nuclear power stations and nuclear weapons as well as the problems of utilising nuclear waste, which intensified after the Chernobyl disaster. The highest level of knowledge in this area was demonstrated by the Americans (76% of correct answers), whereas the EU nations and particularly Russia showed much lower results (53 and 35% respectively).

Very poor knowledge, in comparison with Europeans and Americans, was also demonstrated by the Russians in some other areas. The issues were related to a new theory of continental drift, genetics, the nature of lasers, and the effect of antibiotics.

The 1996 survey involved the public understanding of the term *hole in the ozone layer*, i.e., the causes of reduction in the Earth's ozone layer and the related harmful effects. This term had been chosen because of its frequency in the media as well as because respondents themselves had displayed a primary interest in environmental problems. Besides, the survey implies an assumption that awareness of the causes of reduction in the ozone layer is an indicator of people's cognitive interest in new scientific knowledge, and awareness of the consequences of this phenomenon is an indicator of an instrumental interest in science, excited by concern about their own health.

Fig. 7. Scientific knowledge level in Russia, the EU, and the United States
(the percentage of correct answers, per cent of respondents)



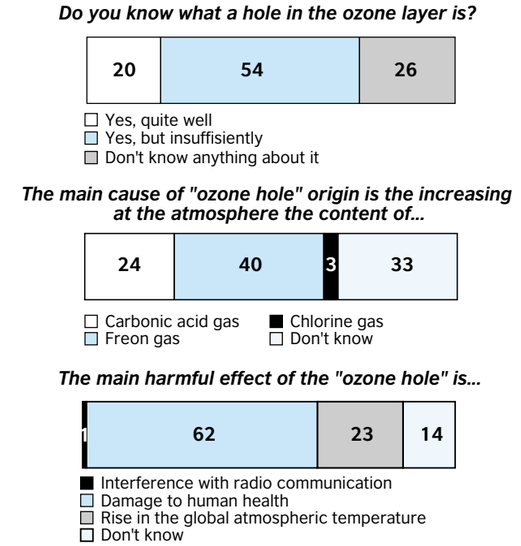
* In the EU the question was not asked
** In Russia a simpler test was administered: *"Ordinary plants do not contain genes, and genetically-modified ones – contain genes"*.
Sources: Russia – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics; EU – Eurobarometer, 2001; United States – National Science Board, 2002.

In general, Russian citizens demonstrated fairly good knowledge about the problem of reduction in the ozone layer. Respondents' estimates of their knowledge were high: 74% have said they know what a *hole in the ozone layer* is (Fig. 8). In fact, almost all of them properly understand the nature of this phenomenon's harmful effect (62% of respondents pointed out *Damage to human health because of an increase in ultraviolet radiation*). However, a considerably smaller number of respondents know the recent scientific version of the causes of reduction in the ozone layer: only 40% referred to an *increase of the freon gas proportion in the atmosphere*. Such an obvious difference in the level of understanding of causes and effects of this phenomenon provides one more proof of the prevalence of the vital interest in scientific knowledge.

Men are somewhat better informed about the causes of a *hole in the ozone layer* than women, whereas women more often correctly assessed the harmful effects, since they are more attentive to health issues. Age-specific differences in the level of understanding of this term are almost non-existent, but the self-estimates of elderly respondents are even slightly minimised, whereas those of younger people are exaggerated.

The highest self-estimate was typical for persons with higher education and residents of Moscow and St. Petersburg,

Fig. 8. Understanding the term "An Ozone Hole"
(per cent of respondents)



Sources: Gokhberg and Shuvalova, 1997.

but the actual level of understanding of the term in these groups turned out to be just slightly above the average. Moreover, metropolitans answered even worse than residents of other big cities.

The main conclusion based on the above data is as follows: the level of scientific literacy in Russia is lower than that of the citizens of advanced industrial countries. The interest in scientific achievements is mainly vital and not cognitive, evidencing itself concerning an immediate danger to personal health and life, but not caused by a drive from individuals towards increasing their personal educational level. Even people with high education have "black spots" in their basic knowledge in natural sciences. The majority of Russians obtain scientific news in a "passive" way, mainly from the mass media. Not many people can afford to buy specialised scientific journals or scientific publications of general interest, or to visit museums and technical exhibitions. It is an alarm signal that the education of Russian citizens may become a deterrent to the technological and economic growth of the country and the solution of global problems.

CHAPTER 2

ASSESSMENT OF THE CONSEQUENCES OF S&T DEVELOPMENT

It is difficult to unambiguously assess the results of the application of S&T achievements. On the one hand, working and living conditions are being improved, but simultaneously the rate of life accelerates to some people's detriment; life expectancy grows, but environmental conditions worsen; opportunities of communication are facilitated, but more and more sophisticated weapons of mass destruction are created; the intellectual level of the population rises, but the threat of unemployment grows, etc.

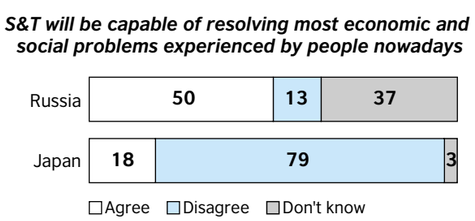
Studies by sociologists and psychologists register public concern with the impact of science on universal human and ethical values and norms, and duality or even plurality in attitudes towards S&T. As a result, individuals learn to filter and use information flowing daily from the media, and from friends and colleagues, in different ways. For example, J. Miller has revealed two main perceptions of information on S&T: the first one expresses hope for science, and the second one demonstrates restraint towards it. According to his studies, interaction of these two value-specific schemes and such factors as gender, age, education, and scientific literacy, form specific public preferences that include, for example, public support for government funding of basic research (Miller, 1996). In understanding the extremely opposite positions of these value-specific schemes, it is possible to consider two directions of philosophical thought, demarcated as far back as the 17th century: scientism and anti-scientism. The scientist orientation is based on the belief that scientific knowledge is an absolute cultural value. Instead, anti-scientism considers scientific knowledge as alternative to cultural values, criticises science for suppressing other forms of consciousness and initiating negative social and natural processes, features science as an alienated mode of thinking and a source of dogmatism and totalitarian claims, and demands equality between scientific and unscientific ways of viewing the world.

To answer the question, which views prevail in the mass consciousness of the Russian population concerning science, parameters such as optimistic and pessimistic expectations concerning its future achievements, positive or negative assessments of the consequences of S&T development, opinions on the role of science and technology in changes in the standard of living and various aspects of quality of life (pace of life, living and working conditions, security and comfort, health and environmental conditions, etc.) have been analysed. Many of these indicators are widely used in similar Western studies (National Science Board, 1991–2002; European Commission, 1994; Eurobarometer, 2001).

2.1. Do Russians believe in S&T?

Several generations of Russian citizens have grown up in an atheistic environment, in the context of the Soviet promotion of S&T progress. So it is no wonder that belief in science became one of the features of the Russian mentality. For example, a half of respondents (50%) agree with the statement that science can resolve most of the economic and social problems of society and only one-seventh (13%) did not agree with this assumption. A quarter of the respondents went for the option *don't know* (37%), which could be viewed as scepticism, hidden in the past due to some ideology about science that the Russians had been indoctrinated with for a long time. A completely opposite ratio of opinions is found among Japanese people who are not as restrained in expressing their opinions: only 18% of those interviewed in that country unconditionally believe in science, and 79% regard opportunities of science with scepticism (Fig. 9).

Fig. 9. Belief in science
(per cent of respondents)



Sources: Russia – Gokhberg and Shuvalova, 1997;
Japan – Nagahama, 1995.

The European respondents share the same view, although for them the question was formulated somewhat differently: *Science and technology can solve all problems* (17% of the respondents were in favour of this, and 73% – against) (Eurobarometer, 2001).

Among particular social groups in Russia's population, confidence in science is more often expressed by respondents in the age group of 25–39 years and by persons with higher education. We should notice at the same time that highly educated respondents also gave more negative answers. More scepticism with respect to the capabilities of science is also displayed by the residents of big cities.

2.2. Effects of S&T: benefits and harms

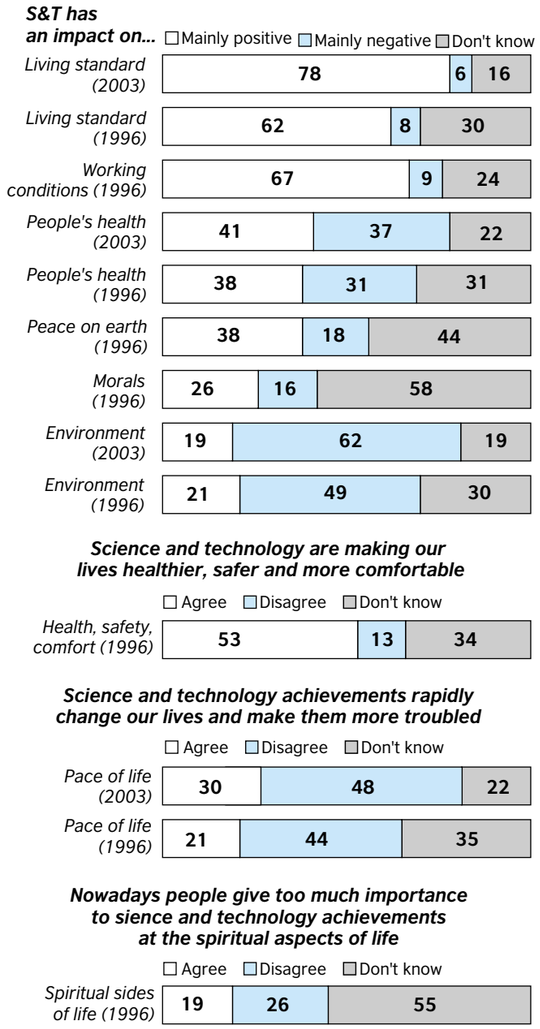
To identify the population's ideas concerning the impact of S&T progress on people's lives, respondents were asked to give positive or negative comments on a number of statements about the impact of science on particular aspects of life, which they interpret in a positive or negative sense, as well as an integrated assessment of the consequences of S&T development.

Assessment of the impact of S&T development on various aspects of life. The greatest unanimity was shown in positive estimates of the impact of S&T development on the *standard of living* and *working conditions* (Fig. 10). In this case, positive answers totalled, respectively, 78% and 67%, whereas negative ones gathered only 6% and 9%. Benefits from S&T progress are more often noted by men, persons with a high level of education, and townspeople.

Similar ratios are observed in answers by residents of advanced industrial countries (Fig. 11). Only the opinion of the Japanese concerning the impact of science on working conditions was not as unanimous as that of the Russians and Americans, and somewhat more pessimistic.

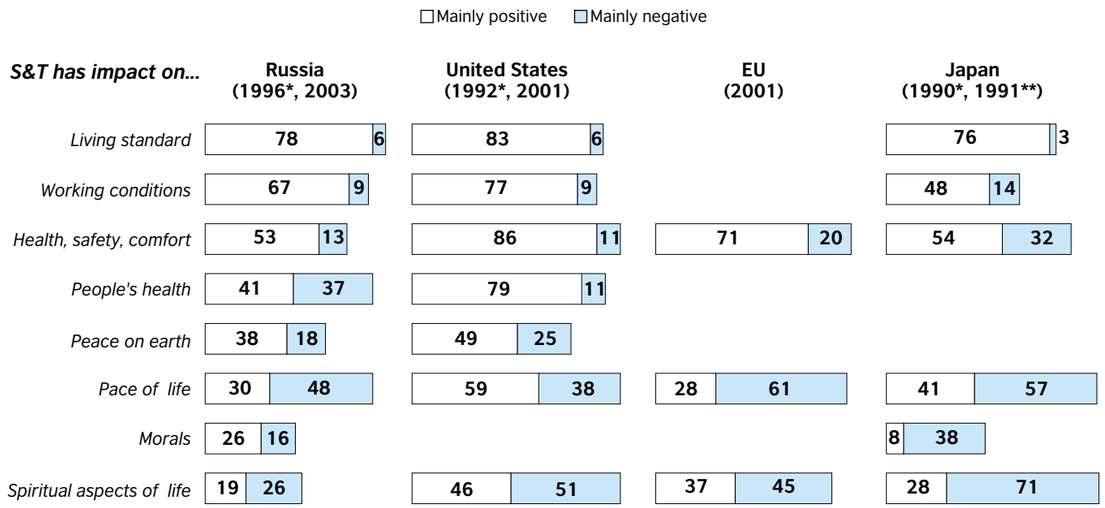
However, in the assessment of the impact of science and technology on well-being – *health, security, comfort* – the share of positive estimates among the Russians is much lower (53%). The same opinion is held by the Japanese respondents (54%), moreover, they gave many more negative responses – 32%, whereas in the Western countries, particularly in the US, the majority of the population has a positive point of view – in the EU the figure is 71% (against 20%), in the US – 86% (against 11%). The reason appears to be that Russian respondents got embarrassed because the first point of the question concerned health, the influence on which could not be estimated by many of them as unequivocally positive. In fact, when they were asked to estimate separately the impact of S&T progress on *people's health*, the opinions were divided almost fifty-fifty (41% positive answers against 37% negative ones, almost the same ratio has been kept since 1996). At the same time, among the Americans, positive responses were 7-fold more numerous than negative ones. It is important to note that in Russia the answers noticeably differ between wealthy and needy

Fig. 10. Assessment of S&T impact on various aspects of life
(per cent of respondents)



Sources: for 1996 – Gokhberg and Shuvalova, 1997;
for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Fig. 11. S&T impact on various aspects of life, assessed by the population in particular countries
(per cent of respondents)



* Options *Living standard, Peopl's health* and *Pace of life* – were offered in 2003, options *Working conditions, Peace on earth, Health, safely, comfort, Morals* and *Spiritual aspects of life* – were offered in 1996.
** Options *Health, safety, comfort, Spiritual aspects of life* and *Pace of life* – were offered in 2001, options *Living standard, Working conditions, Peace on earth* and *People's health* – were offered in 1992.
*** Options *Health, safety, comfort, Spiritual aspects of life* and *Pace of life* – were offered in 1991, options *Living standard, Working conditions* and *Morals* – were offered in 1990.
Sources: Russia: for 1996 – Gokhberg and Shuvalova, 1997, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics; United States: for 1992 – National Science Board, 1993, for 2001 – National Science Board, 2002; Japan: National Science Board, 1991, Nagahama, 1995; EU – Eurobarometer, 2001.

citizens. The higher the income of the respondents, the more often they recognised a positive influence of science on human health. Thus among the respondents with large incomes, positive answers were given by 46%, negative ones by 37%, whereas among respondents with low incomes the share of positive answers was less than that of negative ones – the ratio: 38% against 40%, respectively. Obviously, rich people are better informed and, besides, have more opportunity to take advantage of S&T novelties, achievements of medicine, etc., whereas the poor have no such opportunities and obtain information mainly from the media accessible to them, which tend to cover the negative consequences of S&T development.

The assessments of the impact of science and technology on *global peace* were also ambiguous; however, in this case positive opinions were approximately twice as much (the ratio of positive and negative answers was 38% to 18%). Moreover, this ratio is directly dependent on the age, educational attainment level, and incomes of respondents. Nearly the same picture is provided by the results of the survey conducted by US sociologists (49% vs. 25%).

The most negative opinion, where the share of negative responses exceeds that of positive ones, had developed concerning the accelerating *pace of life* because of S&T achievements (the ratio of positive and negative answers - 30% to 48%) and particularly in the evaluation of the impact of science and technology on the condition of the *environment* (threefold excess – 19% against 62%). Discomfort from the acceleration of pace of life is more often sensed by persons in the working population and urban dwellers. According to the findings of foreign surveys, the answers of US residents are strongly differentiated from the rest. More than half of Americans (59%) answer that they are not disturbed by the high pace of life; moreover, in the United States there was found the smallest share of those who had responded negatively (38%). In European countries and Japan, similarly to Russia, negative estimates prevail.

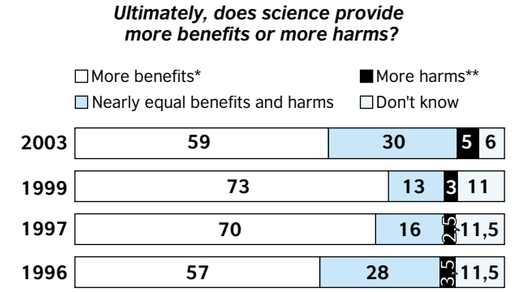
For the analysis of the impact of S&T on people's morality and spirituality, see section 3.4 below.

Integrated assessment of the consequences of S&T development. Both in Russian and in foreign studies, examination of the role of science in society traditionally concerns integrated assessments of the consequences of S&T development.

A majority of Russians believe that development of science provides society with more benefit than harm: *surely, more beneficial* – 31%, and *most likely beneficial than harmful* – 28% (Fig. 12). The number of respondents supporting this opinion varies from 57% to 73%. This group includes strong advocates for the mentioned point of view (every second respondent) and those hesitant (every sixth respondent),

whose opinion may vary, depending on fluctuation of mood, which, in turn, could be caused by the interviewer's questions. For example, in the 1996 and 2003 surveys, the respondents were initially asked about the effect of science on various aspects of life. After that followed the request to present an integrated evaluation of scientific development and achievements. Therefore, negative responses prevailed, in comparison with the results of the 1997 and 1999 surveys, where the emphasis was put on the government support of science.

Fig. 12. Integrated assessment of the consequences of S&T development
(per cent of respondents)



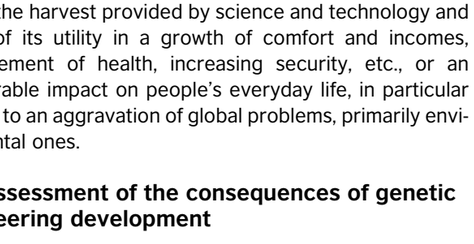
* Position *«More benefits»* contains options *«Undoubtedly more benefits»* + *«Probably more benefits»*, position *«More harms»* contains options *«Undoubtedly more harms»* + *«Probably more harms»*
Sources: for 1996 – Gokhberg and Shuvalova, 1997, for 1997 – Gokhberg and Shuvalova, 1998, for 1999 – Russian Science and Technology at a Glance: 1999, for 2003 – Institute for Statistical Studies and Economics of Knowl-edge / Higher School of Economics.

A sceptical position, which could be considered as moderately negative, had been taken by 13-30% of those interviewed (they consider that science can provide *approximately equally benefit and harm*). And a sharply negative view was shared by 3–5% (those who answered: *certainly more harm than benefit* or *Rather more harm than benefit*).

The share of positive answers was higher among young respondents, persons with a higher level of educational attainment, and residents of big cities. Negative answers were found, as a rule, among senior citizens, and persons with a low educational level. Different positions against science are found among young people (below 24 years): students adhere basically to positive "pro-scientific" views compared to those who are not studying.

Comparison with data from surveys conducted in other countries shows that the most positive assessments were made by the Americans. The "pro-scientific" view of the Russian people stands very close to the American view on the same subject. The Europeans and the Japanese are less optimistic in this respect. Europe has a greater number of respondents with a negative evaluation (almost every fourth respondent), and the Japanese prefer the option with equal consequences and opportunities (every second respondent) (Fig. 13).

Fig. 13. Integrated assessments of the consequences of S&T development by the population in particular countries
(per cent of respondents)



Sources: Russia – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics; United States – National Science Board, 2002; EU – Eurobarometer, 2001; Japan – Nagahama, 1995.

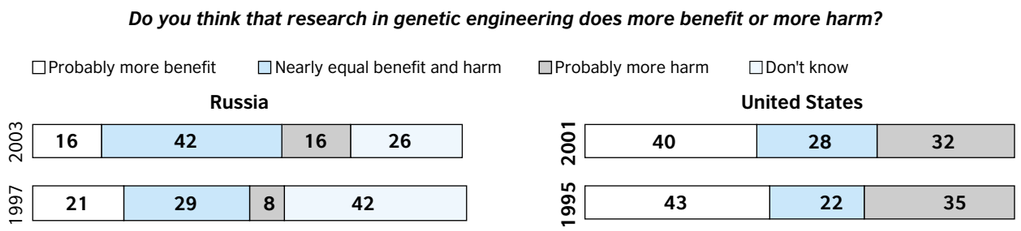
It is interesting to analyse the dynamics of answers to the specified question in advanced industrial countries, reflecting their cultural traditions and the populations' psychological features. For example, among the Americans, the share of positive answers grows, and the share of negative ones, extremely low in the early 1970s, somewhat increased to 1985-90. The latter circumstance is probably related to the emergence of new nuclear powers and major technological failures (the Chernobyl accident, the space shuttle Challenger crash, etc.). However, these factors could not constrain the growth in the share of positive opinions. On the contrary, in France, the proportion of positive assessments steadily goes down, and the number of those who hold the opinion that science brings about *approximately equally benefit and harm* is increasing. The share of negative answers remains unchanged, but at a very low level. Results of the survey conducted in Japan show a similar tendency.

Such data reflect either a real degree of the population's use of the harvest provided by science and technology and proof of its utility in a growth of comfort and incomes, improvement of health, increasing security, etc., or an undesirable impact on people's everyday life, in particular related to an aggravation of global problems, primarily environmental ones.

2.3. Assessment of the consequences of genetic engineering development

Informational support of innovations is very important, because society makes its opinion on whether to accept this or that kind of innovation, based on the received information. Let's look at the results of the informational effect on public opinion regarding genetic engineering. The Russians obtain data about this field mainly through the mass media, and not in every day life.

Fig. 14. Assessment of the consequences of genetic engineering development
(per cent of respondents)



Sources: Russia: for 1996 – Gokhberg and Shuvalova, 1998, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics; United States: for 1995 – National Science Board, 1995, for 2001 – National Science Board, 2001.

The general evaluation of the achievements of genetic engineering is basically sceptical. The majority of the respondents stated that genetic engineering is both beneficial and dangerous (42%). The number of respondents who consider it dangerous (16%) is the same as the percentage of those who think of it as beneficial (16%). A quarter of the respondents (26%) failed to answer the question (Fig. 14).

Positive evaluation is mainly given by men, younger respondents, persons with higher education, and residents of big cities. Negative evaluation is frequent among respondents aged 45 and over, among people with an educational level lower than secondary, villagers and also among the residents of Moscow and St. Petersburg.

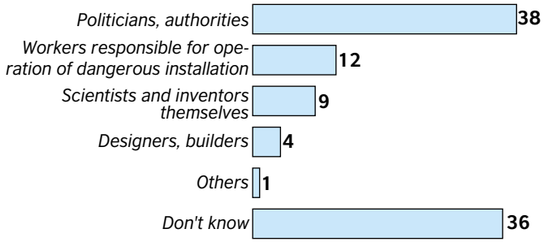
Compared to the results of the 1997 survey, the respondents have expressed a more accurate view on the outcome of genetic engineering and its development. But this view has become much more sceptical than before. Six years ago almost half of those interviewed (42%) were undecided, but among those who gave a substantial answer nonetheless, sceptical (29%) and optimistic (21%) forecasts prevailed, and the number of pessimists was insignificant (8%).

A similar question is asked on a regular basis in the United States (Fig. 14). The responses of the American people, compared to the Russian ones, are more definite and accurate – sceptics are less numerous (28%), although their number has grown a little compared to the 1995 figures, while the key positions are taken either by optimists or pessimists (where optimists are slightly in the lead – 43% and 35%, respectively). In European countries the majority of respondents are sure that genetically modified organisms (GMOs) could have a negative effect on the environment (59%) (Eurobarometer, 2001).

2.4. Who is responsible for the failures?

Many respondents (36% of those interviewed) were undecided in giving a plain answer to the question who is most often responsible for the negative consequences of scientific achievements (Fig. 15). A majority of Russian citizens accuse politicians, representatives of authorities, and officials (38%). Notably, among highly educated respondents, persons aged 40-54 years, and residents of capital cities, this opinion is shared by one in two. Personnel responsible for the operation of dangerous systems (12%) and scientists (9%) were referred to significantly less often, and most seldom blamed were designers and builders.

Fig. 15. Who are, in the population's opinion, to blame for harm caused by S&T progress?
(per cent of respondents)



Source: Gokhberg and Shuvalova, 1998.

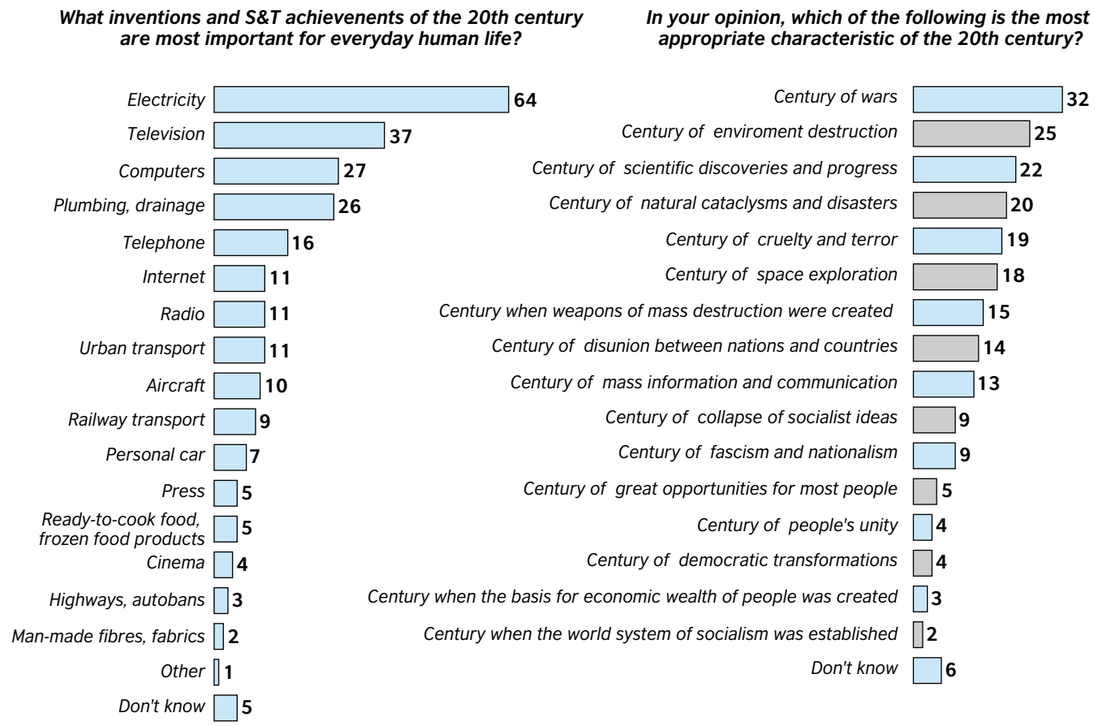
If we consider the standpoint accusing scientists of negative consequences of S&T progress as the indicator of radical "anti-scientism" and, on the contrary, recognition of science as a reference point for world outlook (see section 3.4) as the indicator of extreme "scientism", it is possible to indicate the proportions of adherents of these positions among Russian citizens: 9% on each of the poles.

So how can we neutralise the negative consequences of scientific development? Is it possible to use prohibitive measures? The population's opinion in this respect is considered in section 5.1 below.

2.5. Rating of S&T achievements in the 20th century

The range of opinions of the Russian respondents assessing the results of scientific activities can be supplemented with data from the survey conducted by the Russian Centre for Public Opinion and Market Research (VCIOM) in August

Fig. 16. S&T achievements of the 20th century ranked by importance
(per cent of respondents)*



* The sum exceeds 100% since respondents could choose several opional answers.
Source: VCIOM, 1999.

1999 (sample – 1,600 respondents). The survey involved the most important achievements of the 20th century. It is interesting that the highest rank was received by information technology. For example, from answers to the question which are the most important discoveries and achievements of S&T in the 20th century for everyday life, all these technologies settled at the top of the rating scale: from the second to the sixth place in seventeen. TV was pointed out by 37% of respondents, computers by 27%, telephone by 16%, and the Internet and radio 11% each (Fig. 16). The first place was taken by the invention of electricity. From this, it is possible to conclude that the Russians greatly appreciate the information society.

The second question was devoted to a general characteristic of the 20th century. This case is astounding for the abundance of negative statements. From sixteen characteristics, the first eleven positions were attributed to wars, destruction of the environment, natural cataclysms and accidents, cruelty and terror, weapons of mass destruction, disintegration of nations, fascism and nationalism. For positive statements, high rankings were occupied only by the characteristics related to S&T progress: *the century of scientific discoveries and progress* (the third place), *space exploration* (the sixth place), and *the century of mass information and communications* (the ninth place).

Unfortunately, social transformations, even on the basis of great achievements of science and technology, have not reached such a stage, at least in Russia, that people would consider them as successes of the 20th century. No more than 5% of respondents have assessed the last century as a period of implementation of the idea of equal opportunities, integration of people, democracy, material wealth, and socialism. These characteristics were relegated to the last positions.

CHAPTER 3

IMPORTANCE OF S&T FOR RUSSIA

Science played a significant role in the communist ideology of the former Soviet Union. It was declared a basis for shaping the centrally planned economic system and setting development objectives. This included modernisation of the economy to effect the transition from an agrarian society to an industrial one, and the creation of a military industrial complex to increase the defence capabilities of the state. Moreover, science was considered a source for the communist indoctrination of the population.

Besides the internationally acknowledged achievements of Soviet scientists in basic research were important ideological arguments sustaining the concept of the "most advanced" political system. The USSR, as a superpower, followed an ambitious strategy in all fields of science and technology, and the oversized R&D sector was a consequence. Soviet science and technology was guided primarily by political objectives (Gokhberg et al., 1997, p. 11). Accordingly, tremendous financial, material, labour and information resources were invested in science. Propagation of science was implemented very actively and rather successfully — the status of scientific activities was extraordinarily high and Soviet science was considered as one of the symbols of national prestige.

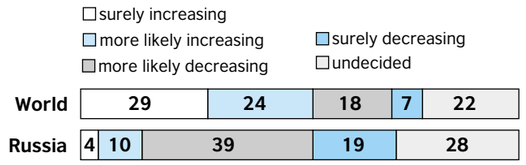
However, with the transition to a market economy, the status of science drastically declined, although, as it might seem, the initially high national research potential could have been translated into innovative activities for increasing the competitiveness of the Russian economy. One of the causes was the distorted structure of Soviet science, its "technocratic" orientation, which was mainly linked to the military industrial complex, whereas expenditures on medicine and related life sciences, natural sciences and agricultural R&D, were significantly lower than in other industrialised countries (Ibid.). The second reason was a traditionally insufficient degree of autonomy of Russian S&T from the state, and the disregard of an important alternative channel of support from non-government funding for applied R&D projects. In the Soviet period, this provision had not existed, and the absence of a competitive environment for enterprises in the centrally planned economy was the main factor hampering introduction of R&D results into industrial practice. At the present time overcoming such a "heritage" seems to be an extraordinarily complicated challenge. This is not only because precious time for modernisation has been lost, but also for a number of more delicate reasons, namely that time is required for the restructuring of the national R&D base, and the creation of the legal and economic conditions for the intensification of innovation processes (Gokhberg, 2003).

3.1. Public opinion on the role of science in the world and in Russia

Russian respondents have attributed fairly high values to the role of science in society. More than a half of those interviewed viewed the value of science as increasing in the contemporary world, although a quarter of them have said that the role of science is decreasing worldwide (Fig. 17). A strengthening of the importance of science is more often recognised by young people, persons with higher education, and residents of big cities. A decline of the role of science in the world was primarily indicated by women, middle-aged or lowly educated persons, and residents of small settlements.

However, while estimating the situation in Russia, most respondents recorded a declining status for science, two-

Fig. 17. Public opinion on the role of science in the world and in Russia *(per cent of respondents)*



Sources: VCIOM, 1995; Gokhberg and Shuvalova, 1997.

thirds of those interviewed saying that its role in this country is going down and only one in seven believing it is going up. The greatest pessimism was expressed by respondents with higher education: 80% in this group noted a decline of the role of science in Russia. On the contrary, young people gave positive estimates twice as often as the sample average.

3.2. Science as a symbol of national prestige

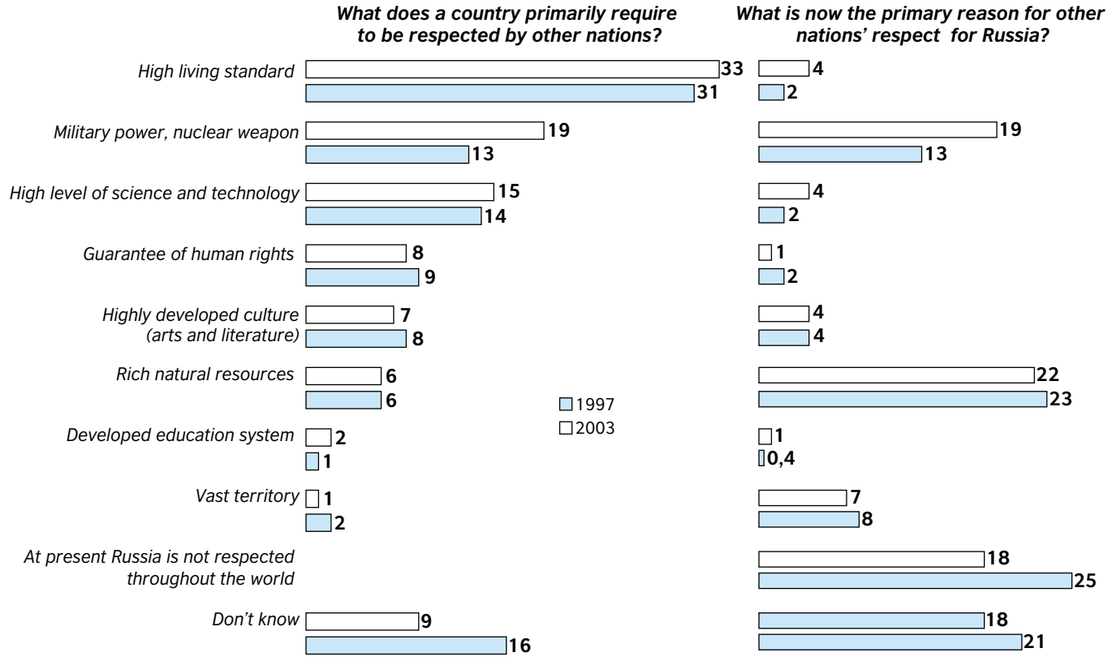
Russian citizens still highly appreciate science as a symbol of national prestige. To disclose the prevailing notions about symbols of national prestige, a question was used referring to an abstract country: *What does a country primarily require to be respected by other nations?* (respondents could give only one answer). In this case, the frequency of responses gave first place to *high living standard*, a rather painful subject for Russians and therefore unsurprisingly marked by each third respondent (Fig. 18). The second place was taken by the option *military power, nuclear weapon*, every fifth of the respondents (19% of respondents[1]) chose it as the key aspect of national prestige, thereby highlighting a special importance for defence-related aspects of science. The option *high level of science and technology* (15%) took third place. Humanitarian values were chosen still less frequently.

The mentioned options were distributed like this among the first, second and third places in almost all the social, demographic and territorial groups. Only four groups, namely women, residents of Moscow and St. Petersburg, managers at various levels, and housewives, marked science and technology as the second priority, and military superiority as the third. Science and technology are also more often highlighted by young people aged 25-34, persons with higher education, residents of Moscow and St. Petersburg, and by the population of the Southern region of Russia. In contrast, military superiority is usually preferred by men, the youngest respondents, and the residents of middle-range towns. Thus, science as a symbol of national prestige has played two roles, directly as itself and also in its contribution to military superiority, which resulted in recognition of its importance by more than one-third of the respondents (34%).

At the same time, while ranking answers to the similar question relating to Russia, first place by frequency of response was rich *natural resources* (22%), the second place was

[1] *Note: the survey was conducted before the US and the UK military campaign in Iraq. The Russian media were widely covering almost every stage of the preparation for the campaign. It is highly possible, that the number of respondents who selected Military power, nuclear weapon as the key aspect of national prestige could have been much less in a time of peace.*

Fig. 18. Symbols of national prestige
(per cent of respondents)



Sources: for 1997 – Gokhberg and Shuvalova, 1998,
for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

occupied by *military power* and *nuclear weapon* (19%), and the third to *vast territory* (7%). Military superiority was given first place by men, youngsters and country people (25%), by unemployed (26%) and housewives (21%). Almost nobody chose either *high level of science and technology, highly developed culture or high living standard* of citizens (4% of respondents each). And one-fifth of respondents believe that *at present Russia is not respected throughout the world* (18%).

On the whole, of the four disclosed main attributes of national prestige, the respondents have indicated for Russia only one function of science – the military one, which confirms a high estimation for the role of Russian science in strengthening the defence power of the nation. At the same time, it is noted with regret that irrespective of the actual merits of the domestic science base, respondents do not consider either the present state of Russia's S&T potential or the level of the national education system, to be significant factors in determining the prestige of this country.

Differences in this opinion are small between social groups. However, it is worth noting some sarcasm in the answers of young respondents who more often than others mentioned as a symbol of Russia's national pride its military power and nuclear weapon. At the same time, for an "ideal" country they, as a rule, specified a high level of S&T development.

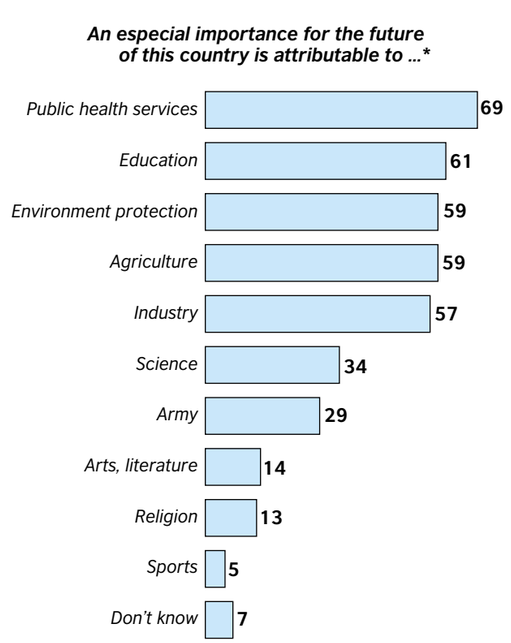
3.3. Importance of S&T for Russia's future vis-à-vis other activities

Looking at the degree of comprehension of the importance of science and interest in it, in comparison with other activities, indicates some distance of the population from science. So, in response to the question *Which of the following is especially important for the future of this country?* science was mentioned by 34% of respondents (Fig. 19). In the list of ten options, science took sixth place in order of frequency, selected by each third respondent. Thus, science leaves behind such positions as defence and spiritual endeavour, as well as sports.

At the same time, the first places were occupied by exactly those activities whose level of development is stipulated by the economic and social functions of science, such as the economy, public health services, education, and environmental protection. This distribution might mean that either the development of these sectors is in general weakly associated with the progress of science, or that scientific knowledge has already gone far ahead. So efforts should be aimed less towards its development, and more towards a wide application of the results of scientific activities in other areas, to facilitate the life of Russian society.

Priority is more often given to science by persons with higher education (52%) and young people, urban residents, and male respondents in general. It is interesting that the rating of science is high among housewives (50%) and students of all levels (46%), which demonstrates the preservation of an understanding of the importance of science in early education. In contrast, the army is positioned above the sciences by respondents with an education below secondary, elderly people, and rural residents.

Fig. 19. Importance of S&T for Russia's future vis-a-vis other activities *(per cent of respondents)*



* Respondents were not limited in the choice of the number of answers and selected from 1 to 6 options.
Source: VCIOM, 1995.

3.4. Spiritual contribution of S&T

S&T influences all domains of society. Over the last two centuries, the application of scientific knowledge, methods, and new technologies, has resulted in revolutionary changes in the economy, politics, and social life. Science has also radically changed the outlook of people in the spiritual area. Under its influence, the very style of thinking is changing. But we have now reached a stage when the progress of science has begun to outstrip social development. This is expressed in the unreadiness of society to regulate conflicts related to the new achievements of science, for example, cloning, life support for coma patients, and the like. Nevertheless, society will be forced to "catch up" with S&T with respect to regulating the ethical aspects, and the earlier it realises this task, the more effective will be its interaction with science.

Among Russia's population, at the time of the 1996 and 1997 surveys, the climate of opinions concerning the impact of science on spirituality was extraordinarily low-key. The request to assess the influence of science and technology on morals and the spiritual side of life caused difficulty with more than a half of respondents (compared to the evaluation of other aspects of life, described in section 2.2). The question on morals was commented on positively by 26% of the respondents, 16% giving negative views. In contrast, while commenting on the sentence *Nowadays people give too much importance to science and technology achievements at the expense of spiritual sides of life* – the number of respondents in favour of the statement comprised 26% compared to 19% of respondents who were against it (Fig. 10). It is possible to consider these negative assessments as a reproach to society's excessive enthusiasm for material benefits at the expense of spiritual life, than as certainty about the destruction of moral foundations. This reproach was found more often among highly educated people and residents of big cities.

For most of the respondents an interest in S&T ran counter to spirituality. For the Japanese, evaluating the influence of science on spiritual life resulted in a share of negative answers almost threefold that of positive ones (71% against 28%), and in estimation of the influence of science on morals this ratio was almost fivefold (38% versus 8%). In the United States and EU countries, the question on the influence of S&T on spiritual life is asked on a regular basis. There were more negative answers than positive ones at the time when the 2001 survey was conducted (Fig. 11).

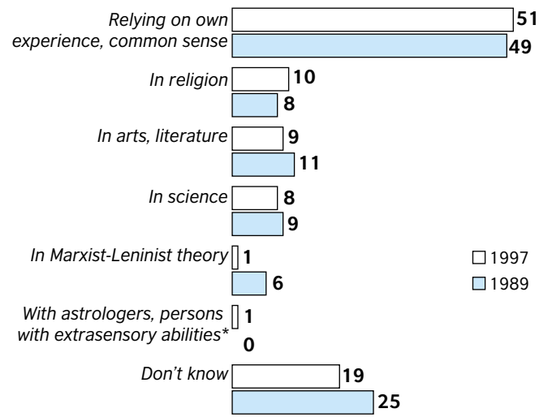
The bulk of negative opinions seemed mainly due to the growing number of splashy publications and TV commentaries about cloning. The forecasts for the results of research in genetic engineering, and the attitude toward cloning of people and animals, predict negative responses from the majority of the population (see sections 2.3 and 5.1). Nevertheless, there does not appear to be anxiety about the expansion of science into the spiritual area in Russian society.

However "scientism" does not appear to be too widespread among Russian citizens. Science is perceived as a guiding line for world outlook by only each tenth respondent (Fig. 20). As the 1989 and 1997 surveys demonstrated, responses to the question where a person can most likely find answers to issues concerning his/her views on life and attitudes towards other people, society, and the world in general, the share of those who chose science came out approximately on a level with religion and the arts. The majority of respondents preferred pragmatic rationality, having mentioned their own experience, knowledge, and common sense. At the same time, this approach to reality is a distinctive feature of scientific modes of thought, and can therefore be considered as favourable for science.

In different social groups, the rating of science is approximately the same and the differences do not exceed sample

error. Even the reference group – respondents with higher education – more often mentioned arts and literature than science. Adherents of religion are more numerous among elderly people. The largest proportion of those trusting astrologers and persons with extrasensory abilities has been found among young people aged 16–24 years (1.8%), which could cause some anxiety since the communist ethic has lost its significance in Russia, and religious principles will hardly prevail in the minds of the younger generation. On the back of the loss of traditional world-outlooks, the activities of magicians, sorcerers, fortune tellers etc. have intensified. To gain authority with the population, they copy the organisational patterns of the scientific community, establishing "institutes" and "academies", awarding masters degrees in white and black magic or "professorships" in parapsychology.

Fig. 20. Guiding lines of world outlook
(per cent of respondents)



* Option *With astrologers, persons with extrasensory abilities* was offered only in 1997.
Sources: for 1997 – authors (the data are published for the first time), for 1989 – Levada, 1993.

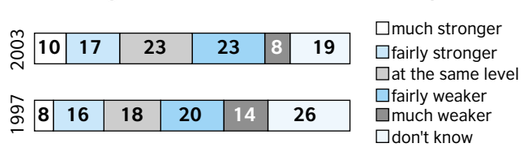
Western countries consider the issue of differentiating between science and pseudoscience to be of great importance. As an example, in answer to the question: *Whether astrology is scientific*?: 9% of those queried in the US survey said that astrology was "very scientific" and 32% answered "sort of scientific"; 56% said that it was not at all scientific. The NSF publication also contains other data regarding belief in pseudoscience (National Science Board, 2001, p. 7–36 – 7–38).

3.5. Comparison of Russian S&T capacities versus those of industrially developed nations

What is the reason for the population's low assessments of the contribution of S&T to Russia's prestige? Two explanations are possible: either it means that the level of Russian science is estimated lowly, or that it is isolated from the practical needs of society. To find out the reason influencing this opinion, two questions were offered to respondents: one on the level of Russian R&D capacities and the other on the S&T level of the Russian economy and society.

In the answers to the first question concerning the level of scientific research in Russia, each fourth respondent evaluated it as standing above the world average. Almost the same number of respondents consider Russian R&D equal to world state-of-the-art levels, but each third is also certain that Russia yields in this respect to advanced countries (Fig. 21). On the whole, positive answers appear to be more numerous than negative ones with a ratio of 50% against 31% (an excess of 19 points). The number of positive assessments was higher among respondents aged 25–34 – 63%, residents of Moscow and St.-Petersburg - 57%, persons with higher education - 56%, and male respondents – 54%. In contrast, a high proportion of negative responses was registered among respondents aged 55–64 – 39%, and residents of big cities – 37%. Thus, the highest ratings for the level of the domestic science base are characteristic of those strata of the population that are more familiar with its achievements.

Fig. 21. Opinion on the level of Russian R&D
(per cent of respondents)



Sources: for 1997 – Gokhberg and Shuvalova, 1998, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

The second question, whether Russia is a country with a high level of S&T development, was intended to demonstrate an assessment of the contribution of Russian science to economic and social development. Opinions concerning this question were divided into three almost equal parts. More than one-third of respondents answered in the affirmative (36%), those who disagreed with this statement were slightly less numerous (30%), and approximately as many could not answer – 34% (Fig. 22). It is interesting to note that a similar question has been asked in surveys conducted in Japan since 1987. The Japanese have a much higher opinion of the level of science in their country, with positive and negative answers in a proportion of 84 and 10% respectively, and this ratio has remained constant over many years (Nagahama, 1995).

Some patterns have been found in the assessments of Russia's S&T level by different social groups. For example,

the older the respondents and the lower their educational level, the higher the assessments. Generally speaking, the more distant respondents are from R&D activities, the higher they evaluate this level, and vice versa. An exception are residents of Moscow and St. Petersburg, of whom almost half consider Russia as a country with a high level of S&T (negative answers were given by 29%). It is possible to explain the high estimates obtained from these metropolitan residents, by the fact that these two cities are the largest centres of science and high-technology production in Russia, where science and the socio-economic area really interact.

Fig. 22. Opinion on Russia's S&T level
(per cent of respondents)

Russia is an advanced country in science and technology

Agree	Disagree	Don't know
36	30	34

Source: Gokhberg and Shuvalova, 1998.

The obtained data indicate that the reason for a low assessment of the contribution of science to Russia's prestige, consists not in a low level of Russian R&D, but in a separation of theoretical science from the practical needs of society.

CHAPTER 4

PRESTIGE OF S&T ACTIVITIES IN RUSSIA

The prevalence of negative information on the condition of Russian science has resulted in an extremely unfavourable microclimate in society, which is a serious obstacle to attracting young people to work in R&D, a concern expressed by many scientists (*Russian Academic Science in Assessments by Scientists*, 1996). They assess their position as being at the bottom of the Russian social structure, at the level marked as 3.3 (on a tenpoint scale), whereas the position of similar professionals abroad is ranked by them much higher, namely at 7.3.

The population also demonstrates a rather negative assessment of the living and working conditions of Russian scientists, but its general attitude towards R&D activities is positive. So, for many strata of the population a scientific career remains attractive. Russian citizens condemn emigration of scientists and believe that the government should stop the brain drain, through establishing social guarantees and privileges for scientists.

4.1. The image of scientific research in public opinion

When analysing the public opinion of the "image" of scientific research, one can easily see that a majority of respondents do not want to speak about science negatively. The social importance of scientific labour, and the complex nature of scientists' work, prevail among the distinctive features of the "image" of science and were mentioned by every second respondent (Table 1, Fig. 23).

Besides, the higher the respondents' educational level, the more appraisals of that kind they give. There are fewer elderly respondents and those with lower than secondary education that view scientific research as a socially important occupation: the option *a cause important to society* was chosen by only a third of the respondents in these groups.

Other respondents found the personal importance of scientific labour more relevant. In the 1995 survey, every fifth opted for the alternative *an interesting occupation* whereas the economic aspects of social status (*an advantageous occupation, an easy and prestigious job*) were rarely mentioned. Among appraisals of that kind, those of unskilled workers and students stand out: the workers denoted scientific labour as *an easy and prestigious job* three times as often, and the students denoted it as *an advantageous occupation* two times and a half as often, as on average throughout the selection.

As a result, only the positive features of the "image" of science were mentioned by as many as three-quarters of those surveyed. A negative view, 'beating the air', was mentioned by only one out of ten respondents. A third of them mentioned this alternative along with the positive features, thus emphasising the impossibility of scientific achievements being put into practice rather than a negative attitude to scientific work. Respondents with higher education older than 40 years opted for the alternative 1.5 times as often. Downright negative appraisals, *a destructive power, destruction of faith, beauty, morality*, were given by only 5% of those surveyed in 1989 (in the 1995 survey there were no such alternatives).

Table 1. Distinctive features of the "image" of science in public opinion
(per cent of respondents)

Distinctive features of the "image" of science	Science is ...	1989, %	Doing scientific research in the present state of affairs is ...	1995, %
Social importance of scientific labour	*useful discoveries*	40	*a cause important to society*	42
	a stipulation of progress	30		
	augmentation of knowledge	22		
	unselfish service	5		
Complex nature of scientists' work	*intensive labour*	37	*a challenge requiring long-term studies and a great physical, mental and memory effort*	50
Personal importance of scientific labour	*a free search for truth*	15	*an interesting occupation*	18
	anticipation of the future	7	*an advantageous occupation*	7
	a way to reach a high social status	6	*an easy and prestigious job*	3
Negative image of science	*a waste of funds, 'beating the air'*	5	*a vain occupation*	11
	a destructive power, destruction of faith, beauty, morality	4		
	false ideals	1		
Don't know		15		19

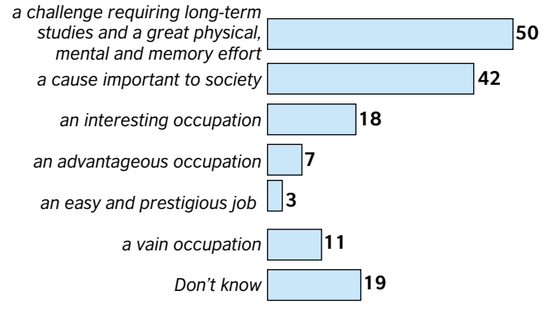
Questions: There are various opinions of what we need science for and what role it plays in the life of people and society. What do you personally think of science? (1989). Do you think that doing scientific research in the present state of affairs is ...? (1995).

Note: In 1989, the respondents formulated their personal ideas of science on their own while in the 1995 survey they were given six ready-made answers.

Sources: for 1989 – Levada, 1993; for 1995 – VCIOM, 1995, Gokhberg and Shuvalova, 1997.

Fig. 23. The "image" of science in public opinion
(per cent of respondents)

Doing scientific research in the present state of affairs is ...



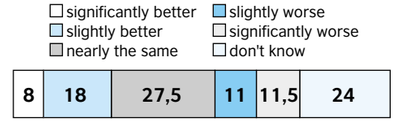
Sources: VCIOM, 1995.

4.2. Living and working conditions of scientists

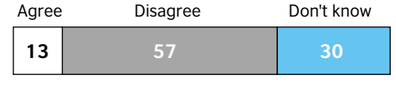
The decline of the prestige of scientific activities is in many respects explained by a deterioration in the economic conditions of Russian scientists. According to the results of the 1996–1997 surveys, our respondents also witnessed this circumstance. Responses to the question whether the economic conditions of most Russian scientists are better or worse in comparison with the bulk of Russia's population, highlighted a negative standpoint of every second respondent. Only one-fourth gave a positive opinion (Fig. 24), whereas 27.5% considered scientists being approximately at the same level, and 22.5% said that their conditions are even worse.

Fig. 24. Public opinion on the standard of living and working conditions of scientists
(per cent of respondents)

In comparison with the bulk of Russia's population, the economic conditions of most scientists are ...



In Russia, there are good conditions for scientists to work successfully

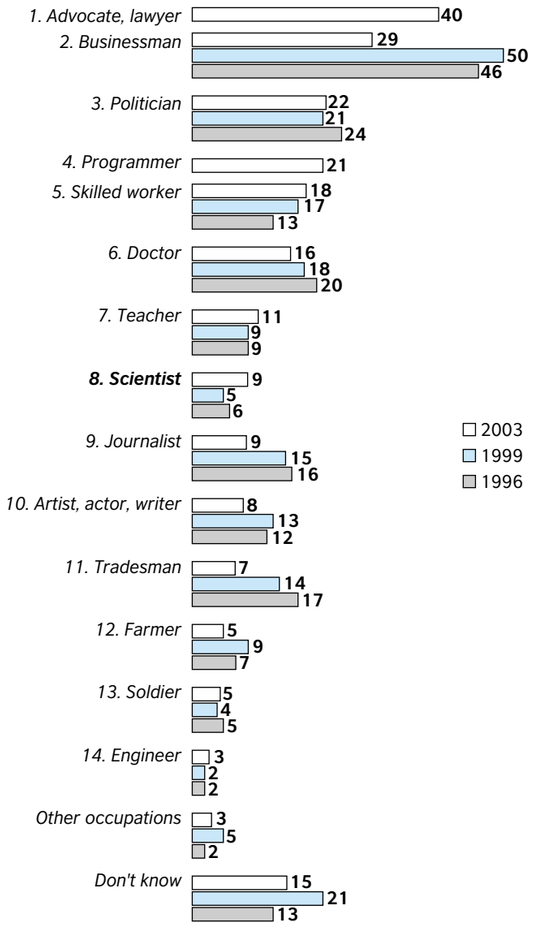


Sources: Gokhberg and Shuvalova, 1997, 1998.

The working conditions of scientists in Russia were assessed even more negatively, only one in eight respondents agreed with the statement that in Russia there are good conditions for scientists to work successfully, and more than a half disagreed. Different social groups demonstrated a strong diversity of opinions, with an inversion between groups with a close relationship to R&D and those remote from it. Working and living conditions of scientists were more positively assessed by respondents with an education below secondary, elderly people, and rural residents; lower marks were received from highly educated persons, young people, and urban respondents. In gender-specific groups, there were almost no differences.

Fig. 25. Social status of scientists in Russia
(per cent of respondents)

In Russia the most respected occupation now is that of...



* The sum exceeds 100 per cent because respondents could give several answers.
Sources: for 1996 – Gokhberg and Shuvalova, 1997, for 1997 – Gokhberg and Shuvalova, 1998, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

4.3. Social status of scientific activity

An indicator of whether a certain activity or professional area is in demand from society corresponds to the prestige of a related occupation. This indicator was based on questions about what kinds of occupations are now popular and respected in Russia, and whether the respondents would like their children to pursue a popular career. In the first option a respondent had to evaluate public opinion in general; in the second the question itself was an indicator of a respondent's opinion (section 4.4).

The question, which was supposed to evaluate public opinion about the status of science in society, was asked in 1996, 1999 and 2003. In the first two surveys the social status of scientific activity was at an intolerably low level. In the occupations which now enjoy, as the respondents say, the highest respect in Russia, scientists were placed next to last: (5-6% of the respondents were in favour (Fig. 25). The 2003 survey has shown an increase in social status, scientists now occupy 8th place (9%), behind journalists, tradesmen and artists/actors/writers, who have enjoyed the highest status since Soviet times.

The rating of professional scientific work is higher among young people aged 16-24 (7th place in all three surveys). It is lower (9th place) among elderly respondents and residents of the capital city, and 10th place among people aged 25-34 and people who have completed secondary education (here journalists, tradesmen and artists/actors/writers have left scientists behind). Residents of big towns gave it 11th place (they mentioned scientists more rarely than farmers).

A similar question was asked in EU countries: *For which of the following professions do you have the most esteem?* Among the 10 occupations mentioned by the respondents[1], scientists were placed second after doctors. Note that second place for scientists was registered in 14 EU countries (out of 15 in total). Only in Ireland were scientists registered in fifth place (Eurobarometer, 2001).

The 2000 US survey included a more direct question about the level of prestige of scientists (a choice was given from a list of 17 occupations). Scientists took second place, 56% of the respondents regarded this occupation as *greatly prestigious*. Similarly to the EU, first place was given to doctors (61%), and third place to teachers (53%)[2]. (National Science Board, 2002, p.7–28 – 7–30).

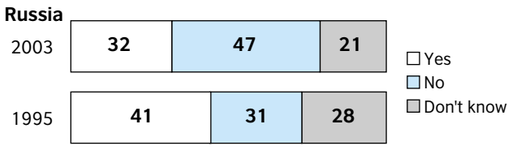
4.4. Attitude of adults toward scientific careers for their children

It is possible to judge the prestige of scientific activities in the population by answers to a question concerning choice of a scientific career for children. In 1995, positive responses were found to be more numerous (41% against 31% negative). At the same time, almost one-third of respondents could not answer (Fig. 26). In eight years nearly half of the population was against scientific careers for their children, and every fifth respondent did not have any clear opinion.

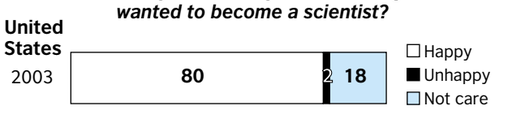
In the responses of some social groups, an original "inversion" is observed between groups more closely associated with R&D and those more distant from it. The better respondents are informed about science, the less they would like to see their children become scientists. It is clearly visible from the answers of respondents with different levels of educational attainment and from various age groups. So, respondents with poor education more often wished for a scientific career for their children. Probably, they treat scientific activity as more attractive for its intellectual and creative nature vis-à-vis their own low-skilled occupations. They more often believe that the living and working conditions of Russian scientists are favourable. On the contrary, highly educated persons more often object to a scientific career for their children. In this social group people view the situation in Russian R&D much more pessimistically. Four out of five respondents view the role of S&T in Russia as declining, extremely negatively assessing the living and working conditions of scientists.

Fig. 26. Prestige of scientific activities
(per cent of respondents)

Do you want your son/daughter to become a researcher?



How would you react if your son /daughter wanted to become a scientist?



Sources: Russia: for 1995 – VCIOM, 1995; for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics; United States – National Science Board, 2002.

Among the age groups, the greatest optimism is observed from elderly respondents who have kept a positive "image" of science from the past. This group demonstrates the most positive opinions toward a scientific career for children and the living and working conditions of scientists. In gender-specific groups, male respondents assess the living and working conditions of scientists somewhat lower than women, and among them the prestige of scientific activities is lower.

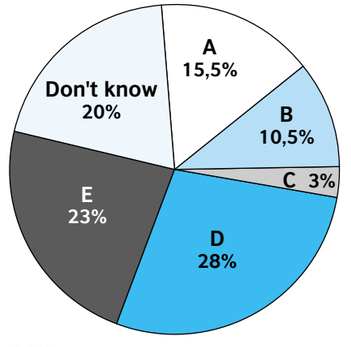
Regionally, the situation is generally ambiguous. A scientific career is advocated by inhabitants of big cities, except Moscow and St. Petersburg, and rural residents, and the smallest numbers are found among residents of small and middle-sized towns. It is possible to explain the low prestige of scientific activities in the latter group, by the fact that in those towns science is at best represented by applied R&D institutes whose financial conditions and social problems are, as well known, in a catastrophic state. The attitudes of rural residents to a scientific career are explained by their reference to an urban way of life. In fact, they have the most positive opinion on the living conditions of Russian scientists. The opinion of residents of Moscow and St. Petersburg, the largest centres of Russian S&T, appear to be negative. It is metropolitan inhabitants who, on the one hand, can see the grave state of Russian R&D, particularly the decline of its role and the deterioration of living and working conditions of scientists, but on the other hand, they understand the advantages of other occupations.

American respondents were asked a similar question in 2001. The results showed that prestige of science is at a very high level in the USA. Four out of five of respondents would be happy if their son or daughter wanted to be a scientist, and only 2% would be unhappy (National Science Board, 2002, p.7–28). This number is even higher among more educated people.

4.5. Public opinion on the emigration of scientists

Despite the generally negative opinion on the living and working conditions of Russian scientists, the majority of the population reacted negatively to their emigration. The problem of brain drain was considered in the 1995 survey (see VCIOM, 1995; Gokhberg and Shuvalova, 1997), which looked at positive and negative reactions to this process, one that can be called a sort of relationship between "cosmopolitanism" and "patriotism". The survey demonstrated a drift of opinions towards the latter, since 51% of respondents spoke against the emigration of scientists (Fig. 27).

Fig. 27. Public opinion on the emigration of Russian scientists *(per cent of respondents)*



Positive (29%):
A They realise their scientific potential, which is impossible to do here
B They get in touch with world science and come back with accumulated experience
C They become representatives of Russian science abroad

Negative (51%):
D By leaving they weaken the country's scientific potential
E They leave their native country in hard times

Sources: VCIOM, 1995; Gokhberg and Shuvalova, 1997.

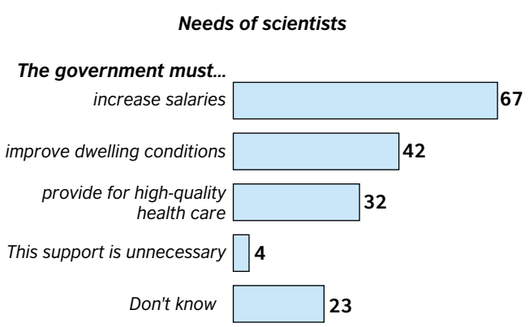
[1] *The list was made out of the following occupations: doctors (mentioned by 71% of the respondents), scientists (45%), engineers (30%), judges (28%), sportsmen (23%), artists (23%), lawyers (18%), journalists (14%), businessmen (14%), and politicians (7%).*
[2] *The list included doctors, scientists, teachers, ministers, military officers, policemen, members of Congress, engineers, architects, lawyers, athletes, entertainers, journalists, union leaders, businessmen, bankers, and accountants (named according to the rating).*

It is necessary to emphasise that positive attitudes towards the departure of scientists for abroad displayed strong motivations, however they were chosen by less than one-third of respondents (29%). Another fifth of them could not answer (20%), which was especially typical for population groups distant from R&D. Representatives of those social groups that had highly appreciated the role of science in the world and its significance for the future of Russia, namely highly educated persons, as well as young people, urban residents, and male respondents in general, saw no demand for science in this country and a decline of its prestige. Accordingly, they justified the emigration of scientists more often. Within these groups, negative opinions on brain drain were also widespread, but basically they were inspired by weakening of the national S&T potential.

As regards other social groups, the emigration of scientists was more often justified by inhabitants of metropolitan cities (the share of positive answers in this group was 41%), employees of the private sector (37%), people with high incomes (37%), the unemployed (39%), students of all levels (43%), and housewives (46%). The most fervent opponents of the departure of scientists for abroad were pensioners (60% of negative answers) and residents of the Ural (58%).

As an important measure of support for Russian science, the respondents have been practically unanimous in advocating social guarantees and privileges for scientists on the part of government. While answering the question *Do you think that the government must render goal-oriented support to scientists?*, only 4% of respondents spoke against it (Fig. 28). Almost three-quarters voted for specific forms of social guarantees: 67% indicated the necessity of increasing salaries, 42% added an improvement of housing conditions, and 32% mentioned high-quality healthcare services.

Fig. 28. Public opinion on social support for scientists *(per cent of respondents*)*



* The sum exceeds 100% because respondents could give several answers.
Sources: Gokhberg and Shuvalova, 1997.

The higher the educational level, the more common opinions on the importance of this support become. In the responses of other groups of the population, the dependence on people's own problems can be traced. So, metropolitan inhabitants more often mentioned salaries and health services, whereas residents of other towns preferred an improvement of housing conditions. Young people more often spoke about remuneration and accommodation, while elder respondents emphasised health care.

CHAPTER 5

PUBLIC OPINION ON GOVERNMENT REGULATION OF S&T ACTIVITIES

Data from our surveys demonstrate that, despite the overall positive attitude of the general public towards the outputs of scientific research, far from all ideas shared by the Russians lend themselves to a favourable climate for the development of science. One such idea is paternalism, which does not encourage the growth of non-government investment in R&D, something that is increasingly relied upon by S&T policy makers for the support of the domestic science base under conditions of budgetary deficit.

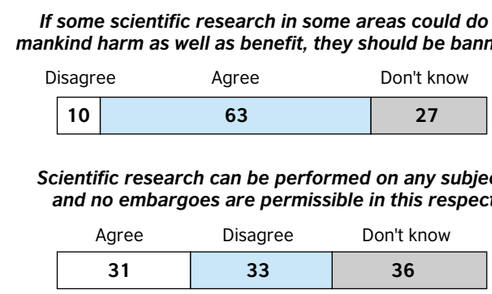
The paternalist viewpoint of science has been around since the very beginning of the institutionalisation of Russian science (generally considered to be around 1724 when the St. Petersburg Academy of Sciences was founded). Its essence lies in the concept of a high degree of governmental regulation of scientific research and an insignificant understanding concerning the autonomy of science. The paternalist orientation can be seen in opinions on the freedom of scientific research and the funding of science.

5.1. Embargo against scientific research in specific areas. Views on cloning

To find out how the population would react to such a measure as restrictions on some scientific themes, respondents were asked to comment on two statements: a negative and a positive one. Full freedom of scientific research was supported by 10% to 31% of respondents (Fig. 29). In contrast, restrictions in some areas were favoured by from 33% to 63% of respondents. In other words, at least one in three Russians would support prohibition of those research areas that may harm mankind, and only one in ten firmly stands on the position of freedom of any scientific subjects. Opponents of restrictions were more numerous among persons with a higher level of education, young people, and inhabitants of big cities, as well as among men in general.

Views on cloning. Attitudes towards cloning show a tendency to become more and more negative as research develops in this area. In 1997, the media actively discussed the subject of cloning in connection with the emergence of Dolly the Sheep. Though this event was presented as a success of genetic engineering in relation to animal studies, many ethical problems began to be discussed, including those related to the possible cloning of humans in the future. (The survey had been conducted prior to the sensational declaration by Dr. Richard Seed on human cloning in the near future.) However, respondents did not display great interest in this subject: 42% of those interviewed were undecided as to what would prove most important in the end, namely benefit or danger from such studies (see section 2.3).

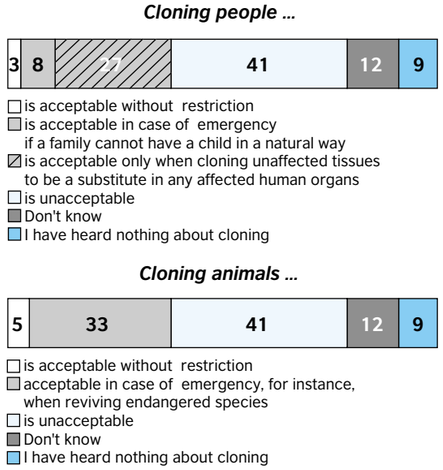
Fig. 29. Opinions on embargo against scientific research in specific areas *(per cent of respondents)*



Source: Gokhberg and Shuvalova, 1997.

But in 2003, 79% of all those surveyed had made up their minds about cloning. Only 9% admitted that they had heard nothing about it, and 12% were at a loss to answer the questions concerning the acceptability of cloning. There were two such questions: one was about people and the other was about animals, with clearly positively motivated alternatives offered, thus inducing people to think, and not to yield to mass media opinion (Fig. 30).

Fig. 30. Opinions on cloning *(per cent of respondents)*



Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

The results are depressing for science, in that a view that is negative and rather rigid has already been formed. 41% of respondents are convinced that the cloning of people or animals is unacceptable under any circumstances. Among the other 39% of "cloning advocates", only 3% approve of such techniques being applied without any moral restriction with respect to people and 5% with respect to animals. The rest of them find it acceptable only in the case of emergency, the opinion being far more rigid with respect to people. For instance, when a married couple cannot have children in a natural way, only 8% of respondents would allow them to clone, whereas 27% would permit cloning tissues to treat affected organs.

Intolerance to cloning is stronger among women, older and poorly educated respondents. In contrast, men, younger and better-educated respondents are better informed of the technology and hold a more liberal opinion of cloning in case of emergency. There are certain differences in regional groups, there are more cloning opponents in Moscow and St. Petersburg and fewer in rural areas and the South of Russia.

The US Science & Engineering Indicators 2002 report contains a number of articles describing views on biotechnology presented by the population of the USA, Canada and some European countries (National Science Board, 2002, pp.7–18 – 7–23). In response to a Gallup poll, 90% of those surveyed opposed human cloning and 64% opposed animal cloning. US respondents expressed a more positive opinion, particularly in relation to animal cloning. In response to the 2001 NSF survey, opinion was split almost in half. 47% of respondents would support *cloning animals such as sheep whose milk can be used to make drugs and vaccines* (strongly support 15%, moderately support 32%), but those who would oppose it constituted 48% (moderately oppose 21%, strongly oppose 27%). As to other debated issues, *using biotechnology in the production of foods, for example, to make them higher in protein, keep longer, or taste better*, would be supported by a greater number of respondents (61%), and genetic testing to detect inherited diseases by 89%.

5.2. Public opinion on R&D funding

The importance of a certain activity to respondents can be judged from their views on whether or not that activity needs to be government-financed. Therefore, the respondents were asked the following question: *Does the government allocate sufficient funds to support education, scientific research, implementation of new technologies, and computerisation?* People are unlikely to know about exact budget expenditures. However they form their opinions based on their observations of the areas concerned. These results can be visible and noticeable: the quality of education of their children and grandchildren (in comparison with their own experience and studies abroad); the level of computerisation at various institutions; and newly developed home appliances sold in shops. These achievements are covered

in news programmes by the mass media, and are discussed in many TV talk shows, which Russian viewers greatly enjoy. Many articles in newspapers and magazines also cover similar issues.

A majority of respondents negatively estimate the state of financing of science and believe that the state allocates insufficient funds for the development of scientific research (76%). Their share, according to the 1995–2003 surveys, has increased by 15 points. And the comparatively small group of respondents convinced that this expenditure is sufficient comprises less than 10% of the respondents (Fig. 31). Practically nobody believes that this expenditure should be reduced (in 1997, 1999, and 2003, this opinion was shared by less than 1% of respondents).

Among social groups, the most categorical judgements about the necessity of government support for science was uttered by respondents with higher education and inhabitants of big cities, as well as respondents aged 40–55 years and men in general. In contrast, the greatest number of those satisfied with the size of budget expenditure on science (12%) was found among young people, apparently less inclined than the others to "paternalism".

In the US, where the budget allocations for S&T in absolute terms outstrip any other country in the world, there is still more than a third of respondents who consider those funds insufficient, and only 14% consider that financing excessive (National Science Board, 2002).

5.3. Relevance of basic research

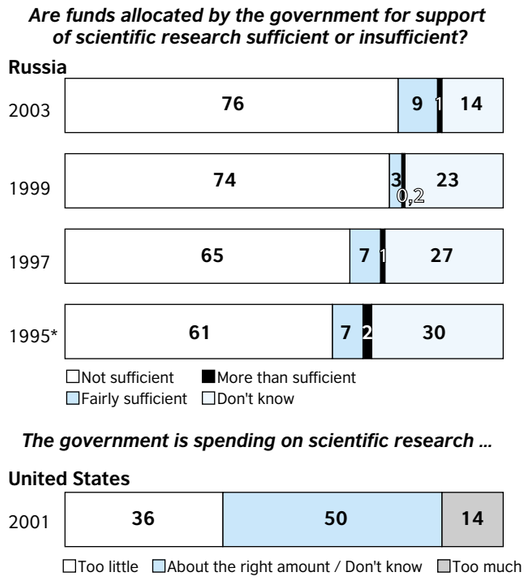
A high degree of consent from Russian citizens has appeared on the necessity of public support for basic research (Fig. 32). In answers to the question *Do you agree that scientific research, even though not yielding immediate profit but increasing human knowledge, should receive financial support from the government?* 71% of respondents agreed with the necessity of support of this kind. Only 5% of respondents do not share this opinion, and a quarter could not answer. Government support of basic research was much more favoured by persons with higher education and residents of Moscow and St. Petersburg.

The question on support for basic research was asked in many European countries, in the United States and Japan. In all cases, the vast majority of respondents in these countries expressed their understanding of government support for science (see Fig. 32).

5.4. Readiness for personal participation in R&D funding

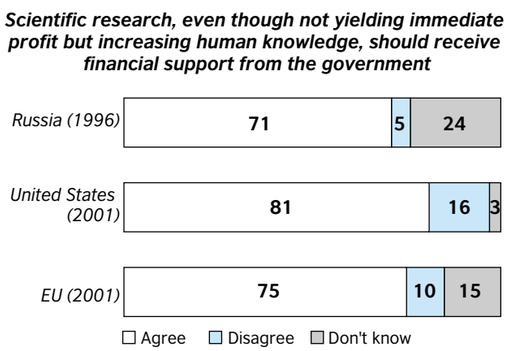
At the same time as having recognised the insufficiency of budgetary financing of science, Russian respondents unanimously rejected the possibility of additional personal participation in its funding. Three-quarters of those interviewed agreed with the statement that an increase in government

Fig. 31. Views on government R&D funding
(per cent of respondents)



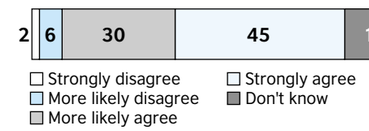
* In 1995, the question and optional answers had another wording: Do you think that government budgetary allocations for R&D should be increased next year, or should they be reduced or left at the previous level?
Sources: Russia: for 1995 – VCIOM, 1995, for 1997 – Gokhberg and Shuvalova, 1998, for 1999 – Russian Science and Technology at a Glance: 1999, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics; United States: National Science Board, 2002.

Fig. 32. Support for basic research
(per cent of respondents)



Source: for Russia – Gokhberg and Shuvalova, 1997; for the US – National Science Board, 2002; for the EU – Eurobarometer, 2001.

Fig. 33. Readiness for personal participation in R&D funding
(per cent of respondents)



Source: Gokhberg and Shuvalova, 1998.

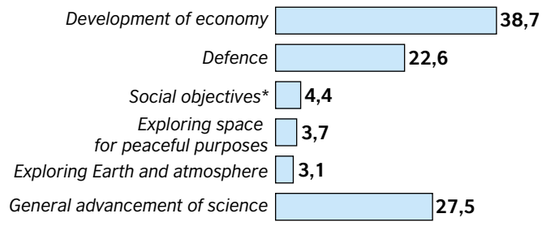
expenditure on science should not affect their personal financial status in any way (Fig. 33). In their opinion, funds for increasing budget allocations for R&D should be found within the framework of the budget or other ways, but not through extra taxes. And only 8% did not agree with the above statement, having thus expressed readiness to renounce their economic wealth for the benefit of science. Readiness to contribute more of their personal wealth for the benefit of science, was more often expressed by persons with higher education and residents of Moscow and St. Petersburg.

5.5. Priority areas for S&T: how they are seen by the population

Defence-related subjects, space, the Earth and atmospheric research had always been priorities in the USSR, supported by the state in both financial and ideological terms, and had achieved considerable success. Similarly at present, government science policy makers, judging by the structure of actual expenditure on R&D, preserve the traditional extremely technicist orientation: defence, industry, and space exploration (Fig. 34). The share of these areas in the structure of the R&D budget is still growing in both absolute and relative terms. "As regards basic social objectives, in particular public health and environmental protection, respective budget allocations for R&D have reduced in absolute figures, and it is unlikely that they will occupy a place among the real priorities of present-day government S&T policies for the immediate future" (Gokhberg, 1998, p. 83-86). In actuality, such social objectives as environmental protection, public health, and social development account for just 4.4% of R&D expenditure in total.

Earlier, political leaders had explained the continuation of this approach as being due to the necessity of rescuing the national S&T base, while by the mid-1990s the idea of using the nation's S&T potential was finally recognised as an important driver of economic and social progress. However, direct interest in science is perhaps absent. Science was apparently not included in the real priorities of government policies in the transition period, but, on the contrary, became one of the main victims in the struggle to

Fig. 34. Domestic expenditure on R&D by socio-economic objective *(per cent)*



* This item includes expenditure on environment protection, public health, and social development.
Source: Russian Science and Technology at a Glance: 1999.

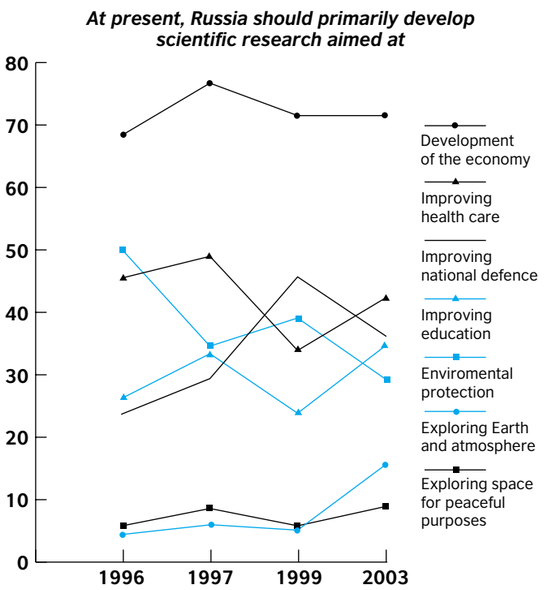
contain the budget deficit. Moreover, in comparison with other expenditure items in the budget, the defaults in actual allocations of R&D funding were the greatest (ibid., p. 78). Defence-related research was the best-protected item of the R&D budget, which explains such a great share of expenditure on it (ibid., p. 83). However, the painful issues of today's Russia, – the economy, environmental pollution, medicine and education – require a change of priorities for the benefit of research in these areas, and is reflected in the opinion of the majority of the population.

The answers to the question *Which areas of scientific research should be developed first of all in Russia today?* have clearly outlined the demand for S&T areas related to social and economic development (the economy, medicine, education), and environmental protection (Fig. 35). Consistently from 1996 to 2003, respondents regarded the economy as the most important problem area, three-quarters of them being sure of giving priority to scientific research with the purpose of developing the economy. Second position by urgency in 1996 had been occupied by environmental problems, but in the next few years the respondents mentioned other important issues, for example, the development of medicine (in 2003 this was specified by 48% of those interviewed), and ecology moved to fourth position (29%).

Third position in 2003 was occupied by defence research, and an activity traditional for science, improving education (36 and 35% respectively). It should be noted that the 1999 survey was conducted during the NATO bombings in Yugoslavia, and the 2003 survey before the US and UK military campaign in Iraq. This certainly affected the results – some defence activities were included in this position, which had earlier occupied fifth place. It is highly possible that the number of respondents selecting an option *strengthening defence* might be less in a more peaceful time. At the bottom of the "priority stairs", were Earth and atmospheric research (16%), and peaceful exploration of the space (8%)

Scientific research is certainly leading in an economic direction in the opinion of some groups of the population.

Fig. 35. Views on priority areas of scientific research
(per cent of respondents)*



* The sum exceeds 100% because respondents could give several answers.
Sources: for 1996 – Gokhberg and Shuvalova, 1997; for 1997 – Gokhberg and Shuvalova, 1998; for 1999 – Russian Science and Technology at a Glance: 1999; for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

This was more often indicated by respondents with a high level of education, inhabitants of big cities, and also young people and men in general. Among respondents with higher education and the young generation, the educational function of science moved to second place, slightly ahead of medical research. Elderly respondents put *improving national defence* in second place. Of course, opinions differed according to gender. With respect to medicine and defence, second place was given to medicine by women, and to defence research by men. The residents of the capital cities and rural residents, women in general and young people aged 25–34 are less inclined to support military ambitions.

CHAPTER 6

INNOVATION CLIMATE IN RUSSIA

In the context of international economic competition, the place of Russia in the world community to a considerable extent depends on its economic status. At the present stage, the contribution of science to the economy is determined first of all by the development of new technologies for the modernisation of the economy. In the innovation process, Russia is significantly lagging behind the advanced industrial nations, despite the high level achieved by theoretical science. One of the reasons for the existing gap has been the historically insufficient autonomy of Russian science from the state, and the neglect of such an important channel for its institutional support as non-government financing of applied development projects. This situation dates back to the pre-communist era (see, for example, Volobuyev, 1987, p. 23). In the Soviet period, this channel was completely excluded, and the absence of competition between public enterprises under the centrally planned economy was the main factor hampering the application of R&D results in the national economy. At present, overcoming this "heritage" seems to be an extremely complicated task not only because precious time for modernisation has been lost but also for a number of other reasons. Namely that time is required for the reorganisation of Russian science, and the creation of the legal and economic conditions necessary for the successful support of the innovation process. In this context, analysis of public attitudes in society seems to be important; namely, consciousness of the need for modernisation and the role of science in this process. Therefore, this section is entirely focused on assessments of the innovation process in Russia.

6.1. Factors of economic growth

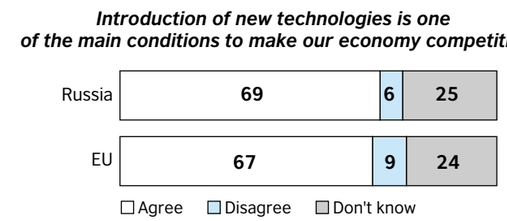
Russian citizens attribute particular importance to the innovative function of science. The importance of technological innovation for Russia is recognised by a majority of respondents. 69% of those interviewed agree with the statement that the introduction of new technologies is one of the main factors in creating a competitive economy, and only 6% disagreed (Fig. 36). Particularly positive assessments of the importance of the innovation process were made by male respondents and people with higher education, as well as younger citizens.

Approximately the same proportion of responses has been obtained in similar surveys for twelve European nations. 67% of EU citizens subscribe to the view that *only by applying the most modern technology can our economy become more competitive*. Here only 9% of Europeans do not agree (European Commission, 1994). And in the 2001 survey approximately two-thirds of the sample (64%) also subscribed to the idea that it is necessary *to use the most advanced technologies to make the economy more competitive* (Eurobarometer, 2001).

At the same time, a majority of the population clearly understand that in order to boost the economy many other issues need to be addressed, particularly legal ones, but also in a wide range of other areas. The ranking of such conditions by degree of importance is strikingly logical, with respect to the proportion of those who have selected them by responding to the question *What will be the key factor for economic growth?* (Fig. 37).

The first two most important are factors of political stability – discipline, law and order (chosen by 43% of respondents),

Fig. 36. Significance of technological innovation for Russia
(per cent of respondents)



Source: for Russia – Gokhberg and Shuvalova, 1997; for the EU – European Commission, 1994.

as well as a strong national leader (35%) who would "make order" in Russia. However, the same factors appeared even more important four years previously, when law and order was chosen by 62%, and political stability by 44% of respondents.

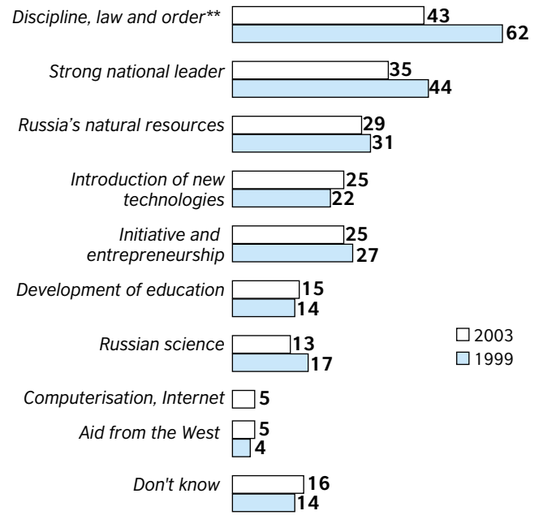
Then there are those who think it will be possible to use *Russia's natural resources* to the best advantage only under the establishment of political stability (29%). Next are technological and human factors — *introduction of new technologies, initiative and entrepreneurship* (25% each). Development of education and Russian science are also perceived as of importance, although at a lower level (15% and 13%). It is interesting to note that almost nobody relies on *Aid from the West*. Gender groups rated the factors in a generally similar order, but men named *Russian science* more often that *development of education* (14% and 11%).

Across the age groups, younger respondents tended to give weight to modernisation and the human factor, including its components such as *use of new technologies, initiative, entrepreneurial qualities of people* (29% each). Older people, however, tend to believe in the political factor – *discipline, law and order* (57%), and a *strong national* leader (45%). Additionally, the younger respondents also hoped for *computerisation and development of the Internet*, as well as *assistance from the West* (11% and 10%). Looking at differences in educational level, those with higher education differed from the others in that they awarded second and third place to the human factor (35%) and modernisation (34%).

Geographical differences showed that residents of large and medium-size cities attached greater importance to "the iron fist" and modernisation (38% and 31%), whereas residents of Moscow and St. Petersburg chose obedience to law and order (52%), the human factor (27%) and the development of education (20%).



Fig. 37. Factors of economic growth
(per cent of respondents)



* The sum exceeds 100% because respondents could give several answers.
** The first three lines in the 1999 survey appeared as follows: *Obedience to laws by everybody – executives and common people alike; Achievement of political stability; Rational use of national resources.*
Source: for 1999 – Russian Science and Technology at a Glance: 1999, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

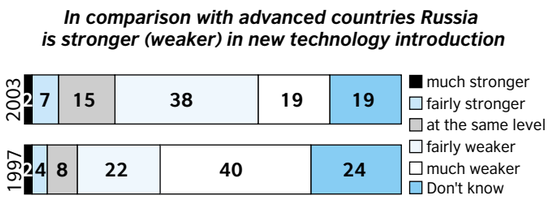
6.2. Public opinion on the level of new technology introduction

Whilst respondents have a high appreciation of the importance of innovations for Russia (see Fig. 43), the real level achieved by Russia in the area of technological innovation was assessed mostly negatively (Fig. 38). Positive answers, comparable to world levels, were very few, only 24% (of which: *Much stronger* 2%, *Fairly stronger* 7%, and *At the same level* 15%), and negative answers were twice as numerous (57%, of which: *Fairly weaker* 38%, *Much weaker* 19%). Compared to the 1997 survey, the general feeling has become much "warmer" – six years ago the proportion of positive responses to negative was 14% to 62% (in other words, the former was only one quarter of the latter).

On the whole, men gave more positive and negative answers (25% and 62% respectively), while women gave less (22% and 53% respectively). In the educational and geographical groups, as well as among respondents with different social status, the attitude of more informed groups tended to be more negative. This was true, for example, for people with higher education compared to those with lower-than-average education (19% and 74%; 27% and 44%); people from large cities compared to those from the country (16% and 70%; 31% and 45%); the youngest re-

spondents gave more positive and less negative answers (31% and 54%), whereas older people, especially those still in the working age group, tended to be more negative (22% and 66%).

Fig. 38. Opinion on the level of new technology introduction *(per cent of respondents)*



Source: for 1997 – Gokhberg and Shuvalova, 1998, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

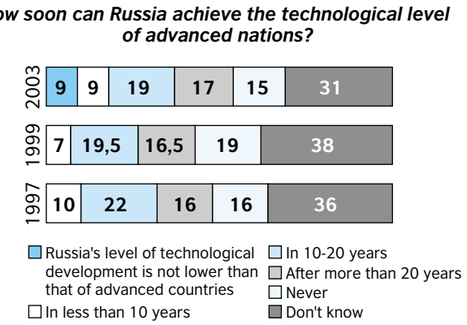
6.3. Economic growth forecasts

An analysis of responses to the issue of the prospects for technological development shows that respondents had no common opinion on that matter. Thus, 9% of all respondents said that Russia's level of technological development is not lower than that of advanced countries (Fig. 39). The share of optimists believing that Russia could achieve the technological level of advanced nations in less than in 20 years, almost equalled the share of pessimists convinced that it would happened in the far future or never at all – 28 to 32%. Moreover, this proportion hardly changed at all in the period 1997–2003. And practically the same number of people were unable to say when our country would reach the level of advanced states.

The greatest variation appeared across the age groups. The youngest respondents (aged 16–24) were the most optimistic, with the greatest share of those who believed that Russia would reach the level of advanced states in the next 10 years (14%) or 10–20 years (30%). However, very few of them (only 4%) believed that Russia's technological development was at a high level. The most profound pessimism sounded in the answers of older people, of pensionable age (55–64 years old), and especially those working. Among other social groups, the forecasts of men, and the residents of Moscow and St. Petersburg are more optimistic (10–20 years). Practically all groups had a remarkably consistent share of people who believed Russia's technological level to be no worse than in advanced nations (the difference was within statistical error limits) – except, as mentioned above, the youngest respondents.

In general, the gap between theoretical research and the practical use of the resulting knowledge, was most acutely felt by persons with higher education, men, young people, and urban residents. Representatives of these groups of the population were positive about supporting the introduction of new technologies, and made more negative assessments of this process in Russia and simultaneously more positive assessments of the level of Russian S&T.

Fig. 39. Economic growth forecasts *(per cent of respondents)*

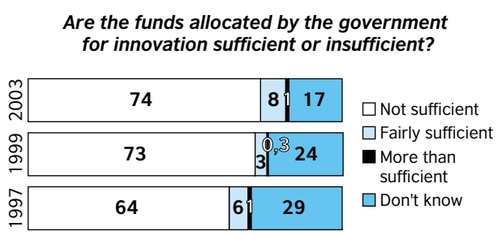


Source: for 1997 – Gokhberg and Shuvalova, 1998, for 1999 – Russian Science and Technology at a Glance: 1999, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

6.4. Public opinion on government funding of innovation

The population attributes responsibility for the success of the innovation process to the government. The overwhelming majority considered that it is necessary to increase budget expenditure for the introduction of new technologies (Fig. 40) and the development of scientific research (see Fig. 31 above), almost one quarter of those polled. And the comparatively small group of respondents convinced that this expenditure is sufficient amounts to 8% of the sample. Practically nobody believed that this expenditure should be reduced (in 1997, 1999, and 2003, this opinion was shared by less than 1%).

Fig. 40. Public opinion on government funding of innovation *(per cent of respondents)*



Sources: for 1997 – Gokhberg and Shuvalova, 1998; for 1999 – Russian Science and Technology at a Glance: 1999; for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

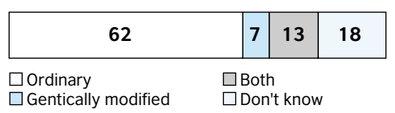
There is a clear relationship with educational level and place of residence: the better educated the respondents were and the larger the city they live in, the firmer is their opinion that innovation funding is insufficient. People with poor education, women and older people were less definite in their opinion (they said more often that they did not know the answer). The greatest share of those satisfied with the size of budget expenditure on innovation (12%) was found among young people.

6.5. Innovative behaviour of the population

The introduction of the products of innovation into the market becomes difficult if the final consumers are somehow prejudiced against them. It is relevant to people's overall attitude to any novelties, as well as to their acceptance of particular goods and services. Let's address some of the peculiarities of the development of public opinion, by looking at the example of genetically modified products that are being widely covered in the mass media, and self-assessments of innovation behaviour.

The attitude to genetically modified products. While 75% of respondents considered themselves able to make predictions as to the effects of genetics studies (see section 2.2.2), 81% of those surveyed have already made up their minds whether to use genetically modified products or not (Fig. 41). So, a majority of respondents would not cultivate genetically modified vegetable crops in their kitchen garden or garden-plot, even though scientists may insist that the genetics of these crops have been modified in order to improve their disease-resistance as well as storage and flavour characteristics (62%). Only 7% of those surveyed would trust scientists and plant genetically modified crops, whereas 13% would verify scientists' assertions by personal experience through planting both kinds of crops.

Fig. 41. The attitude to genetically modified products *(per cent of respondents)*

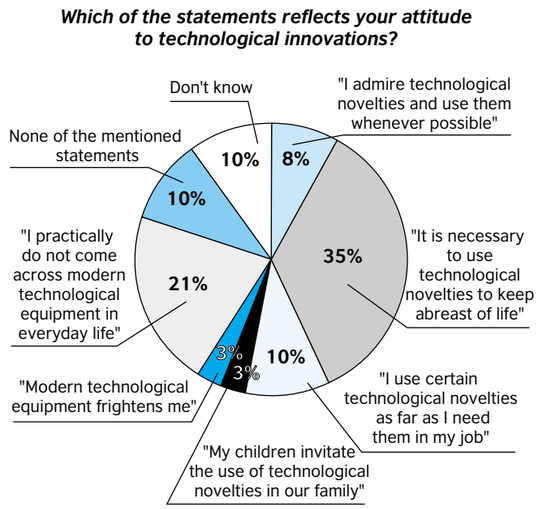


Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Thus, a negative opinion of genetically modified products is already formed with 62% of the respondents, a positive one with 20%, and 18% of all those surveyed have not made up their minds yet. Respondents with a higher level of education, men as a whole and young people, expressed full confidence in scientists more often but their share is only a little bigger than the average throughout the selection. The same groups, and quite young respondents of 16–24 years old as well as city-dwellers, trust scientists but would like to verify their assertions by personal experiment. And finally, women, the respondents in the age range of 25–54, as well as the citizens of Moscow, St. Petersburg and smaller towns more often take a negative attitude.

Typology of innovation behaviour. The overall tendency in opinions of innovations is more favourable than neutral. There are practically no negative attitudes; virtually nobody has said that modern technology frightens him or her (only 3% hold this opinion). However, those expressing their attitude to technological innovations in terms of admiration and eager to use its achievements at any opportunity, are also few (8%). A majority, as good as half of the respondents (48%), chose positive alternatives, but with an "external" motivation. 35% practice the principle "technological innovations is to be applied to keep up with the times"; another 10% use certain technological novelties as far as they need them in their job, and, finally, another 3% of the respodents are prompted to use them by their children (Fig. 42). Neutral answers were given by those respondents who have said that they do not deal with modern technology in every day life (21%) or who abstained from answering (10%).

Fig. 42. The motivation of putting technological innovations to domestic use *(per cent of respondents)*

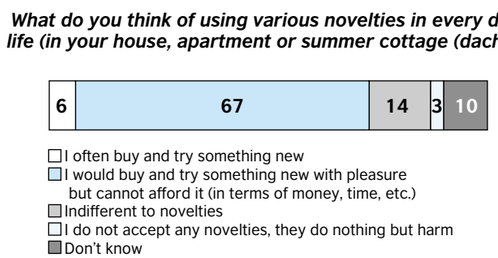


Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

So, we can distinguish four types of people by the intensity of their emotional attitude to innovations: the “admiring” type (8%), the “positively motivated” type (48%), the “neutral” type (31%), and the “negatively motivated” type (3%). Respondents of the first and second type are more often found among men as a whole, young and better-educated people, and city-dwellers, the most striking difference being found among those who chose *Modern technology is to be applied to keep up with the times*. Respondents belonging to the third and fourth types are more often found among women, older and poorly educated respondents as well as country-dwellers, the most striking difference occurring among those who chose *I practically never have to deal with innovations in every day life*.

A similar proportion showed up when the respondents made self-assessments of their innovation behaviour. A downright negative attitude (*I do not accept any novelties, they do nothing but harm*) was expressed by only 3% of the respondents (Fig. 43). 6% expressed a very positive attitude *I often buy and try something new* (i.e. a person satisfies his or her need for innovation sometimes even at the expense of other needs). However a majority of respondents (67%) satisfy their other needs first of all, but have an overall positive attitude to novelties: *I would buy and try something new with pleasure but cannot afford it (in terms of money, time, etc.)* 14% appeared to be indifferent to novelties. Another 10% were at a loss for an answer.

Fig. 43. Self-assessment of innovation behaviour types
(per cent of respondents)



Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

So, we can distinguish four types of people’s self-assessment of innovation behaviour: the “innovators” type (6%), the “potential innovators” type (67%), the “neutral” type (34%), and the “conservative” type (3%). Respondents belonging to the first type more often occur among men as a whole, younger and better-educated people as well as citizens of bigger settlements. The second type is more common among women, middle-aged respondents, people with higher and specialized secondary education, and citizens of smaller towns. The third and fourth types tend to be older people, people with a low level of education and the rural population.

CHAPTER 7

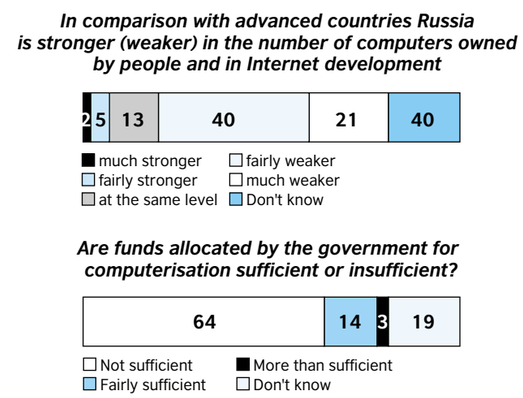
PUBLIC AWARENESS OF INFORMATION AND COMMUNICATION TECHNOLOGY

7.1. Dissemination and use of information and communication technology

As Fig. 44 demonstrates, almost two thirds of respondents believe that Russia is *less advanced* or even *sufficiently less advanced*, both in the number of people who own computers and in Internet development, in comparison with developed countries (40% and 21% expressed a related opinion). However, every fifth respondent is sure that Russia is not lagging behind developed nations (13% are positive that Russia is at the same level of advancement, 5% that it is more advanced, and 2% much more advanced). Thus, the ratio of positive and negative opinions is 20% to 61%. Almost the same ratio was found in relation to government support for ICT (64% of the respondents think that the support of this sector is not sufficient, 14% that it is sufficient, and only 3% excessive).

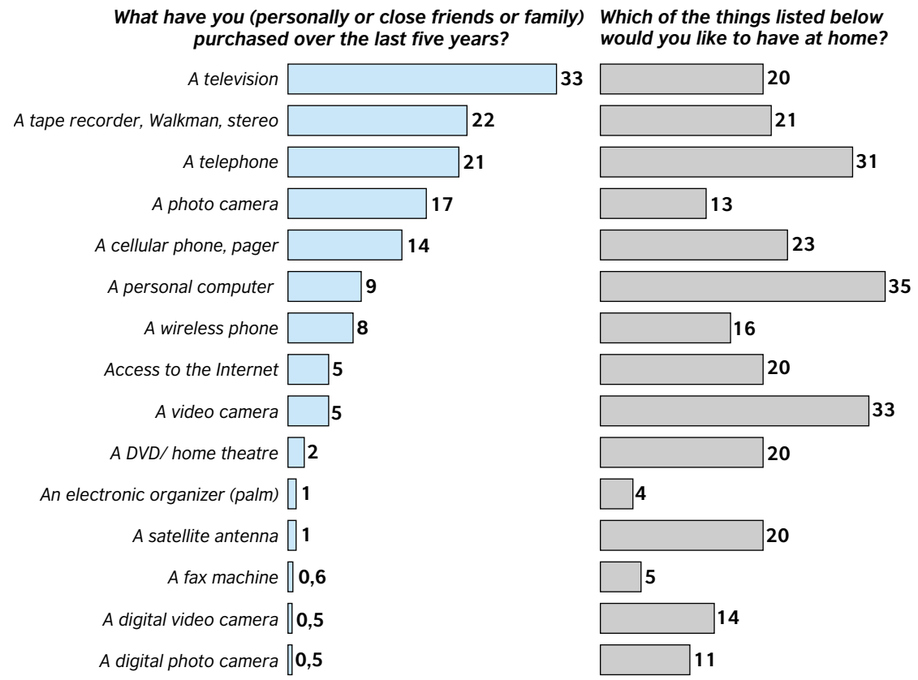
While commenting on the above questions, male respondents and youngsters provided more informative responses (both negative and positive), because they might have felt more competent in the ICT area. Female respondents and elderly people sometimes failed to respond at all. People with higher education and residents of big cities, commented more often than other groups that Russia lags behind other countries in ICT. However, only people with a high educational level (among other “competent categories”) stated repeatedly the need for government support of the mentioned areas.

Fig. 44. Views on the level of computerisation and on government funding for this process
(per cent of respondents)



Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Fig. 45. The availability of information and communications technologies in households and the demand for them
(per cent of respondents)*



*The sum exceeds 100% because respondents could give several answers.
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Survey data confirm that, unfortunately, a majority of Russia’s households do not have *"new"* ICT products. Over the last five years, *"traditional"* technologies have been the most popular purchases: televisions (bought by 33% of those surveyed), tape recorders/ Walkmans/ stereos (22%), telephones (21%), and photo cameras (17%). The most popular *"new"* technologies have proved to be cellular phones/ pagers (they have found owners among 14% of the respondents) and personal computers (9%), putting them in fifth and sixth places. However, other *"new"* information and communications technologies are still weakly represented in households. For instance, only 5% of those surveyed have access to the Internet and less than 2% of respondents have a DVD/ home theatre, satellite antenna, etc. (Fig. 45).

Deferred demand distributes the same information and communications technologies in a slightly different way. A majority of respondents would like to buy a personal computer (35% of respondents). Second and third places were taken by *“traditional”* technologies: video cameras (33%) and telephones (31%). At the same time, cellular phones and pagers took fourth place (23%). That means that *"traditional"* and *"new"* technologies appear alternately in the ratings. As many as five technologies have shared fifth place (20-21%), with two of them representing *"traditional"* technologies (televisions and tape recorders/stereos) and the three others representing *"new"* ones (access to the Internet, DVD/ home theatre, and satellite antennae).

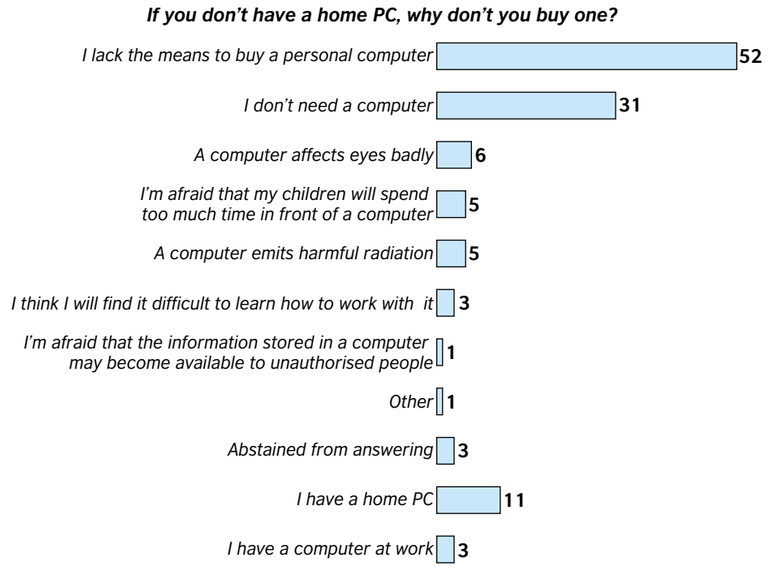
Thus there is great interest in *"new"* technologies, although Russians’ demand for *"traditional"* information and communications technologies is not yet fully satisfied. The common feature of such technologies is their multi-functionality, including the opportunity to use them for entertainment.

What is the reason for such a great gap between the demand for *"new"* information and communications technologies and their actual availability in households? Above all, it is lack of financial means. The situation with personal computers may serve as a case in point.

7.2. Factors preventing the spread of personal computers

Despite their relative cheapness, computers have not spread significantly either domestically or at work. According to the survey, over the last year three fourths of respondents have never used a personal computer. Answering the question *If you don’t have a home PC, why don’t you buy one?*, more than half of the respondents claimed to lack means (Fig. 46). Nearly a third of them thought a computer to be unnecessary. A few people feared the negative influence of a computer on their health (5% feared harmful radiation and 6% were afraid of a detrimental effect on their eyes). Only a few were scared by the complexity of acquiring computer skills (3%). Still fewer

Fig. 46. The factors preventing the spread of personal computers
(per cent of respondents)*



**The sum exceeds 100% because respondents could give several answers.*
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

people were concerned with the possibility of intrusion into their private information stored on a PC (less than 1%).

Thus a negative attitude to personal computers among respondents is not noticeable, and the main reason for their not buying one is the lack of means or need. The responses depended on age or education. Young people and respondents with a higher level of education more often referred to lack of means, whereas older people and respondents with a lower level of education said they did not need it. Respondents in the 25–34 years age range were more concerned with the possibility that a computer might absorb too much of their children's time, while those of 45–54 years old were afraid of a negative effect on their health (they highlighted its possible detrimental effect on eyes and harmful radiation). Regional differences were defined by proximity to the capital city: the farther they were from Moscow, the more often respondents mentioned the lack of means for buying a PC as a reason.

7.3. Respondents' awareness of the capabilities of modern computers and the Internet

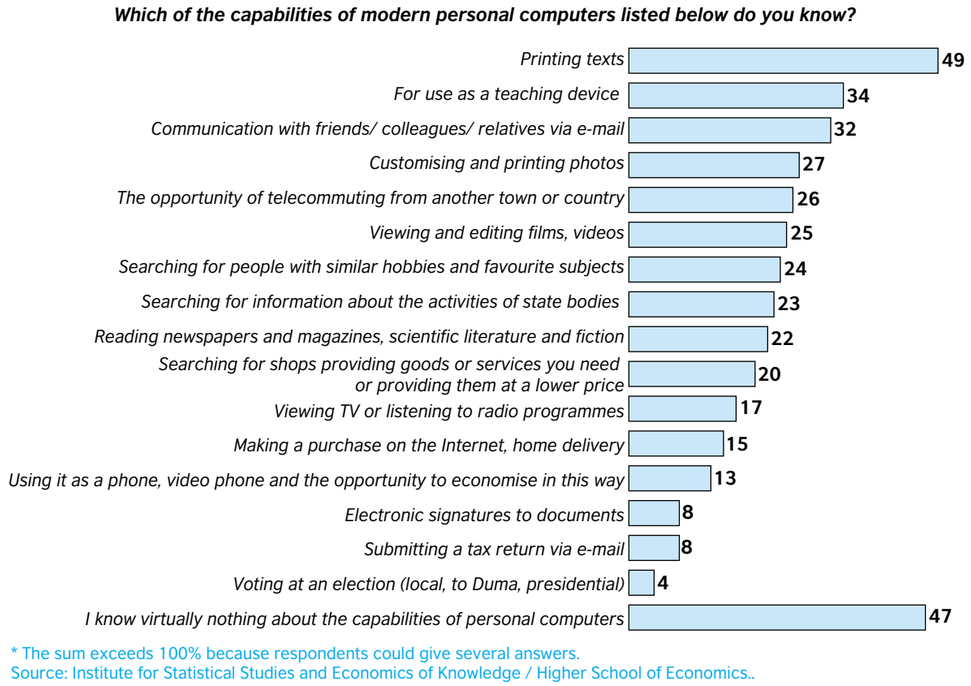
To find out how aware Russians are of the capabilities of modern personal computers, the respondents were given the major functions of personal computers. They were allowed to mark any functions known to them. As good as half of the respondents said that they *knew virtually nothing about the capabilities of personal computers* (47%). The rest of the respondents turned out to be quite aware of most of the functions of a modern PC (Fig. 47). For instance, half of the respondents knew that it is possible to print texts using a computer (49%).

The opportunity of using a computer as a teaching device for educational purposes (34%) took second place. The option *communication with friends/ colleagues/ relatives via e-mail* took third place (32%). The other chosen alternatives mainly focused on searching for information (20 to 27% of those surveyed). The respondents were least aware of the opportunity to execute electronic legal documents, ranging from an electronic signature to submitting a tax return (8% of those surveyed knew about these), and voting at an election (4%).

7.4. Users of personal computers and the Internet

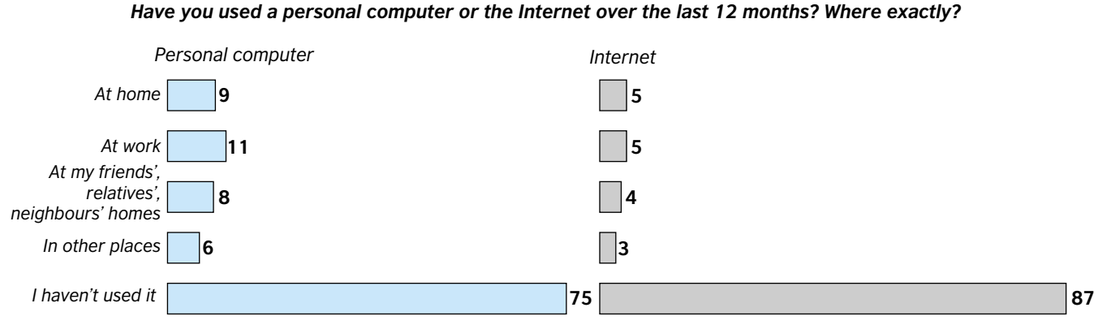
Over the last year, only every fourth respondent has used a personal computer (Fig. 48). They are most commonly used at work (11% of those surveyed), then at home (9%), and at friends', relatives', or neighbours' homes (8%). A majority of users (19% of those surveyed) have only one computer at their disposal: either at home, at work or somewhere else. A computer is available to only 5% of those surveyed simultaneously at two places suggested on the list, to 1% at three places, and only four respondents ticked all the positions listed.

Fig. 47. The respondents' awareness of the capabilities of modern computers and the Internet
(per cent of respondents)*



* The sum exceeds 100% because respondents could give several answers.
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics..

Fig. 48. The number of PC and Internet users
(per cent of respondents)*



* The sum exceeds 100% because respondents could give several answers.
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Only every eighth respondent has used the Internet over the last year, i.e. 13% of those surveyed. It is worth mentioning that there were observed to be twice as many PC users as Internet users, this being relevant to other indicators as well. So, in this country, in spite of their relative cheapness, computers have not yet spread significantly, either domestically or at work.

The main channels for promoting use of computers and the Internet as well as development of the corresponding skills seem to be: in youth culture (students), the intellectual environment (people with higher education), and the urban environment. For instance, young people of 16–24 years old use PCs twice as often as even the next age cohort of 25–34-year-olds (60% and 30% respectively), whereas older respondents resort to the help of computers even more rarely. The same regularity is to be observed with regard to Internet users: the youngest generation constitute 34% of such users and older users only 11–14%. The biggest share of PC users falls to students (77%, here the status characteristic is added to the age one), with half of them using the Internet as well (49%).

55% of respondents with higher education have used a computer, about a third of them having used the Internet. There are far fewer among those with secondary education (25% and 14% respectively), and only a few among poorly educated people (12% and 5% respectively). There is a world of difference between the city and the country. In big cities the share of PC users accounts for 36%, and that of Internet users for 24%, with 15% and 7% respectively in rural areas.

Every fifth respondent is an active PC user. 13% of respondents work on a personal computer every day and another 6% about once a week (Fig. 49). The remaining 6% of respondents use a computer less regularly, once a month or rarer. The most active PC users are students (60% of them use it once a week or more) and young people in the age range from 16 to 24 years old (45%), executives (57%), graduates (41%), and people with higher education (45%). Muscovites (29%), the citizens of other large cities (27%), clerical staff (27%), middle-aged respondents of 25-44 years old (22%), men as a whole and the citizens of middle-sized cities (21% each) are also active PC users.

Every fourteenth respondent is an active Internet user. 3% of those surveyed browse on the Internet every day and another 4% do it once a week. The others do it far rarer. In the various groups, the most active users are executives (23% of them browse on the Internet once a week or more), people with higher education (21%), students (22%) and young people of 16–24 years old (18%). Frequent visitors to the Internet are also Muscovites (15%), the citizens of other big cities (13%), graduates (14%), men (10%), respondents within the age range of 24-34 (9%), people with complete secondary education, clerical staff and the inhabitants of Russia's European regions (8% each).

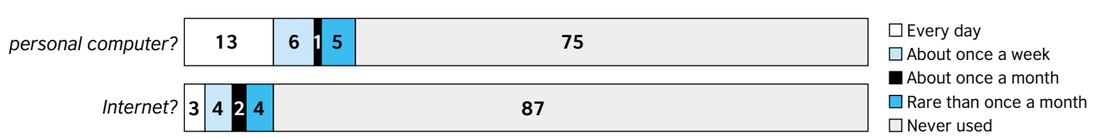
7.5. Prestige of ICT occupations

The prestige of being employed in the ICT sector was measured from questions about occupations that enjoy the highest respect in Russia at present, and about occupations that the respondents would like their children to choose. In answering the former, the respondents evaluated public opinion on the occupation, while the latter question indicated the personal opinion of the respondents. The questions concerned programming as it is identified with informatics. It should be noted that programming is a fairly new occupation that has only recently spread in Russia.

The social status of programmers is fairly high. Fig. 25 shows the distribution of responses to the request to name 5 occupations now enjoying the highest respect in Russia. The 2003 survey has shown that, on the list of 14 occupations, programmers are in 4th place; they were named by 21% of respondents after lawyers (40%), businessmen (30%) and politicians (22 %). Views on the demand for other occupations in the intellectual area, such as teachers, scientists and engineers are much lower.

Women, people of middle age (between 25 and 54), people who received higher education or vocational training, and city residents, awarded a higher status to people working in the area of information technologies – they put programmers in third place, ahead of politicians. People in supervisory positions, specialists, white-collar workers and students also named them more frequently. Programmers were viewed as having a lower status by men, skilled workers and unemployed people (fifth place after skilled workers), rural residents (fifth place after doctors), people with lower-than-average education (sixth place after doctors and skilled workers) and people above the age of 65 (eighth place).

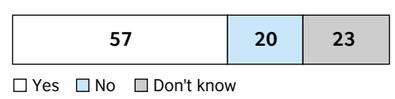
Fig. 49. The rate of using computers and the Internet
(per cent of respondents)



Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

The prestige of a job in the ICT sector, as measured by the question about their own children's career, is also high: 57% of respondents would like their children to become programmers, while only 20% had no such wish (Fig. 50). The career of a programmer appeared to be more attractive to people from medium-sized and small towns (64% and 62% respectively) and less so to large city residents (it was mentioned by only 48% of Muscovites), people aged more than 65 (41%), people with lower-than-average education (51%) and people living in rural areas (53%).

Fig. 50. Prestige of occupations in ICT
(per cent of respondents)



Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

CHAPTER 8

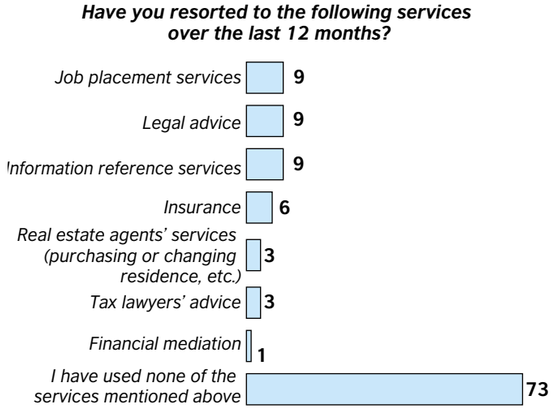
USE OF PROFESSIONAL SERVICES

8.1. The actual use of professional services

The area of professional services is a popular and well-paid activity in countries with a developed market economy. Speaking of Russia, not all professional services are in popular and sufficient demand yet. Nevertheless, some of them have a very high social status. For instance, the profession of lawyers and other legal experts is currently enjoying the most respect in Russia, according to the majority of the respondents (40%) who made their choice from the list containing 14 occupations. These professions are in the lead, having a rating even higher than those of entrepreneurs and politicians (see Fig. 25 above).

The rate of using professional services by the population shows how deeply this element of the *New Economy* is instilled in every day life, something it is essential to understand when predicting prospects for professionalising the economy. According to the survey, the population does not often use professional services. For instance, over the last year, only every fourth respondent (27%) has taken advantage of specialists' services to help with personal or business issues. But even these respondents generally used only one service present on the list given (one service – 18%, two services – 7%, three and more services – 3%). The most popular services proved to be job placement, legal advice and information reference services, each chosen by 9% of those surveyed (Fig. 51). Insurance services are still rather underdeveloped (6%). And only a few respondents resorted to the assistance of real estate agents or tax lawyers (3% each).

Fig. 51. The actual use of professional services by the population
(per cent of respondents)*



* The sum exceeds 100% because respondents could give several answers.
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Certain differences were observed in the rate and structure of using professional services by the different social groups. Gender groups are the only ones where almost no difference was observed. The share of those using such services decreases with age in the age groups. Young people of 16 to 24 years old were the most active group and more often resorted to information services (18% to reference ones and 17% in job placement) as well as insurance services (10%). This makes a total of 39% using such services in this group.

In the next cohort of 25 to 34-year-olds, slightly fewer respondents used such services (34%), but when they do, they tend to use the more "serious" services. Although job placement services were still popular (13%), legal advice took second place (11%), with information reference services coming third (9%). "Rare" services, such as those of real estate agents (7%), tax lawyers' advice (5%), and financial mediation (4%), enjoyed the most popularity in the group.

The share of those using professional services is also higher than average throughout the cohort of 35 to 44-year-olds (33%). This group is the third most active one, but the second one in terms of the "seriousness" of the services used. Like the previous group, this one also displays a high use of legal advice (11%) and tax lawyers' advice (5%), the other services being used slightly less often.

The maximum use of legal services occurs in the group of 45 to 54-year-olds, which interestingly consume less of the other services than other groups. And the overall rate is close to the average of the sampled respondents (26%).

The lowest rate of using professional services is among the respondents of retirement age (11-13%).

The rate and structure of using professional services also differs in each of the educational groups. The maximum rate is registered among respondents with higher education (35% of the respondents belonging to the group have used any of the services suggested). This group shows the maximum rate of resorting to legal and reference services (18% and 16%) as well as tax lawyers' advice (7%), the rate of using insurance and real estate agents' services being a little higher than in the other educational groups. But at the same time job placement services are the least popular here (6%).

In the two groups where the respondents have secondary and specialised secondary education, the difference is not great. The overall rate of using professional services is more or less the same in these two groups, and close to the average of the selection (25% and 27%). Those without specialised education have more often resorted to specialists when looking for a job (12%) and/or used information reference services (10%), but have less often used legal or insurance services (7% and 5%). On the other hand, the frequency of using the two latter services by those having specialised secondary education is a bit higher (10% and 7% respectively), whereas job placement services have been resorted to by only 8% of those surveyed in the group.

Among Muscovites, information reference services proved to be the most popular (18%), whereas insurance services were not as popular as on average among the sampled respondents (3%). Generally, the rate of using professional services in large cities is on the whole higher (34%) than compared to small settlements (25%). It is of interest that rural people do not differ from the inhabitants of small and middle-sized towns in this respect, but they use information reference services a little less often (5%) and job placement services a little more often (10%).

In the groups singled out by socio-professional status, the most active users of professional services turned out to be executives (42% of those surveyed in the group have taken advantage of such services) and housewives (40%). They resort to legal advice quite often (24% and 16% respectively), but executives use information reference services even more often (27%). In the latter group, the use of tax lawyers' advice is also higher (8%), while housewives more often take advantage of job placement services (13%) and real estate agents' services (10%). Executives also use more varied sources to get information. In other groups of the employed respondents, job placement services are in the lead (11-13%). Interestingly, only 27% of the surveyed jobless respondents have turned to placement agents over the last year.

8.2. Sources of information regarding professional services

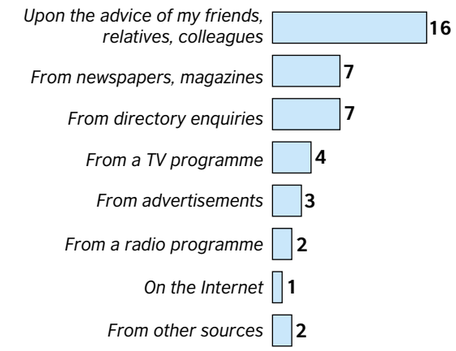
The most common source of information regarding professional services is the advice of friends, relatives or colleagues; this was chosen by 16% of those surveyed (Fig. 52). Second place was given to two sources: the periodical press and directory enquiries (7% each). Then come television programmes (4%), advertising (3%), radio programmes (2%) and the Internet (1%). Apparently, respondents sometimes had problems distinguishing between commercial advertisements and specialised programmes (especially, if they were on closely related subjects). This is of little surprise as it is possible to come across articles in the periodical press that are actually a sort of advertising.

The list can be slightly broadened by interpreting respondents' answers entered under the option *from other sources*. For instance, self-advertising is a kind of *advertising* (9 respondents said that insurance agents *had come to them by themselves*); a variety of *advice* is the advice of casual acquaintances (there were people among the sampled respondents who added *in a polyclinic*, *in a hospital*). Some information was provided by local authorities and specialised bodies or individual professionals (e.g. lawyers).

Some differences in using sources of information regarding professional services were observed in the different social groups. There was almost no difference within the gender groups. The advice of friends, relatives, colleagues was the main source of information in all social groups. However, there were slight differences in the use of the periodical press and directory enquiries. Young respondents of 16 to 24 years old, the citizens of Moscow, St. Petersburg and the North of Russia have resorted to directory enquiries more often on the whole. However older respondents, those with higher education, the citizens of large cities (except for the capitals) and those living in the Ural region, have more often used advertisements in the periodical press. The use of the Internet as a source of information regarding professional services is more typical of young respondents, those with higher education, Muscovites, and the citizens of St. Petersburg.

Fig. 52. The sources of information regarding professional services *(per cent of respondents*)*

What are the sources that you have got information from regarding organisations (or people) providing such services?



* Respondents could give several answers.
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Unfortunately, the selection does not allow us to draw more comprehensive conclusions concerning, for instance, the level of the respondents' satisfaction with the quality of the services provided, barriers to using such services, etc. A special survey would be required to examine this.

CHAPTER 9

PUBLIC INTEREST IN EDUCATION

The progressive development of science, the economy, and society in general is to a considerable extent determined by the state of the education system. Here, the basis of the intellectual potential of society is laid and qualified personnel trained, whose subsequent professional activities serve socio-economic and S&T progress, leading to the economic and spiritual well-being of society.

In summary, we can say that the various findings concerning education mentioned in the previous chapters reveal a rather unfortunate picture. First, all respondents treated education as an important but secondary area of activity. Most respondents did not see education as an important area contributing to Russia's development. Thus, in answering the question *What is the main condition for Russia's economic growth?*, only 15% chose education (sixth place). Only one person out of a hundred said that education was the main factor claiming respect from Russia, the reason being that it never occurs to anyone to name education as one of the national prestige factors (only 2% of all respondents thought so).

The respondents expressed a great interest in education issues and methods of improving the education system. As

many as 30% of respondents said they had a personal interest in education issues, which is a fairly large number (fifth place out of the 14 available options). Furthermore, one out of three people agreed that it is important at the present time to develop the scientific areas connected with improving education.

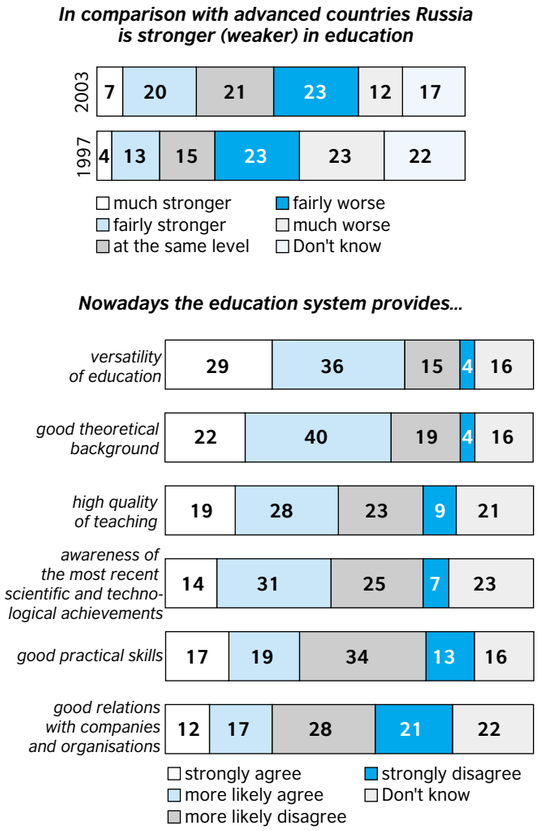
Thus, the society has definite views on many of the issues. Earlier surveys showed that the value of good professional education began to increase during the period of transition to a market economy, and the society began to offer increasing rewards for some kinds of qualified professional work, and rejected former "ceilings" restricting salaries and incomes.

In the following chapter we shall look at the nature of interest in occupations in the education sector, whether the respondents would like to increase their educational level, in what areas, from what motives, etc.

9.1. Views of the population on the education system in Russia

Contrary to the popular domestic opinion that the Russian education system is the best in the world, the 2003 survey has shown that one in three Russians assessed its level as below current world state-of-the-art standards. And yet almost half of respondents are sure that Russia does not concede to advanced countries in this respect, and one in four considers that the standard of education in this country exceeds global standards (Fig. 53). Opinion has grown much more positive compared with the 1997 survey, when every second person held a negative opinion. The members of social groups who gave the largest number of positive views were young people, persons with higher education and inhabitants of Moscow and St. Petersburg.

Fig. 53. Views of the population on the education system in Russia
(per cent of respondents)



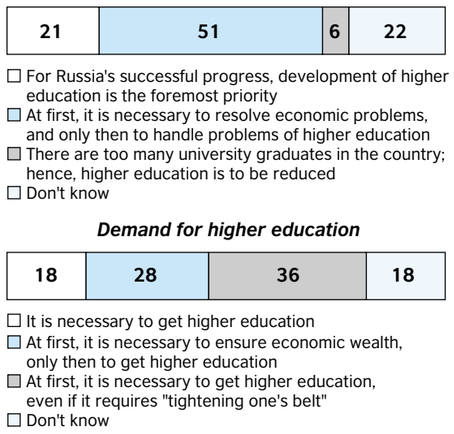
Sources: for 1997 – Gokhberg and Shuvalova, 1998, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

The role of science in education is considered by respondents as quite important. We can note that, in their choice of fields of activity that in the first place require interaction with science, more than one-third of those interviewed referred to education (see Fig. 35 above).

The highest estimation was given to such criteria of the quality of domestic education as versatility, good theoretical background, as well as the quality of teaching and awareness of the most recent scientific and technological achievements (Fig. 53). Conversely, negative opinions prevailed in estimates of the practical skills acquired by students and the relations of universities with companies and organisations. Thus, Russia's education system appears to "mirror" its R&D sector with its high level of basic research, and poor orientation to practical application of knowledge in other areas, especially the national economy.

9.2. Views of the population on higher education

Fig. 54. Views of the population on higher education
(per cent of respondents)



Source: for 1997– Gokhberg and Shuvalova, 1998, for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

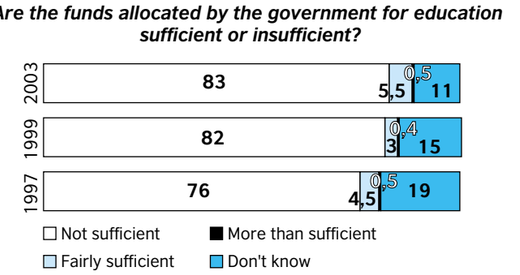
The public need for the development of higher education is highly estimated by the Russians. Only 6% of respondents believe that the country has got a surplus of professionals with higher education, and that it is necessary to reduce their further training. A half of the respondents, taking into account the present economic situation, consider it expedient to solve economic problems first, and only then the problems of higher education. One in five is sure that the future of Russia depends first of all on the development of higher education (Fig. 54). Highly educated and better-off people, young respondents, and residents of Moscow and St. Petersburg, more often hold this position, while the idea of curtailing higher education has not found serious support in any social group of Russian society.

The population also assesses the need for acquiring higher education relatively highly, even despite the present economic difficulties. Responding to the question *What is to be done now by young people intending to acquire higher education?*, more than one-third of respondents stated that it should be acquired, even if it is necessary *"to tighten one's belt"*. More often, this position is demonstrated by women, and better-educated and better-off people. Far fewer respondents (28%) believe that young people should at first ensure economic prosperity for themselves and their families. Still less numerous are those who do not see the necessity of acquiring higher education by young people (18%); such were more frequent among men, persons with low education, members of needy families, and inhabitants of small towns.

9.3. Public views on education funding

Simultaneously, the population well understands the necessity for the further development and improvement of education. This is testified by the respondents' unanimous assessment of the level of government funding for this sector as being deficient. For example, more than four fifths of those interviewed (83%) think that the government does not allocate sufficient funds. Those satisfied with the level of budget funding were very few (5.5%), and those who consider it too high numbered only 0.5% (Fig. 55). On this question, the greatest disparity exists between the answers of respondents with different levels of education: the higher the educational attainment, the more critical the assessments (91% among persons with high education and 74% among persons with low education).

Fig. 55. Views of the population on the government funding of education
(per cent of respondents)



Sources: for 1997 – Gokhberg and Shuvalova, 1998; for 1999 – Russian Science and Technology at a Glance: 1999; for 2003 – Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

9.4. Prestige of teaching

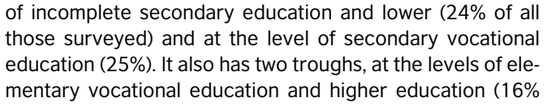
The prestige of teaching was assessed from questions about occupations that enjoy the greatest respect in Russia at present, and whether they would like their children to choose that occupation. In the first instance the respondent was evaluating public opinion on the given occupation, while in the latter, the answer revealed the respondent's personal opinion.

The social status of teaching is not very high, judging by the data appearing in Fig. 25 showing the distribution of responses to the request to name 5 occupations currently enjoying the highest respect in Russia. On the list of 14 occupations, teachers were in 7th place – 11% of respondents (following lawyers, businessmen, politicians, programmers, skilled workers, and doctors; behind scientists, journalists, artists/actors/writers, tradesmen, farmers, soldiers, and engineers).

The only group that awarded a higher status to teachers was that of people aged above 65: their rating of teachers went to sixth place (pushing down programmers). Respondents aged 16 to 24 and 35 to 44, people with full secondary education, residents of Moscow and large and medium-size cities, all awarded a lower status to teachers, putting them in tenth or eleventh place where they trailed behind scientists, journalists, and/or artists/actors/writers.

The measurement of the status of teaching based on the question about a career for respondents' own children revealed a much lower estimation. Only one out of five people wished their children to become teachers (19% of respondents). Conversely, two thirds (62%) of all respondents held a negative attitude towards a teaching career for their children (Fig. 56). Thus compared to the estimations of status that put teachers slightly ahead of scientists, people's personal attitudes were more negative. It seems that this is a case of underestimation of public opinion.

Fig. 56. Prestige of teaching
(per cent of respondents)



Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

A teacher's prestige was higher in the older groups, while the rejection of this occupation by the youngest groups (aged 16 to 24) was very striking: only 11% would like their children to become teachers, while 72% were against it. In the geographical groups, a teacher's career appeared more attractive to rural residents. Looking at differences in educational level, those with a lower level of education were noted for a positive attitude to a teaching career for their children.

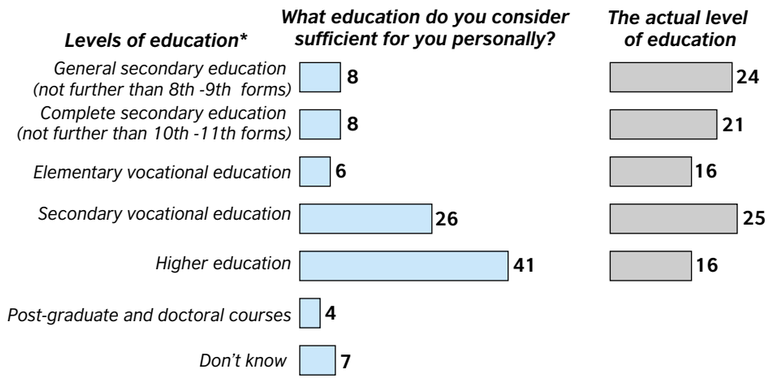
In recent years the status of teachers has grown quite remarkably in the US. In answering a direct question in 2000 about the prestige of scientists (to be ranked among 17 various occupations) respondents put teachers in third place. 53% awarded this occupation *very great prestige*, with doctors occupying first place (61%), and scientists second place (56%).

9.5. Demand for education

The respondents' demand for education was analysed by comparing their actual level of education with their desired one, their preferred professional skills, the motivational factors of those who did their studies the previous year, and how satisfied they were with the education acquired.

Rating levels of education. The respondents' distribution by their actual level of education has two peaks, at the level of incomplete secondary education and lower (24% of all those surveyed) and at the level of secondary vocational education (25%). It also has two troughs, at the levels of elementary vocational education and higher education (16%

Fig. 57. The actual and desirable levels of education
(per cent of respondents)



* The list given to the respondent did not contain the alternative.
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

each). The distribution of the respondents' answers to the question what level of education they consider sufficient for themselves personally, only has a peak at the level of higher education (opted for by 41% of those surveyed, Fig. 57).

Secondary vocational education (at the level of a technical secondary school) is also quite popular: it was chosen by a quarter of all those surveyed (26%). However, secondary school level would suffice for only 16% (either complete secondary education or even general secondary education, each opted for by 8% of the respondents). And finally, the most unpopular level is elementary vocational education (it was chosen by 6% of all those surveyed). The general outcome is that there is a satisfied demand for secondary vocational education and an unsatisfied one for higher education, which every fourth respondent would like to have but does not have.

The greatest difference in social groups is to be observed among the respondents with different levels of education and different socio-professional backgrounds, as well as in the different age and regional groups. In the group with higher education, a vast majority of the respondents would like to have this very level of education (84%), and another 12% would like to go further by doing post-graduate or doctoral studies (Table 2). Almost nobody would like to lower standards, yet there were 2% of the respondents with higher education who, in their opinion, could content themselves with secondary vocational education on the level of a technical secondary school.

Table 2. The correspondence of the actual and desirable levels of education
(per cent of respondents at each level of education)

What education do you consider sufficient for you personally?	Average	The actual level of education				
		General secondary	Complete secondary	Elementary vocational	Secondary vocational	Higher
General secondary education (not further than 8th -9th forms)	8	30	1,5	1	0	0
Complete secondary education (not further than 10th -11th forms)	8	11	23	1	0,5	0,5
Elementary vocational education	6	6	6,5	22	0,5	0,2
Secondary vocational education	26	20	19	34	46	2
Higher education	41	17	36	31	48	84
Post-graduate and doctoral courses	4	2	4	2	3	12
Abstained from answering	7	14	10	9	2	0,2

Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

In the secondary vocational education group, the opinions split in half between the actual level of education (46%), and higher education (48%), whereas only 3% of those surveyed in the group aspire to post-graduate studies. In the elementary vocational education group the opinions split in three parts, the smallest comprising those who are satisfied with their actual level of education (22%), and the other two wishing for a higher level, i.e. secondary vocational education (34%), and higher education (31%). And very few of them (2%) aspire to post-graduate studies.

The picture differs slightly in the complete secondary education group. Elementary and secondary vocational education is less popular here (6.5% and 19% respectively), but the respondents are immediately aimed at higher education (36%) and even further at post-graduate studies (4%). Those who are satisfied with their actual level of education are few (23%). And finally, in the general secondary education group, there are even more of those who are satisfied with their actual level (30%), while those pretending to higher education are only half that in the other groups (17%).

Thus, those satisfied with their actual level of education vary from 22% of the respondents with elementary vocational education, to 84% of the respondents with higher vocational education, the share accounting for 40% on average throughout the sample. Consequently, people unsatisfied with their actual level tend to be those who stopped at the elementary level of their vocational education. And in any educational group, only a few said that they would content themselves with a lower level of education. On the whole, those unsatisfied would like to raise their level of education, with secondary and higher vocational education competing options.

Across the age groups, the younger respondents more often prefer higher education, whereas among 16 to 24-year-olds, there are many dreaming of post-graduate courses (11%). One of the groups where higher education is not in the lead is that of people aged 65 and older (the other groups are qualified and unqualified workers). One in four of them said that general secondary education would suffice, and almost the same share of respondents would content themselves with secondary vocational education.

Higher education, compared to secondary vocational education, is more often a priority among the citizens of larger and middle-sized cities, in particular, Muscovites, rather than smaller settlements. Gender distinctions are minimal. The only thing worth mentioning, is that women as compared to men would more often like to have both higher education (44% and 38% respectively) and secondary vocational education (27% and 24%).

A great difference was observed in the groups distinguished by different occupations, but such groups are not representative. Nevertheless, it is worth noting that two groups rated post-graduate courses and secondary vocational education equally highly, with higher education being a mutual priority: those of executives and students. Workers, however, showed preference for secondary vocational education, higher education being only in second place, whereas third place was given to elementary vocational education by qualified workers, and complete secondary education by unqualified workers. The unemployed made more or less the same choice as qualified workers.

So, their actual situation was found to be unsatisfactory by more than half the respondents. However, they would be able to improve the situation by getting additional training and thus addressing the insufficiency of their primary education.

Rating professional skills. Indeed, analysis of the answers to the question *Being given a chance to get additional training and raising your professional level, what would you choose first of all?* has shown that more than half of the respondents feel a need for additional training. 50% of them knowing for sure what knowledge they would like to acquire, 7% abstaining from answering, the remaining 43% not finding it necessary to study further (Fig. 58). Looking at the different professional skills, the most popular one proved to be computer skills (17% of those surveyed would like to learn how to use computers and a further 4% would like to become familiar with new software products). Second place went to foreign languages (19%); legal knowledge took third place (17%); theoretical knowledge and practical skills in their acquired profession were in fourth place (15% each); and finally, fifth place was given to economic knowledge (14% of those surveyed).

Fig. 58. The demand for additional training: rating professional skills
(per cent of respondents)*

* The sum exceeds 100 per cent because respondents could give several answers.
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Looking at the social groups, the greatest distinctions were observed across the age groups, although the other groups have peculiarities of their own. Where gender is concerned, men would like to perfect their knowledge and skills (they more often feel a need for additional theoretical knowledge and practical skills in their profession, legal and economic knowledge, becoming familiar with new software products). Women tended more to want to extend their range of knowledge and skills (to learn a foreign language and how to work on a computer). Although there were a few more women satisfied with their education than men (44% and 41% respectively).

Naturally, across the age groups, the youngest respondents felt the greatest need for knowledge (only 8% of them answered that they did not need to get additional training), but even among those approaching retirement age (45–54 years old), as good as half opted for certain professional skills. The most popular skills among youngsters were foreign languages (chosen by 40% of those surveyed in the group) since many of them have acquired computer skills since they left school, whilst among people of middle years legal knowledge is in the lead, and older people gave preference to computer skills and foreign languages.

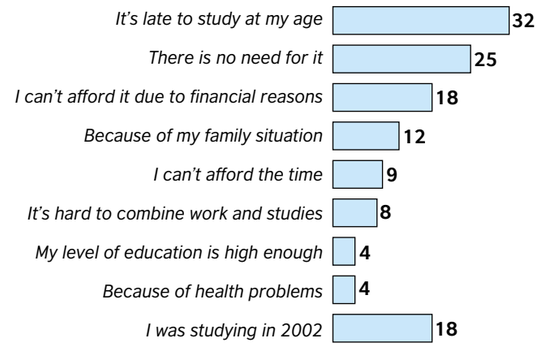
In the educational groups, the smallest share of those who did not feel a need for additional training fell to respondents with higher education and secondary vocational education (34% each), while people with lower than secondary education were the most satisfied with their level of education (59%). The need to learn a foreign language, as well as legal and economic knowledge, was in the lead among respondents with higher education (as they have already acquired computer skills), while foreign languages and computer skills shared first place among respondents with secondary vocational education. The representatives of the latter group needed theoretical knowledge in their profession more than other groups, and the respondents with secondary (unspecialised) education were in need of practical skills.

Looking at the inhabitants of settlements of various types, rural people were the fewest to feel a need for additional knowledge (48%), but in general the difference was not so great as in the two previous groups. The citizens of Moscow and St. Petersburg needed foreign languages the most, the citizens of other cities and towns were mostly in need of computer skills, city-dwellers admitted to the insufficiency of their economic knowledge, and the citizens of smaller towns were not satisfied with their theoretical knowledge.

Barriers to acquiring education. The analysis of answers to the question *If you didn't do any studies or raise your professional level in 2002, what were the main reasons?* showed that the most popular alternatives were those pointing out the lack of need for additional training: *it's late to study at my age* and *there is no need for it* (chosen by every third and every fourth respondent respectively, Fig. 59). And these two reasons accounted for almost half of the sampled people (44% of all respondents). Interestingly, the *age* reason showed up as early as among the 25 to 34-year-olds. The alternative *it's late to study at my age* was opted for by 4% of those surveyed in the group, while there were 23% of such respondents in the cohort of 35 to 44-year-olds and 49% among the 45 to 54-year-olds. The lack of need is also present in the answer *My level of education is high enough* given by 4% of all those surveyed (20% being among people with higher education, only 2% among those with secondary vocational education, and 1% in each of the other educational groups).

Fig. 59. Barriers to acquiring education (raising one's professional level)
(per cent of respondents)*

If you didn't do any studies or raise your professional level in 2002, what were the main reasons?



* The sum exceeds 100 per cent because respondents could give several answers.
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

Real obstacles in the way of acquiring education were pointed out by 38% of those surveyed. Strained *financial circumstances* (chosen by 18% of those surveyed) and their *family situation* (12%) were in the lead among such reasons, with many respondents pointing them out jointly in a pair. The respondents opted a little less often for *lack of time* (9%) correlating with both the two above mentioned reasons, and *pressure of work* (chosen by 8% of those surveyed). Almost none of the respondents justified themselves by *poor health* (4%), this reason being often given together with *age* factors. Women opted for their *age* and *family situation* more often whereas men preferred *lack of need* and *time* together with *pressure of work*.

Looking across the age groups, respondents in the age range of 25 to 34 years old tried to justify themselves more than others, first of all, by strained *financial circumstances* (36%), their *family situation* (31%) or *lack of time* (20%). In the cohort of 35 to 44-year-olds *financial circumstances* were still in the lead (29%), but the indicators of an insufficient demand for additional training started showing up: the *lack of need* and *age* factors.

Barriers differed across the educational groups. For instance, in the group of respondents with higher education, first place was given to three reasons indicating an insufficient demand for additional training: the *lack of need*, *age* factors and a *high level of education* (pointed out by every fifth respondent in the group). Strained *financial circumstances* became the third reason in the secondary education groups. The respondents with lower than secondary education chose their *age* as the main reason (a half of respondents in the group) as well as *lack of need* (another quarter of them).

Considering respondents from different types of settlements, the only peculiarity was registered with citizens of Moscow and St. Petersburg. Their second most popular alternative was the *lack of time*, while in other cities, towns and villages, this alternative was chosen in fifth or sixth place. The third most popular alternative was *pressure of work*, whereas in other places *financial circumstances* were mentioned as the third most popular reason.

9.6. The effectiveness of vocational education

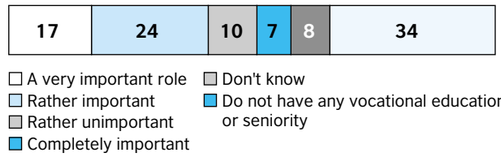
One can get some insight into the effectiveness of vocational education by analysing assessments given by respondents who have experience of that education. In this case, the following indicators were taken into account: assessments of the importance of vocational education in professional life, estimates of the volume of knowledge acquired and used to do the job, correspondence of the profession acquired to the one currently practiced, and motivations for changing profession. People's professional mobility, manifesting itself in a transfer to another job entailing a switch to another profession, can indicate a breach in balance of demand in the labour market and supply on the educational services market. Such breaches can be addressed by changing the structure of curricula and/or providing additional training, thus raising the effectiveness of vocational education.

The role of vocational education in professional life. When giving their assessment of the importance of vocational education in their professional lives, most of the respondents admitted that it was playing an important role (*a very important one* was chosen by 17%, *rather important* by 24%, making a total of 41%, Fig. 60). Only 17% of those surveyed denied the importance of vocational education in professional life (7% found it completely unimportant, 10% of those surveyed deemed it rather unimportant). A third of respondents said that they had not done voca-tional education (34%).

Positive answers were ahead of negative ones in almost all the social groups under study except for unqualified workers. The majority of positive answers were given by respondents over 45 years old, those with higher and secondary vocational education, metropolitan citizens, as well as graduates and executives. There was no difference observed across gender.

Fig. 60. The importance of vocational education in professional life
(per cent of respondents)

If you have vocational education, what role has it been playing in your professional life?



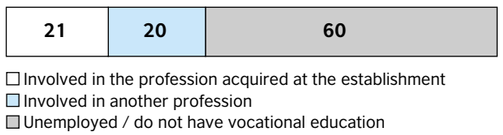
Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

The assessment of the professional standard acquired in an educational establishment. Working respondents were asked to estimate the volume of knowledge acquired in their educational establishment from the point of view of their further professional activities. Given word for word, the question ran as follows: *Do you find the knowledge acquired in your educational establishment sufficient for your professional activities?*. Positive answers prevailed here, too. 39% said that the knowledge was *quite sufficient*, another 24% found it *rather sufficient than insufficient* and every tenth held the opinion that they had been taught *more than needed*. Every fourth respondent gave a negative answer. However, on the whole, these tended to be "soft negative": 21% of those surveyed said the knowledge was *rather insufficient* and only 4% opted for the flat *completely insufficient*[1]. So, the proportion of those assessing the knowledge acquired as sufficient or insufficient for their further professional activities was 3:1.

The correspondence of the profession trained for to the one currently practiced. Have the vocationally trained respondents been able to find a job according to the professions they trained for and kept it up to now? Interesting answers to the question *Are you currently involved in the profession acquired at your educational establishment or in another one?* split approximately in half. 21% were working in the profession acquired, but 20% had switched to another one. The remaining 59% of those surveyed are either unemployed or not vocationally trained. (Fig. 61)

Fig. 61. The correspondence of the profession acquired to the current profession
(per cent of respondents)

Are you currently involved in the profession acquired at your educational establishment or in another one?



Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

[1] *The answers were given by working respondents only (1061 people, or 50.3% of the selection).*

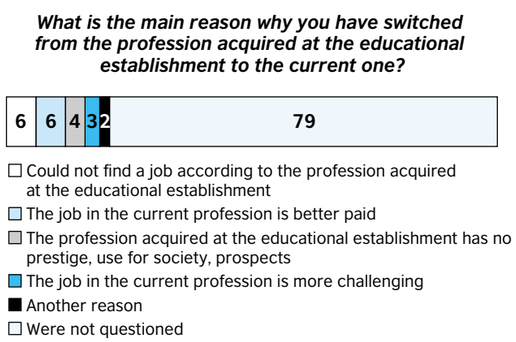
Among the social layers under study, there were groups in which the share of those not involved in the profession trained for, exceeded the share of those involved in the profession trained for at the educational establishment. These were men as a whole (23% and 20%), respondents having secondary vocational education (33% and 27%), citizens of medium-sized towns (25% and 21%) and rural-dwellers (17% and 14%), with the greatest discrepancy being found among clerical staff (52% and 24%) and unqualified workers (41% and 17%). In the rest of the groups the profession acquired corresponds slightly more often to the one practised. The greatest share of those involved in the profession acquired were in the two professional groups: graduates (where 73% are involved in the profession acquired and 25% are not) and executives (56% and 38%).

The motivation for switching to another occupation. Switching to another profession can mean the lost labour of both teachers and the students themselves, as well as wasted time and money. Throughout our sample there proved to be 412 people (or 20% of the sample) who had switched to another occupation. What were their motives? Among the answers to the question *What is the main reason why you have switched from the profession acquired at the educational establishment to the current one?* the most frequent ones included the impossibility of finding a job according to the profession acquired at the educational establishment, and a higher salary in the current profession (chosen by up to 6% of those surveyed). They also cited fluctuations in demand, that the profession acquired at the educational establishment proved to be of no prestige, utility for society, or had no future prospects (3.5%). All the reasons could be viewed as mistakes by education managers in predicting the demand for educational services. Only 2.5% explained their switch to another profession as due to finding a more challenging job in their new profession, and another 2% gave other reasons, mostly health problems and the need for earning additional income on retirement (Fig. 62).

Looking at differences in education, respondents with higher education were more often able to afford a transfer to a better paid or more challenging job by switching to another profession (the reasons mentioned climbed higher in the rating in the group and took first and third places respectively). In contrast, the representatives of the secondary vocational education group were more often involved in another profession since they could not find a job in the profession they had trained for, or because their profession had no prospects. A similar situation was observed in the gender, regional and professional groups: men, Muscovites and executives proved to have more favourable circumstances in transferring to another job than women, country-dwellers and clerical staff.

Fig. 62. The motivation for switching to another profession

(per cent of respondents who have made a switch)



Source: Institute for Statistical Studies and Economics of Knowledge / Higher School of Economics.

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