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Author(s)	Kobayashi, Toshiya
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The Trend of the Academic Scientists after the Soviet Collapse and Conversion of the Japanese Science and Technology Policy in the 1990s

Toshiya Kobayashi

Japan Advanced Institute of Science and Technology

1-1 Asahidai, Nomi, Ishikawa 923-1292, Japan

t-kobaya@jaist.ac.jp

ABSTRACT

After the Soviet Union's collapse in 1991, the development of scientific inquiry, which had seen so many achievements in the fields of nuclear and space sciences in the second half of the 20th century, sustained serious damage.

Much scientific inquiry in the Soviet Union depended on the national budget and was managed by the government. The national budget, however, shrank dramatically after the old government's demise.

Many research institutes in Russia faced sharp reductions in research funds in the 1990s, making it difficult for many researchers to continue their work. Plunging salaries rendered many academic scientists destitute, triggering a spate of Russian scientist movement away from research and cutting the number of researchers to less than half that in the Soviet era[1]. The emigration of scientific minds reached about 2,000 a year from 1991 to 1996.

Soviet era scientists rarely stayed longer than one year to work in Japan. By 1992, a year after Soviet collapse, nearly 100 had visited Japan for longer stays, with 399 arriving in 2002. An average of nearly 250 Russian researchers left home yearly for Japan to stay one year or more in the ensuing decade.

Why did so many Russian researchers seek Japan? The answer lies in new scientific and technological policies introduced by Japan in 1992. This report explores these policy changes and their influence on trends in scientific inquiry in Russia .

Keywords: Collapse of the Soviet Union, brain drain, a shortage of researchers, Japan's scientific and technological policies

INTRODUCTION

Since the Soviet Union's collapse in 1991, its scientific research and development system, which had made significant achievements in the areas of nuclear and space sciences in the second half of the 20th century, suffered serious damage. Many of scientific researches conducted in the former Soviet Union depended on its national budget, which has drastically been decreased after its demise.

As a result, many research institutes in the new Russia faced sharp reduction in research funds in the 1990s, making it difficult for many researchers to continue their work. Salaries of scientists were significantly reduced, and many scientists faced financial difficulties. This situation triggered a spate of Russian scientist movement

away from research, cutting the number of researchers to less than half that in the Soviet era. Especially able researchers—over 2,000 researchers a year from 1991 to 1996—migrated outside the country.

Soviet era scientists rarely stayed longer than one year to work in Japan. However, by 1992, a year after the Soviet collapse, nearly 100 had visited Japan for longer stays. This number increased every year, reaching 399 in 2002. Thus, on average, almost 250 Russian researchers per annum left their country to visit Japan for longer stays over one year in these 10 years.

Why did so many Russian researchers seek Japan after the collapse of the Soviet Union? A major reason lies in new science and technology policy introduced by Japan in 1992. This report explores the effect of these policy changes of Japan on the trends in and movement of scientific researchers of the former Soviet Union.

1. Science in Russia facing catastrophe

The science and technology research system, which Russia succeeded from the former Soviet Union, had been completely financed by the national budget. The Science Academy, universities, the Ministry of Industry's affiliated research institutes had been all in the government-managed sector. In the Soviet era, there had been no research and development conducted in the private sector in the sense it is referred to in the West. However, immediately prior to and following the Soviet collapse (1991 – 1992), various systems were transformed for the sake of developing a market economy. Many of the measures taken in this process could be rather described as “shock treatments.” For

example, a severe fiscal expenditure restraint policy was introduced in order to reduce the huge government fiscal deficit (which corresponded to over 10% of GDP in 1993). This policy restrained the scientific research expenditure (see Figure 1), directly hitting Russia's science and technology community which had depended on the national budget. The ratio of research and development budget to GDP, that had been 2.03% in 1990, decreased to 0.8% in 1993. In this process, many of government funding plans for scientific and technological research, which had been scheduled to be implemented, became impossible to carry out. In 1993 and 1994, respectively 28.9% and 44.7% of the planned fund was not provided. This means that Russian research institutes missed a total of 2.3 trillion ruble that they had planned to receive. They had little chance of receiving research funds from non-government sources. Due to Russia's economic slump, the ratio of funds from privatized companies etc. remained only 7%.^[1]

As a result, a catastrophe struck Russia's science and technology community. First, many research institutions became inactive. The payment of already low wages for scientists continued to be delayed, forcing many scientists to find side jobs. It became impossible to secure the budget to keep research facilities or to purchase resources necessary for conducting research. In this period, the minimum monthly wage needed for sustaining the minimum level of living was said to be 1,900 ruble. According to a sociological study on science-related workers living in Moscow, 71.3% of them earned an average income of 2,000 ruble or less per month.

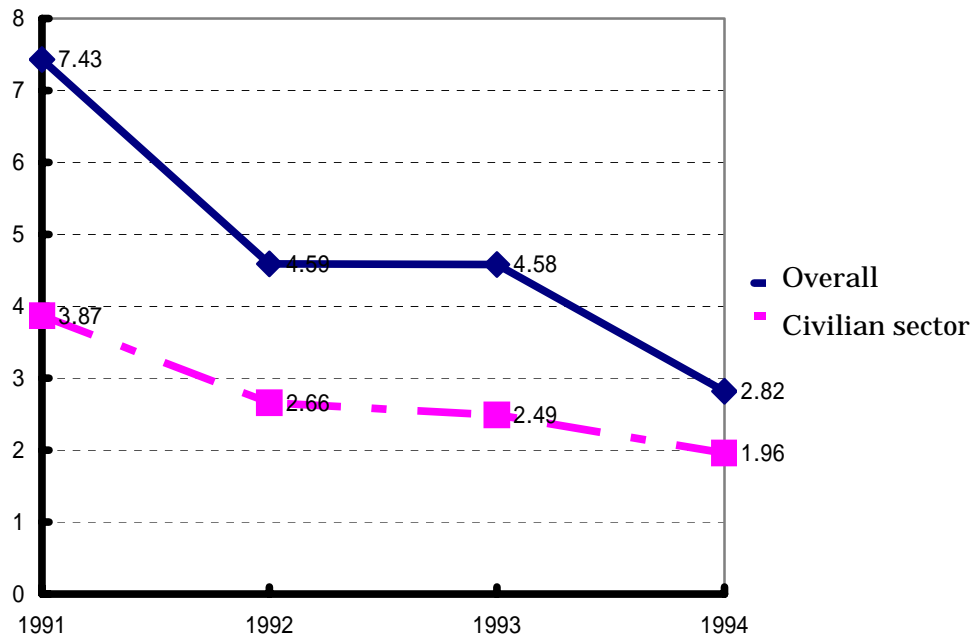


Figure 1: Rapidly decreasing ratio of the research and development allocation in Russia's national budget (%)

Source: Study Group on Science and Technology Overseas, Ministry of Science and Technology Policy of the Russian Federation, "Current Situation of Science and Technology in Russia: Outline of Development," *Foreign Science and Technology Policy*, Vol. 7, No. 5, 1996, p. 61.

2. The decrease of researchers and brain drain.

The above factors have caused the following two phenomena in relation to human resources in science and technology areas: (1) increasing evasion of working in science and technology areas in the country; and (2) "Brain Drain" of research and development human resources to overseas[2].

As the data on Figure 2 from the Center for Science

Research and Statistics indicate, the number of scientists decreased from 804,000 immediately after the Soviet collapse (1992) to virtually a half (or approximately 410,000) ten years later. An observation of the decreasing trend shows a significant decrease between 1992 and 1997 while the change is marginal in and after 1998. The scientific research system of new Russia has thus suffered a significant damage due to the decrease of researchers.

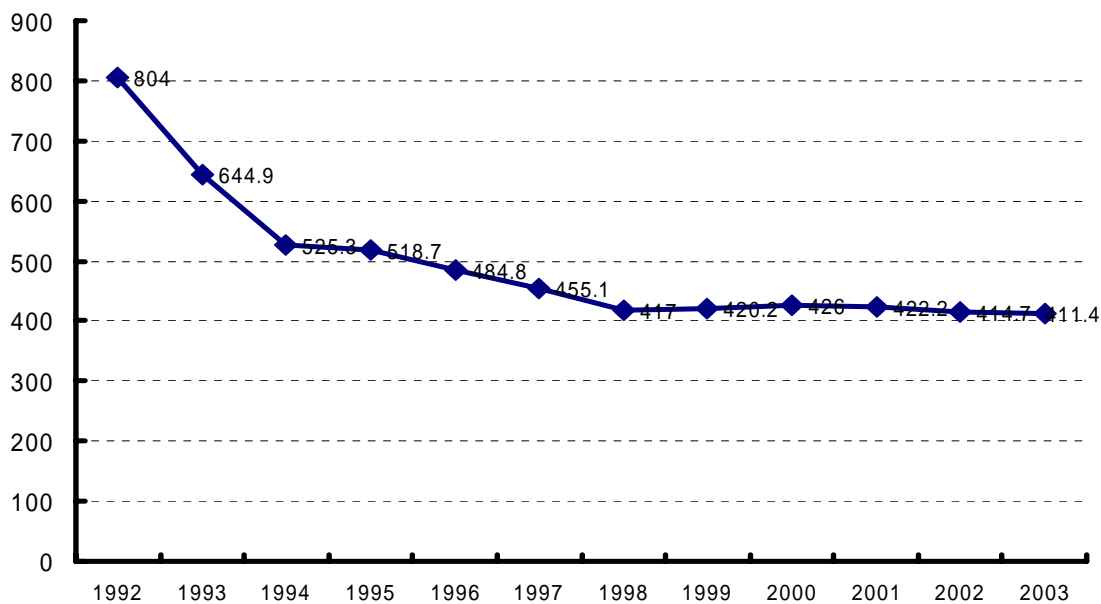


Figure 2: Decrease of researchers from 1992 to 2003 (In thousands)

Source: Center for Science Research and Statistics of the Ministry of Industry, Science and Technology and Russian academy of Science

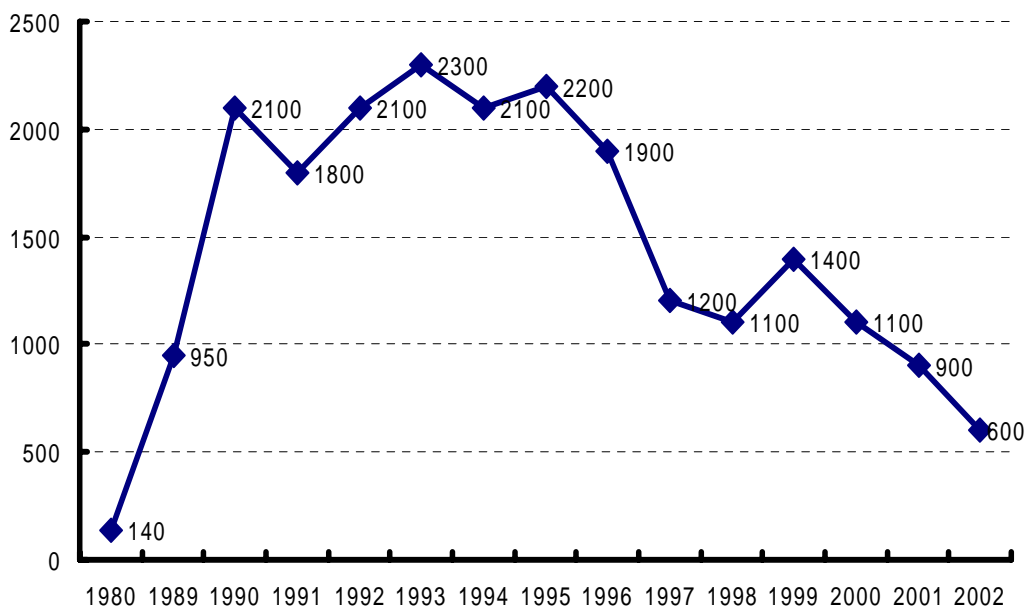


Figure 3: Changes in the number of Russian scientists migrating overseas from 1980 to 2002

Source: Center for Science Research and Statistics of the Ministry of Industry, Science and Technology and Russian Academy of Science

Furthermore, Figure 3 shows data of researchers who migrated overseas in some 20 years or between 1980 prior to the Soviet collapse and 2002. It obviously demonstrates the fact that about 2,000 researchers were “brain-drained” every year in the seven years between 1990 or the end of Gorbachev administration and 1996. It is presumed that these some 14,000 researchers represented the group of the most able researchers. For example, Alexei A. Abrikosov at the Argonne National Laboratory in the United States, a 2003 laureate of Nobel Prize for physics, migrated to the U.S. in 1991.

The brain drain, however, continued to decrease after 1997. The number of migrants to foreign countries decreased to below 1,000 in 2001 and continues to decrease up until today. These data imply that “most of the scientists privileged with opportunities and abilities for moving to other countries have already left the country.”

Thus, science in Russia as of 2005 faces the situations that:

- (1) The number of scientists and engineers have decreased to a half of what was at the height in the 1980s; and
- (2) Researches privileged with opportunities and abilities for moving to other countries have already left the country.

3. Is brain drain rather a positive phenomenon?

Professor Igor Ivanchik at Levedev Physics Institute in Moscow argues in his book *Russia's Science in Confusion* that the brain drain is not a negative phenomenon for science in Russia, based on the

following grounds:

- (1) They can come home if they wish to.

In the Soviet era, too, some able scientists migrated overseas and took asylums—including Leonchev of economics; Ilya Prigogine of thermodynamics; and Gamow of cosmology. Once they left their country, they were not allowed to go home. Today, however, unlike the former Soviet era, the freedom to leave and enter the country is guaranteed. Overseas migrants, too, are free to go back to their home country. It is possible if they wish to.

- (2) Overseas research institutions serve as refuge

Given the widespread inactivity of research institutions in Russia due to fund shortage, overseas research opportunities serve as refuge for able scientist to conduct sufficient research.

- (3) Russian scientists' international perspectives are developed.

Scientific research during the former Soviet era was conducted in extreme isolation, with significant adverse effects. Today, overseas research activities provide scientist with good opportunities to develop their international perspectives. In fact, more international exchanges between scientists should be encouraged.

Then, Professor Ivanchik presumes that, when Russia's economy recovers in the future, some of the scientists who have migrated overseas might go back to Russia. If this presumption is correct, that would be good news for Russia's science. The author felt, however, it would be necessary to examine at an early date whether this presumption was correct or not.

4. Few Russian scientists wished to go home

In order to examine the above presumption made by Professor Ivanchik, the author conducted a questionnaire and interview survey between September and December in 1996, about 9 years ago, with three Russian scientists who were working on fellowship at national research institutions in Tsukuba Academic City, Japan's largest research park, and eleven Russian faculty members at the University of Aizu in Fukushima Prefecture. As it turned out, all the scientists who participated in this survey expressed their satisfaction with their research environment in Japan and their wish to continue to stay in Japan in the future. No scientist clearly expressed their wish to go back to Russia in the near future. Their largest concern is whether or not the continuation of their desired research is guaranteed. Their safe refuge is the place where that is guaranteed. As described above, today's Russia does not provide this guarantee. Regarding Professor Ivanchik's above theories, his hypothesis that Japan serves as refuge for Russian scientists has been proved. Also, his argument that scientists' international perspective will be developed has also been proved correct. Nevertheless, it has also been demonstrated that, unless Russia's research environment is substantially improved, it is unlikely that Russian scientists "come home" in the near future.

5. Japan's science and technology policy matching Russian scientists' needs

In 1986, during the former Soviet era, there was only one Russian researchers staying in Japan. However, in 1992 or immediately after the Soviet collapse, as many as 95 Russian researchers were registered to stay in this country. The number has since continued to increase, reaching 162 in 1994, 230 in 1996 as mentioned above and eventually almost 400 in 2002 or ten years after the Soviet collapse. Figure 4 outlines this trend of former Soviet scientists visiting Japan with the data from some 20 years in the past. As mentioned above, in 1992 or shortly after the Soviet collapse, nearly 100 Russians with teaching and research purposes came to Japan. This increasing trend reached its height in 2002 with 399 visitors; and the number decreased by 46 to 353 next year, 2003. Still, the total number of Russian visitors, including those other than visitors with teaching or research purposes, increased from 6,026 in 2002 to 6,734 in 2003 or by as many as 708. Since the Soviet collapse, the number of registered Russian residents has consistently increased every year.

These statistical data were collected by Japanese government's Immigration Bureau, the Ministry of Justice, and published every five years since 1954 until 1974; every two years since the fifth publication in 1984; and every year since the tenth publication in 1995.

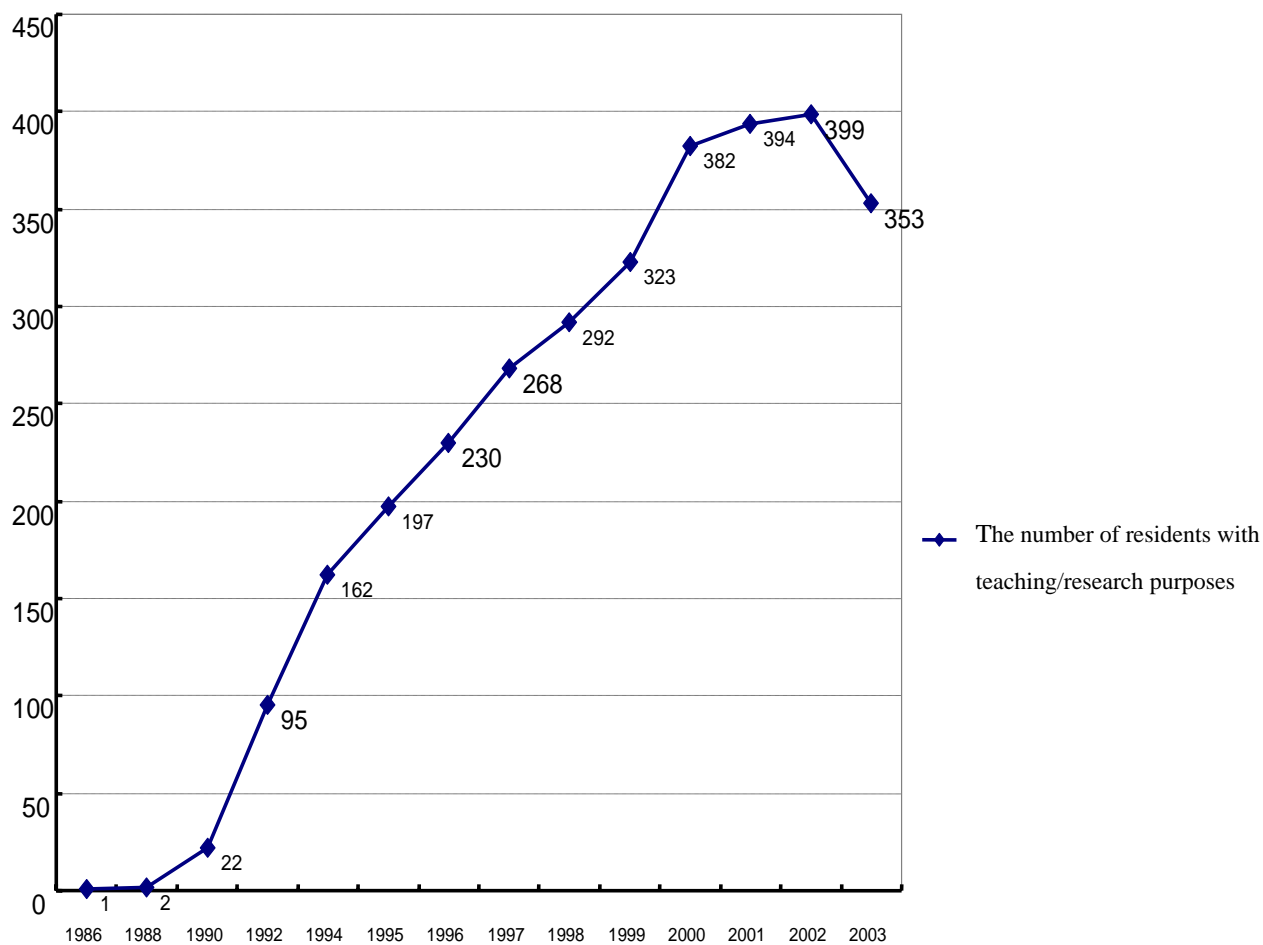


Figure 4: Annual changes in the actual number of visitors with teaching or research purposes, among registered Russians residents in Japan (From 1986 to 2003)

Source: Immigration Bureau, the Ministry of Justice, *Statistics on Foreigners Registered in Japan*, 1987, 1989, 1991, 1993-2004 editions

	The number of registered residents with teaching/research purposes in 1986	The number of registered residents with teaching/research purposes in 1996	96/86 ratio
Russians	1	230	230
Americans	865	1455	1.68
British	193	458	2.37
French	103	200	1.9
German	121	246	2
Chinese	629	2055	3.26

Figure 5: Rate of increase of registered foreign residents with teaching/research purposes from 1986 to 1996

Source: Immigration Bureau, the Ministry of Justice, *Statistics on Foreigners Registered in Japan*, 1988 and 1997 editions

Therefore, all the statistical data published in and after 1986 are covered. The data from 1986, 1988 and 1990 are the data of the former Soviet Union while data in and after 1992 have been collected for Russia and other CIS countries separately. The data of 1992 and after used in Figure 4 prepared by the author are the data of Russia alone.

Figure 5 shows the increasing trend between 1986 and 1996 of registered residents for teaching or research purposes from major countries including Britain, the United States, France, Germany and China. The number from Russia is significantly larger than those from the other countries. As a result of the Soviet collapse, human exchange in scientific research between Japan and Russia has become active. Why did Russian researchers choose Japan as their destination which had been unfamiliar to them? As I asked this question during the interview

survey with Russian scientific researchers in 1996, many Russian researchers expressed their impression that employment opportunities in Japan are more available for young researchers than in the U.S. and Europe. Underlying this background is Japan's science and technology policy at that time. In 1992 or immediately after the Soviet collapse, Japanese government adopted "Basic science and technology policy principles (General Framework of Science and Technology Policy)" [3] in a Cabinet meeting. Based on this framework, it established a number of systems to employ researchers with fixed-term contracts in order to create flexible and competitive research environment in Japan. Many of the Russian researchers have been hired for research positions with these fixed-term employment contracts.

All of the three Russian scientific researchers—whom I

interviewed at National Institute for Advanced Interdisciplinary Research, Agency of Industrial Science and Technology, Ministry of International Trade and Industry (what is now Ministry of Economy, Trade and Industry)—were employed in these capacities. The Russian researchers mentioned that they would have not come to Japan if there had been no such opportunity. In other words, the timing of the drastic change in Japan's science and technology policy that coincided with the Soviet collapse prepared favorable conditions for former Soviet scientists to come to Japan. The prerequisite was, of course, the collapse of the Soviet Union which made it easy for Russian scientists to travel overseas. An additional background was that they found the availability of these opportunities through exchanges with Japanese researcher who they met at international conferences etc. Still, without such policies of Japan, they probably could have not actually come to Japan. Thus, Japan's science and technology policy changes incidentally offered "refuge" for young researchers from the former Soviet Union who faced difficulties due to its collapse.

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