

Chapter 4

Inputs to the Soviet R&D Sector

The three main factors crucial to the strength of a national R&D sector are:

1. Education.
2. R&D personnel.
3. R&D financing.

All three are usually dependent on one another. Generally, the quantitative and qualitative niveau of one will affect that of one or both of the others. So, it follows that if the education system produces graduates with suitable knowledge and skills, then the stock of R&D personnel will be of respectable quality. Qualified and competent staff will attract more R&D financing through interesting and applicable project proposals and results. The expectations of respectable remuneration will attract more students to these fields to prepare them for a career in research and development, and so on.

This chapter deals with these three inputs in the Soviet R&D sector. In order to best demonstrate the size and extent of scientific resources in the former Soviet Union comparisons with Western and Eastern nations are made.

4.1 Education

Education is the process of acquiring knowledge by instruction of specific technical skills. These skills become an individual's human capital that can be sold in the market. The cumulative total of the individual human capital

within the borders of a country represent that nation's stock of knowledge – a valuable national resource.

On the whole, education policies that sustain R&D should provide the higher levels of education that fulfill certain criteria.[1] These include the requirements to:

1. Respond to new needs at the national, local, and community levels.
2. Contribute to revitalizing the economy by producing suitable types of highly qualified manpower and to further training of the labor force in the context of rapidly changing technologies and economic conditions.
3. Sustain adequate levels of technological innovation through scientific research progress.

In a study on national innovation systems, Richard Nelson (1992) comes to the important conclusion (among others) that a distinguishing feature of the countries in his sample, which were sustaining competitive and innovative firms, was the presence of education and training systems that provide the firms with a flow of people with the requisite knowledge and skills.[2] Indeed, universities consciously train their students with an eye to industries' needs.

Consequently, education becomes the cornerstone of technical progress which is fundamental to economic growth and development. Technological advance demands from both consumers and producers require evermore information, training, and skills. Of course, *producers* include everyone from enterprise managers to workers on the shop floor, to research and development scientists, engineers, and technicians, to university scholars and assistants, and many, many more. Increased awareness on the part of producers and consumers of innovation and technology stimulates competition, raising the general standard of living and increasing the social benefit to all.

4.1.1 General education and literacy: The foundation for a scientific culture

The sheer size of the Soviet Union and before that the Russian Empire has throughout history diverted attention from the economic and technological situation of the nation. This becomes more clear when data are viewed on a per inhabitant basis. Estimates made in the past have revealed that Russian per capita national income in 1913 was only 15% of the United States, 22% of British, 33% of German, 50% of Italian and Austro-Hungarian levels, and was roughly equal to that of Bulgaria and Romania (Falkus, 1972, p. 12). These rankings appear to reasonably correspond to those based on GDP per capita from *Table 3.1*.