Professional and Scientific Personnel in the U.S.S.R.

Nicholas DeWitt

Russian Research Center, Harvard University, Cambridge, Massachusetts

SINCE the late thirties, under a veil of growing secrecy, Soviet authorities have become increasingly reluctant to publish detailed information concerning the supply of specialists in the U.S.S.R. In view of this and of the growing desire among Western scholars and the public in general for clarification of the Soviet professional and scientific manpower problems, a study entitled *The Soviet Professional Labor Force, 1928–53* was undertaken, some of the summary findings of which are presented here (*1*).

As early as 1930 and especially after the 1933 decree concerning placement of trained personnel, Soviet authorities established the legal practice of the involuntary placement of professionals and semiprofessionals within occupational fields that coincided with the formal specialized training completed by them in academic institutions. This practice was greatly intensified during the immediate prewar period (1938–40) and solidified by labor legislation acts further restricting occupational mobility. At the same time, the ranks of professionals began to be filled predominantly by increasing numbers of graduates from academic establishments.

These trends continued without modification in the postwar period, and it is possible to argue that today in the Soviet Union the individual's professional occupation, such as engineer, medical doctor, veterinarian, and so forth, is determined primarily by the level of formal education and by the narrow field of specialization during this training. Thus, it appears justifiable to speak of the Soviet professional labor force as consisting predominantly of trained specialists with higher education and of the Soviet semiprofessional labor force as being composed, to a large extent, of persons with secondary specialized education and occupations determined by the respective specialization in the course of training.

These assumptions, verified in fact for the professionals in the course of the research, permit the use of available educational statistics in order to ascertain the size and occupational composition of the Soviet professional labor force, or at least, to be more precise, the dominant component within it. This, of course, does not preclude the fact that through some extra-legal actions or some informally acquired practical skills, both horizontal and vertical occupational mobility can and still does take place—only, however, to a limited extent and with ever-increasing restrictions.

At the end of 1953, the total number of workers and employees in the U.S.S.R. (excluding collective farm labor force, the military personnel, forced labor, and handicraftsmen) was 44.8 million persons (*2*), which constitutes a 42-percent increase over the 31.5 million at the end of 1940 (*3*). At the end of 1953, the number of specialists with completed secondary and higher professional and technical education, which, except for a few agricultural specialists, represents part of this labor force, was 5.94 million, which constitutes an increase of 138 percent over the 2.5 million in 1940 (*4*). It appears, therefore, that, although both the labor force itself and trained specialized personnel as a part of it experienced growth at a much slower rate than in the prewar decade (between 1930 and 1940 the labor force roughly doubled and the number of specialists increased about fivefold), the increase of trained professional and technical personnel continued at a considerably greater rate than the labor force itself, thus contributing substantially to the qualitative improvement of the latter.

In 1940, out of the total 2.5 million specialists employed in the national economy of the U.S.S.R. (that is, excluding military establishments), there were about 850,000 professionals with completed higher education and about 1,650,000 semiprofessionals with completed secondary specialized education. By the end of 1952, the number of specialists in these categories was estimated as 1,785,000 and 3,715,000, respectively (*5*). During 1953 an increment of about 200,000 and 240,000, respectively, took place.

However, at the same time a marked change appeared in the occupational distribution of professionals with completed higher education. Table 1 shows the distribution by type of occupational training at the end of 1940 and 1952.

Furthermore, it appears that during the last 12 yr the number of engineering and agricultural specialists increased by only a modest 65 percent and socioeconomic professionals by some 75 percent, but the medical and educational professionals increased by the large percentages of 148 and 164, respectively. This indeed represents a sharp reversal of a trend that existed in the prewar decade, when the number of trained engineers increased roughly sevenfold (from 41,000 in 1930 to 283,000 in 1940), while the entire professional labor force roughly tripled. This development is explainable not in terms of equalization of supply and demand for engineers and agricultural specialists, since training in these fields has not de-

Table 1. Distribution by training of Soviet professionals with completed higher education.

Occupational training	End of 1940		End of 1952	
	(Thousands)	(Percent)	(Thousands)	(Percent)
Engineers of all types in construction, manufacturing, transportation, and communication	283.5	33.5	467.0	26.2
Agricultural specialists (in agronomy, veterinary medicine, land conservation, electrification and mechanization of agriculture, forestry)	97.3	11.4	161.0	9.0
Socioeconomic professionals (in economics, trade, accounting, banking, planning, statistics, jurisprudence, social and communal service)	61.7	7.3	109.0	6.1
Educational professionals (teachers and professors of all ranks, art and music performers and instructors)	284.1	33.5	748.0	41.9
Medical professionals (in therapeutics, preventive medicine, dentistry, pharmacy, athletic coaches and physical culture)	121.6	14.3	300.0	16.8
Total	848.2	100.0	1,785.0	100.0

clined in recent years as compared with the prewar period, but in terms of two expediencies that prevailed in the recent period.

On the one hand, the demand for medical professionals increased enormously during the war, and apparently the training of medical personnel was continued at a high level in the postwar period. On the other hand, the postwar policy of expanding upper grade enrollment in secondary schools created a large demand for teachers with higher education. As a result, by the end of 1950 the number of teachers with completed higher education was about 610,000, or 26 percent of the total 1,600,000 teachers employed. This also represents a substantial qualitative improvement over the 7 percent of teachers with completed higher education employed in 1939.

The substantial gain in the size of the trained professional labor force, which about doubled between 1940 and 1952, appeared primarily as a result of the ability of the Soviet higher educational system to turn out graduates. It might be true, however, that to some extent it was also caused by the preferential treatment of professionals through deferments and evacuation during the course of the war, which helped somewhat to reduce war losses. On the basis of the estimates made, it is possible to assume that hypothetical war losses (1941–45) owing to excess civilian deaths and male military deaths during the war among Soviet trained professionals were about 8 percent. These losses occurred among trained professionals, in addition to the average annual losses resulting from natural causes (retirement, death, and so forth) and political causes (persecution and firings), which, if the war had not taken place, would have been (as they actually were in the prewar decade) slightly more than 2 percent (*6*).

Furthermore, it was verified that, while in 1940 there were about 32 percent women professionals, by the end of 1952 the proportion of women had increased to about 50 percent, primarily because of the large increases of medical and educational professionals, where the relative share of women was already in 1940 about 60 and 40 percent, respectively, as compared with 20 percent in engineering in that year.

In 1953 the training of professionals was conducted in about 860 higher educational establishments, as compared with 750 in 1940. In addition, in 1953 there were about 40 higher educational establishments offering correspondence courses exclusively. The total enrollment in higher educational establishments in 1952–53 was 942,000, as compared with 620,000 in 1940. In addition, in 1952–53 there were about 500,000 correspondence students, more than 70 percent of whom were receiving training in the field of education (primarily teachers for primary schools). In 1953–54 the total enrollment (including correspondence students) increased by 120,000, for a total of 1,562,000.

The distribution of annual graduations from higher educational establishments in two selected years, which reveal recent trends in training, is shown in Table 2. Without taking into account graduations through correspondence training (primarily teachers), it appears that, although a proportional decline in annual graduations of engineers occurred, in absolute terms the training of Soviet engineers (with 5½ yr of training, three of which are devoted to narrow specialization) continued at the same high numerical rates as in the prewar period and was considerably higher than that in the United States in recent years. Furthermore, out

Table 2. Distribution by field of graduations from Soviet higher educational establishments.

Field	1940		1952	
	(Thousands)	(Percent)	(Thousands)	(Percent)
Engineering	29.3	28.6	30.0	16.7
Agricultural	10.1	9.9	15.0	8.3
Socioeconomic	4.8	4.7	15.0	8.3
Educational	40.6	39.8	88.0	48.9
Medical	17.4	17.0	32.0	17.8
Total	102.2	100.0	180.0	100.0
Correspondence	Negligible		41.0	

of 88,000 graduations in the field of education in 1952, 18,000 were graduated from Soviet universities, and roughly one-half of them (that is, about 9000) were pure and applied natural-sciences majors (also with 5½ yr of training).

The most recent information indicates that graduations from higher educational establishments in the summer of 1954 are expected to be about 230,000, which would represent an increase of about 30,000 over the preceding year. It is planned that acceptances in the fall of 1954 will be about 440,000. The steady increment of acceptances during the last few years has been maintained largely because of the spectacular increase in graduations from secondary schools. Although in the prewar period the shortage of secondary-school graduates presented a phenomenal handicap in the selection of students for higher education, it appears that the Soviet educational system at the present time has reached a turning point in its evolution. For the first time a substantial surplus of secondary-school graduates over the available admission vacancies in higher educational establishments can be definitely ascertained. The secondary schools of the Russian Republic (*RSFSR*) alone, which in the past few years represented about 60 to 65 percent of the U.S.S.R.'s total, both by upper grade enrollment and secondary-school graduations, are expected to graduate 470,000 this summer. All this implies that a better selection of students entering professional training in higher educational establishments and the further expansion of this type of training might be quite feasible (*6a*).

Statistical analysis reveals also that the graduation rate, not ascertainable for the immediate postwar years owing to irregularity in the flow of students whose courses were interrupted, apparently is leveling off (1948–53, 70 percent) to the prewar level of about 60 graduations per 100 acceptances. Apparently, then, the strict selection of students in higher educational establishments, which according to established norms stipulates only 48 graduations per 100 acceptances, is again being enforced, at least to some extent.

In the fall of 1951 the full-time teaching staffs of Soviet higher educational establishments were about 80,000, as compared with 51,000 in 1940 (*7*). The last census of teaching staffs of higher educational establishments, conducted on 1 Jan. 1947, and made public in 1950, revealed that in that year out of 67,200 full-time professors and teachers, roughly one-third were teaching in engineering colleges, that approximately only 8 percent were full professors and 22 percent were assistant professors. It was revealed at that time that between Jan. 1947 and the end of 1951 the full-time teaching staffs should increase by 17 percent, a figure that apparently was realized. Furthermore, it was contemplated that in the years after 1951 the average annual rate of growth should be about 6 percent.

Although official data are lacking on the basis of past accomplishments and sustained increases in enrollment, it appears that by the end of 1953 there were probably about 90,000 full-time teachers and professors in Soviet higher educational establishments. It was also revealed at that time that the least number of students per teaching member of faculty was in the fields of engineering and natural sciences, which suggests that students in these fields apparently still continue to receive more attention than students in other disciplines.

The same census also revealed that the mean age of a Soviet professor (professor) was about 54 yr, and the mean age of an assistant professor (dotsent) was about 46 yr. This implies, on one hand, that a large turnover in the leading professorial staffs can be anticipated in the near future, but, on the other, a marked conservatism in regard to appointments to academic ranks. Furthermore, it was revealed that 35 percent of university and college teaching staffs consisted of women and that, what is more surprising, after 30 yr of Soviet rule only 35 percent of all teachers in higher educational establishments were members of the Communist Party, and notably in the fields of engineering and the physical-mathematical sciences, where only 17 and 19 percent of professors, respectively, were Party members.

In 1952 the Soviet Union had 2900 research establishments, as compared with 1560 in 1940 (*8*). They employed in 1952 twice as many research scientists in all fields as in 1940, or about 68,000, a large proportion of whom (probably about one-third) were still engaged in applied and technical research. Thus, about 9 percent of Soviet professionals in all fields (1,785,000) were engaged either in teaching in higher educational establishments (about 90,000) or in scientific and technical research (about 68,000). A large proportion of academic rank holders, however, especially in the fields of engineering and applied and natural sciences, were simultaneously involved in some research activity as well.

In the postwar period, a substantial increase in advanced-degree training is observable. Enrollment in advanced-degree training, which consists primarily of research work, under the personal guidance of senior research and teaching personnel, in academic institutions and research establishments in 1952 totaled about 27,000, as compared with 12,400 in 1940 and an almost negligible number a decade earlier (800 in 1929). By the end of 1952, among all professionals and presumably predominantly among those 158,000 who are engaged either in research or by higher educational establishments, there were about 50,000 with advanced academic degrees, about 40,000 with "candidate" degrees, and 10,000 with "doctor" degrees. On the basis of advanced-degree-enrollment trends and awards of advanced degrees, it appears that 35 to 40 percent of all advanced-degree holders are in the field of technical and applied natural sciences, 5 to 7 percent in each of the fields of pure mathematics and physics, chemistry, medicine, philology, economics, and the rest spread by a fraction of 1 percent over various other fields.

Plans made public at the recent Party Congress proposed that by 1956 annual graduations from higher educational establishments should be about double those of 1950, or 330,000 to 370,000 annually. Acceptances in the field of engineering in 1950 were more

than 70,000, and thus it is possible to expect that by 1956 Soviet higher educational establishments will be graduating about 50 percent more engineers annually than in 1950, or somewhat more than 45,000. Furthermore, the number of scientists in all fields employed by research establishments should also double, or reach a level of about 120,000. In the period between 1950 and the end of 1955, it was planned that the award of advanced graduate degrees should also double, as compared with the period between 1946 and the end of 1950, during which about 13,500 advanced degrees were awarded. Recent rapid expansion of upper grade enrollment in secondary schools (in 1953–54 the upper grade 8–10 enrollment in Soviet secondary schools was 4.5 million as against the highest prewar figure of 1.8 million in 1939–40) provides a substantially sound foundation for even further expansion of higher education after 1956. The already existing high level of enrollment suggests that these ambitious plans might become a reality. This in turn would imply a considerable increase in the size of the trained professional labor force and a substantial gain in trained scientific manpower.

Although there have been some notable postwar shifts in the occupational distribution of Soviet professionals and substantial gains have been made in the fields of education and medicine, the high numerical rate of training of engineers has continued. Furthermore, in the postwar period notable gains have been made in advanced-degree training, where engineering and applied sciences have continued to predominate. All this permits no complacence on our part. Until recently, only the institutional and general framework of the Soviet educational and scientific effort have received any attention, while the long-neglected problem of training and qualitative performance of Soviet scientists and professionals in many fields of research and technology still remains unsolved and almost unexplored (*9*). The entire field still awaits thorough objective investigation by Western scholars; and, as quantitative findings concerning Soviet efforts tend to suggest, it is high time to undertake this task.

References and Notes

1. I am greatly indebted to the Russian Research Center of Harvard University for the financial assistance that made the study possible, to A. Inkeles for his guidance, and to D. B. Shimkin for his help in the initial stages of research.
2. *Pravda,* Jan 31, 1954.
3. W. Eason, "Population and labor force" in *Soviet Economic Growth,* A. Bergson, Ed., 1953, p. 110.
4. *Pravda,* Oct. 6, 1952; Jan. 31, 1954.
5. The technique of estimates is based primarily upon a detailed survey of annual graduation schedules of Soviet educational establishments. A few main sources are mentioned here: Gosplan, *Narodnoye Khozyaistvo* (Sbornik) [National Economy (Digest)], No. 2 (1949); No. 3 (1950), No. 4 (1951). E. Medynskii, *Narodnoye Obrazovaniye v S.S.S.R.* [Popular Education in the U.S.S.R.], 1952. *Bol'shaya Sovetskaya Entsiklopediya* [Large Soviet Encyclopedia], ed., 2 1952, vol. 9; S.S.S.R. vol., 1947. *Sotsialisticheskoye Stroitel'stvo, 1933–38* [Socialist Construction, 1933–38], 1939. *Kul'turnoye Stroitel'stvo, 1928–38* [Cultural Construction, 1928–38], 1940. A. Sinetskii, *Professorsko-Prepodavatel'skiye Kadry* [Teaching Staffs], 1950. *Vestnik Vysshei Shkoly* [Journal of Higher Education], 1946, No. 1, 10, 11–12; 1947, No. 4, 6, 11; 1949, No. 7; 1951, No. 3, 10. *Pravda,* Mar. 18, Oct. 16, 1946; Jan. 17, July 7, 1947; Mar. 13, June 27, 1948; Sept. 6, 1949; May 24, 1951; Jan. 29, May 24, June 14, 16, Sept. 1, Oct. 6, 1952; May 21, Oct. 26, 1953; Jan. 31, 1954. *Bol'shevik,* 1952, No. 12.
6. By average annual losses is meant "godovaya ubyl' po fizicheskim prichinam (smert', invalidnost') i otsev vvidu politicheskogo nesootvetstviya" [annual losses due to physical causes (death, invalidity) and political incompatibility] (*Vestnik Vysshei Shkoly,* 1948, No. 4, pp. 12–17, and Gosplan (Tsentral'naya komissiya po kadram), *Plan obespecheniya narodnogo khozyaistva S.S.S.R. kadrami spetsialistov (1929–33)* [The Plan of Providing the National Economy of the U.S.S.R. with a Cadre of Specialists, 1929–33], Moscow, 1930, pp. 24, 103). In the estimating process, average annual losses were used as coefficient k in the equation $T_n = (T_{n-1} - kT_{n-1}) - G_n$, where T_n is the number of trained specialists at the end of year n, T_{n-1} is the number of specialists at the end of the preceding year $(n-1)$, and G_n are graduations in the year n. The average annual losses among trained professionals were actually slightly more than 2 percent in the prewar (1930–40) period, while Soviet official sources for planning purposes describe their variation as being between 2 and 4 percent. If it is assumed that 2 percent average annual losses would have existed even if there were no war, then the losses (hypothetical war losses, 1941–45) attributable directly to the war were about 8 percent. Some independent checks (reported increases for several fields of professionals) were used in making this generalization and to verify the estimating technique.
6a. *Pravda,* May 19, 1954; *Izvestiya,* May 20, 1954. There are already indications that this surplus of secondary-school graduations over the available vacancies in higher educational establishments not only will have beneficial effects as far as the selection of candidates for higher educational establishments is concerned, but also will create its impact upon the modification and probable improvement of the standards of training of semiprofessional specialists in the so-called "technicums." It has already been revealed (*Izvestiya,* May 19, 1954) that probably up to 100,000 of this year's secondary-school graduates will enter "technicums" for specialized semiprofessional training.
7. A. Sinetskii, *Professorsko Prepodavatel'skiye Kadry* [Teaching Staffs], 1950; *Pravda,* Oct. 6, 1952.
8. *Bol'shevik,* No. 6, 1941; *Pravda,* Oct, 6, 1952.
9. C. Zirkle, ed., *Soviet Science,* 1952, is the only outstanding pioneering work in this direction that has appeared in recent years.

The rapid progress true Science now makes occasions my regretting sometimes that I was born so soon. It is impossible to imagine the height to which may be carried, in a thousand years, the power of man over matter. We may perhaps learn to deprive large masses of their gravity, and give them absolute levity, for the sake of easy transport. Agriculture may diminish its labor and double its produce; and all diseases may by sure means be prevented or cured, not excepting even that of old age, and our lives lengthened at pleasure beyond even the antediluvian standard. O that moral Science were in as fair a way of improvement, that men would cease to be wolves to one another, and that human beings would at length learn what they now improperly call humanity.—BENJAMIN FRANKLIN, in a letter to Joseph Priestley.