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"The Expansion of Soviet Science"

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# THE EXPANSION OF SOVIET SCIENCE[1]

by

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The Soviet scientific establishment has had a considerable impact upon the behavior of the Soviet government both at home and abroad. Many western scholars have noted the significance of debates in genetics for Soviet agricultural policies,[2] the influence of economists and area specialists upon Soviet foreign policy,[3] and the importance of natural sciences for Soviet military policy.[4] It is precisely for this reason that "knowledge production" remains a key element in Western observations of the Soviet scene.[5]

For the most part, those western analysts who examine the production of knowledge in the USSR focus their attention upon such inputs as capital investment, training programs, organizational patterns and political pressures. While not denying the significance of these factors, this article will take a slightly different approach and direct the reader towards an analysis of the output of the Soviet research community.

Historically, the Soviet knowledge industry has been marked by a tradition of centralization. Beginning in 1724 with the importation of the Academy of Sciences structure from the West, Russian and Soviet science has been dominated by an elite corps housed in the nation's

capital (be that capital St. Petersburg or Moscow). However, during the past two decades or so, considerable variation within the broader pattern of centralization has occurred. Significant research in many fields now takes place outside of the academy structure and away from Moscow. This expansion of research capability has not yet been fully acknowledged in the West, nor have its implications been fully appreciated in the USSR itself.

This process of expansion began in the 1920s and 1930s. During that period, new institutional arrangements supported the development of a national infrastructure for scientific research. The Soviet government established pedagogical institutes in nearly every regional center.[6] Several of these institutes, particularly those located in the capitals of the union republics, later became universities and opened their own research establishments.[7] During the 1930s, the USSR Academy created a national network with a branch institution in the capital of each union republic. These Academy branches, in turn, absorbed many of the university-based research centers mentioned above.[8] The 1940s saw the development of Academy plans, modeled after the Ukrainian and Belorussian academies, which would transform each republican branch into a nominally autonomous union republican academy. Beginning in 1941 with the creation of the Georgian and Lithuanian academies and continuing until 1961 when the Moldavian Academy received its charter, every union republic except for the RSFSR has established its own academy.[9] In 1957, the USSR Academy launched its Novosibirsk-based Siberian Division[10] and, by the mid-1970s, nearly every autonomous republic was the site of a branch of the USSR Academy.[11]

Certainly these branches and republican academies do not function as independent entities. The USSR Academy continues to exercise

tight budgetary and policy control over them.[12] The Academy's All-Union Project and Scientific Research Institute for the Planning of Scientific Research Institutes, Laboratories, and Scientific Centers of the USSR Academy of Sciences and the Academies of Sciences of the Union Republics joins the disciplinary divisions of the Academy and Academy-sponsored scientific councils to establish the academic capabilities and research plans of various research centers. Moreover, in August 1967, the Communist Party's Central Committee issued a major resolution concerning the social sciences.[13] That decree stressed the necessity for tight ideological control over all social scientific research. This policy statement called upon the Academy and other academic, party and governmental agencies to improve the quality of social scientific research and to end the needless duplication of research efforts by expanding central coordinating programs. The party leadership also urged that social scientific research be cast in a more practical light.

The basic tenets of the 1967 resolution were reconfirmed in 1978 when policy and planning statements supported an even greater role for the all-union Academy in the coordination of scientific research.[14] Thus, one must recognize that while an expanded institutional network is already conducting significant research outside of the Academy, that institution still acts as the "director of the Soviet scientific orchestra."[15] And yet, even this fact does not preclude the possibility that largely dependent republican, regional and local institutions can serve as important research centers. The mere existence of hundreds of institutes in the various academies across the USSR (Table 1) creates an academic infrastructure for a national knowledge industry.

TABLE 1 ABOUT HERE

A similar pattern may be observed in the Soviet university system. By the eve of the First World War, a dozen Russian universities had opened their doors to students; now, six decades later, sixty-five universities out of more than 800 institutions of higher education serve half a million students (Table 2). This impressive quantitative growth represents only part of the Soviet university system's expansion. In 1917, Tomsk University was the only university east of the Urals.[16] Today, universities may be found throughout the USSR.

TABLE 2 ABOUT HERE

As with the Academy of Sciences, the growth of the Soviet university system was both planned and purposeful.[17] First, central institutes and correspondence schools established branches in important regional centers. Next, these units grew into technical and pedagogical institutes. Finally, many obtained university status. In addition, regional pride and rivalries have often spurred the replication of scientific and educational centers. Once Kiev and Minsk could claim republican academies, every other republican capital followed suit. Once Ufa and Makhachkala had gained universities, the capital cities of every other autonomous republic would do so as well. Research and educational institutes confer an aura of sophistication or, as one 1974 city planning manual suggests, no socialist city is complete without industrial establishments, institutions of higher learning and scientific research institutes.[18]

Similar attitudes concerning the desirability of research centers exist among the industrial ministries as well, where research offices, later research institutes and now research academies serve as status symbols reflecting the relative importance of a given bureaucracy. In addition to its importance for institutional prestige, the fact that the Ministry of Agriculture,[19] the Ministry of Internal Affairs,[20] and several other ministries currently operate multi-institute research "academies" and employ highly-paid "academicians" has important consequences for the knowledge industry, particularly as it is unlikely that these government agencies will allow their investments to lie unused.[21]

At present, hundreds of ministerial centers employing thousands of specialists conduct applied research. This network acquired particular significance following 1961 when the number of Academy of Sciences institutes was reduced by some 40 percent.[22] The new policy, which sought to confine the role of the Academy to basic science, transferred control over many applied research centers to industrial ministries. Moreover, the Council of Ministers' State Committee for Science and Technology, which many Western observers view as a potential future rival to the Academy itself,[23] has continued to grow since that time as does the ever spreading research network of the State Planning Committee (Gosplan). Thus, expansion of scientific research in the USSR is proceeding at varying paces institutionally out of the Academy as well as geographically away from traditional centers in Moscow.

The institutional growth of research and training facilities has led to a rapid increase in the number of trained specialists entering the labor market (Table 3). While the absolute number of graduate students

has leveled off, that quantity remains too large for every rising scholar to be employed in Moscow or in the Academy. Significant numbers of qualified scientists inevitably find themselves working in less prestigious centers. Once there, they may improve the local standard of research and upgrade the quality of education provided to local students. Moreover, regional research centers are beginning to train their own qualified specialists.

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TABLE 3 ABOUT HERE

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Current U.S. government projections indicate that the population of the southern tier Transcaucasian and Central Asian republics will double by century's end. With population growth in the Russian, Baltic and Western republics leveling off, this will result in a net population shift out of the central European portion of the Soviet Union to the south and east.[24] As this change takes place, Soviet decision-makers must either attempt to lure the growing southern population to the traditional economic centers of the north; or, they must relocate the central focus of economic activity to the south and east. A political decision largely independent of science policy will be made, and it will be made by central officials. Once reached, this decision will exert a powerful influence upon every sector of the national economy, including the knowledge industry. It is possible, then, that central political and economic planners may increase the economic importance of the Soviet "sun belt". Should they do so, one might expect a quantitative and a qualitative improvement in that region's knowledge output.

Other factors may work against government efforts to centralize. Once an academic institution exists, desires often emerge among at least some of its staff to improve the quality of its work. The history of Soviet social science contains several examples in which institutes have fought to maintain their standing for little other apparent reason than the fact that they had a reputation to protect. Leningrad has long been one of the leading centers for Oriental Studies in the USSR and in Europe.[25] This situation continues even though the headquarters of the Academy's Institute of Oriental Studies moved to Moscow a generation ago. In part, the logistical problems which prevented the relocation of the massive oriental holdings of Leningrad's libraries and manuscript collections were responsible for its continued dominance; in part, however, it has continued to dominate the field simply because many Leningrad scholars refuse to allow their tradition of excellence to die out. As a result, the work of the Leningrad Division is more highly regarded in some research areas than that of the institute's Moscow headquarters. Similarly, Tallin, Tartu and Tbilisi remain leading centers for the study of linguistics despite considerable political and economic counterpressures over the years,[26] and the Ibragimov Institute of Language, Literature and History in Kazan' continues to make important contributions to philology, history and ethnography.[27]

An academic job market shrinking at the center but expanding elsewhere, a growing population in Central Asia, and a continuation of regional and institutional rivalries based upon past performance may not conclusively demonstrate the emergence of a national knowledge industry in the Soviet Union. A reader, while acknowledging all of these phenomena, may still remain unconvinced that a marked diffusion of Soviet scientific

output has taken place. Nothing mentioned thus far constitutes proof positive that research completed a generation ago in Moscow or Leningrad may now be conducted elsewhere, or that research which once was the sole domain of the Academy of Sciences may now be shared with ministerial research centers. In attempting to demonstrate that this indeed is the case, it will be necessary to review the available evidence concerning the state of current research within the Academy, within the research system of the USSR Ministry of Higher and Specialized Secondary Education, and within the institutional networks of the State Committee on Science and Technology and the State Planning Agency (Gosplan).

Turning first to the Academy, the available evidence supporting geographic expansion is considerable, yet diffuse. Given space limitations, a few examples of non-Moscow Academy research must suffice. As most readers probably already know something about the Siberian Division of the USSR Academy based in Novosibirsk,[28] discussion of some other geographic divisions within the Academy network is perhaps more appropriate.

The Far Eastern Scientific Center of the USSR Academy of Sciences[29] began operations in 1970 when eight institutes in Vladivostok, Khabarovsk, Magadar and on Sakhilin Island, were brought together under a single administration. Since that time, the staff of the Far Eastern Center, which in 1973 included four academicians, fourteen corresponding members of the Academy, fifty doctors of science and five hundred candidates, has supported wide-ranging and "fundamental" research in the natural and the social sciences. In geology and oceanography, two fields where the center has excelled, these investigations focus quite naturally upon the Pacific Ocean region.

Similarly, scholars at the Dagestan Branch of the USSR Academy of Sciences in Makhachkala concentrate upon subjects relating to that region.[30] Since its establishment in the late 1960s, much of the work of the Branch has been tied to oil production. During the first seven years of operation scholars from the Branch attended over 500 national and regional conferences, presenting nearly 200 papers.

The work of republican academies varies widely in content, quality, and quality. The Latvian Academy, with its Institute of Electronics and Computer Technology, has won considerable praise for its establishment of multi-computer computation centers.[31] In addition, it sponsors major research projects in applied mathematics, physics, biology and environmental studies while the Belorussian Academy has become an important and innovative center for population and sociological as well as linguistic studies.[32]

Fortunately, more systematic data are available for the research network of the Ministry of Higher and Specialized Secondary Education.[33] Unlike the United States, where perhaps most research is conducted at university centers, the backbone of the Soviet research establishments consists primarily of institutions outside of university setting. Yet, here again, one cannot totally ignore the work of Soviet university scholars.

Tables 4 and 5 summarize the current (1976-1980) five-year research plan for the Ministry. The chief focus of research assignments in the plan is upon pedagogical and administrative concerns. It divides nearly 1,200 research assignments among 400 ministry-affiliated research centers into 14 basic research categories. Table 4 demonstrates that more than half of the participating institutions are located outside of Moscow, Leningrad and the republican capitals, with less than a quarter being located in Moscow or Leningrad.

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TABLES 4 AND 5 ABOUT HERE

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Initially, the data provide evidence of geographic expansion away from Moscow and Leningrad. Such a conclusion is somewhat mitigated, however, by the materials summarized in Table 5. First, nearly every assignment contains at least one Moscow-based institution (usually the Ministry's own Scientific Research Institute of the Higher School) which maintains responsibility for coordinating the work of the other institutions investigating the same topic. As a result, if one examines assignments rather than institutions, the Moscow representative rises to just over a third while the non-Moscow, non-Leningrad, non-republican capital figure drops to just over a third.

There are several other indications of expanded university research activities. A review of professional journals contains several references to direct linkages among major universities and local institutions of higher learning. Scholars from Leningrad State University supervise the work of an entire network of less prestigious universities and pedagogical institutes in such cities as Syktyvkar, Ivanovo and Kaliningrad.[34] Other regional institutions are known to send some of their best students to national institutions in Moscow for graduate training.[35] At the end of such a program, the students return to their home university or pedagogical institute to train other local scholars and to supervise and raise the level of local research. In addition, some universities and pedagogical institutes join together to form regional associations. These groups sponsor conferences,

coordinate research projects, and generally support the research efforts of scholars within their jurisdictions. During 1969, 55 institutions of higher learning and 200 research establishments in the Northern Caucasus (including the Chechen-Ingush, Dagestan, Kabardino-Balkar, Kuban, Northern Caucasus and Rostov universities) joined together to form the Northern Caucasus Scientific Center of the Higher School.[36] This body organizes conferences and sponsors research projects with particular emphasis upon modern European history and Soviet foreign policy. Many of these results appear in the Center's journal, Izvestiia SKNTsVSh. Finally, the Scientific Research Institute of Mechanics and Applied Mathematics attached to the center has been active in efforts to evaluate the consequences of water pollution from oil products and detergents.[37]

Along the Volga, some 540 scholars from universities and pedagogical institutes in such cities as Kazan', Kuibyshev, Penza, Saratov, Ufa, Ul'ianovsk and Volgograd have been combined to form the Volga Scientific Methodological Council for the Planning and Coordination of Political Economic Research in Local Institutions of Higher Learning.[38] This group, which became active during the early 1970s, supports research examining technological innovation and manpower utilization and has proposed investigations on the economic relationships among the people of the Bashkir, Chuvash, Kalmyk, Mari, Mordovian and Tartar autonomous republics.

If such a geographic dispersion has taken place on a large scale, has there been any pattern in its impact? The most striking change in the geographic distribution of Soviet scientific production is the marked relative decline of Leningrad as an academic center. Within the Academy, the move of the main administration to Moscow along with wartime evacuations

and losses depleted the city of many of its leading researchers.[39] While certain specific institutes remain important (the already mentioned Leningrad Division of the Institute of Oriental Studies is one example; the newly created Institute of Socio-Economic Problems is another); that factor does not offset the general decline. Moreover, prior to 1917, Leningrad had been a primary center of the national university system. The change here is most dramatic. Unlike Dnepropetrovsk, Kazan' and Moscow universities, which are directly subordinate to the USSR Ministry of Higher and Specialized Secondary Education, Leningrad State is considered to be of only republican significance.[40] This second tier designation deprives the university of some prestige and, more importantly, of priority status within the ministry's resource allocation system. The relative decline of Leningrad University may further be illustrated by examining the 1976-1980 research plan of the USSR miinstry of Higher and Specialized Secondary Education[41] (Tables 4 and 5) in relation to the 1935 research plan of the RSFSR People's Commissariat of Enlightenment (Table 6).[42] While a precise comparison is not possible given the incompatability of the data, the decline in Leningrad research assignments is so great that significant variation is unlikely given more comparable data for both periods.

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TABLE 6 ABOUT HERE

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If Leningrad appears to have lost much of its importance, which centers have gained in relative academic stature? The most visible example of such gain would be the Siberian Division of the USSR Academy,

located in Novosibirsk.[43] This division serves as the functional equivalent of an RSFSR republican academy. The role played by Academy and university research centers in such cities as Sverdlovsk[44] and Tomsk[45] is also of considerable significance, making the work of scientists throughout the central regions of the Russian Republic worthy of increasing attention. The Baltic[46] and Ukrainian centers[47] for the most part continue to maintain high standards, although it might be argued that as they are already advanced, any further improvement relative to other regions is somewhat unlikely. Belorussia has become an important center for demographic, sociological, linguistic, computer and agricultural studies.[48]

While developments in the Transcaucasus remain uneven, Tblisi's longstanding domination of the region's research community has not abated.[49] Scientific infrastructures are in place throughout the area, however, and Armenian scholars have already made important contributions to several disciplines, including economics, ethnography, and philology.[50]

The future development of Central Asia's research capacity, as mentioned previously, is closely tied to political decisions yet to be made concerning the area's future economic, social and even political development. If, as many predict, the center of the Soviet Union's economic activity begins to shift towards Central Asia, then one may expect a rapid development of scientific resources in the region. Institutional networks are already in place so that such an expansion could occur in a relatively short period of time.[51]

While the research network of the Academies of Sciences and the Ministry of Higher and Specialized Secondary Education most clearly illustrate the extent to which geographic expansion has already taken place,

the research networks of the State Committee on Science and Technology as well as the State Planning Agency (Gosplan) exemplify a considerable degree of institutional expansion. As noted previously, the State Committee for the Coordination of Scientific Research was organized in 1965 as the State Committee for Science and Technology.[52] Since that time, this body has constructed an empire of scientific councils, information institutes and research centers.

The councils, which are often established with the support of the Academy, bring together dozens of leading scholars in every discipline to discuss and coordinate research in a given topic area.[53] These groups, which can serve as the functional equivalent of the so-called "invisible universities" in the West, vary in size and in importance from topic to topic. Often little more than a handful of scholars operating from their desks, they can grow to seemingly mammoth proportions. The Scientific Council on the Complex Problems of the Optimal Planning and Management of the National Economy, for example, brings together hundreds of leading scholars from Academy, State Committee and Gosplan research establishments on a continuing basis.[54]

According to one official Soviet listing published in 1976, there are 193 agencies for scientific technical information collection supported by the State Committee and the republican academies.[55] These agencies operate within regional and disciplinary sub-divisions throughout the USSR (they exist in each ministry and in every geographic jurisdiction, covering some 64 disciplines). Many of these centers grew out of the concern over duplication of research which arose during the mid-1960s and eventually led to the 1967 Central Committee decree on the social sciences.

Writing about their present-day significance for the social sciences, Academician V. A. Vinogradov (Director of the Institute of Scientific Information for the Social Sciences of the USSR Academy of Sciences and the State Committee for Science and Technology) recently observed:

> The USSR institutions of scientific information on the social sciences are integrated into a system which is an autonomous part (a subsystem) of the All-Union State System of Scientific and Technological Information (GSNTI). It comprises two All-Union institutions, a number of branch centres, regional information organizations and a wide network of information processing departments attached to scientific humanities institutions and universities.
>
> Branch information services...operate within the areas of their competence and in close co-operation with the All-Union information centres.
>
> Regional information services have been set up in most of the Union republics.... The major mission of these services is to collect, process and store data on the social sciences of primary significance to the scientific institution and State bodies of the Republics.[56]

The State Committee's research (as opposed to information) institutes are most active in the general area of managerial studies. The Committee, along with the Academy of Science, operates the Institute of the Problems of Management, which first opened as the Institute of Automation and Telemechanics in 1939.[57] With over 2,000 employees and 300 graduate students under the direction of Academician Trapeznikov, this center has been in the forefront of Soviet cluster analysis, econometric modeling, inventory theory and mathematical programming. In 1976 the Committee, acting together with the Academy, established the Institute of Systems Research. Both the director of this new institute, D. M. Gvishiani, and a deputy director, B. Z. Mil'ner, maintain close contact with various international associations in the social sciences, especially the

International Institute of Applied Systems Analyses in Vienna. Projecting a full staff of 300-400 employees, the institute promises to become one of the leading multi-disciplinary research centers in the USSR.

Meanwhile, Gosplan increased is research capabilities in 1955 by establishing the Scientific Research Economics Institute[58] to provide academic support for the agency's planning process.[59] During the late 1950s and early 1960s, several republican planning agencies established similar research arms[60] and, in 1960, the national Gosplan founded the Scientific Research Institute of Planning and Norms[61] as well as the Institute of Complex Transportation Problems.[62] These last two centers became directly involved in efforts to introduce mathematical methods to Soviet economic analysis.[63] That same year, 1960, the Council for the Study of Productive Forces moved from the Academy to Gosplan.[64] That council, which was first organized in 1915 as the Commission for the Study of Russia's Natural Productive Forces,[65] remains one of the most important economic research centers in the USSR. In keeping with the agency's interest in resource allocation Gosplan recently established the Institute of Complex Fuel Energy Problems.

In conclusion, the available evidence concerning the work of research centers under the direction of the academies, the Ministry of Higher and Specialized Secondary Education, the State Committee on Science and Technology and the State Planning Agency suggests that conditions already exist for significant research results to emerge from institutes outside of the Academy and away from Moscow. If this is true, what implications can be drawn from this fact?

First, the history of Soviet science has been marred by the frequent interjection of politics into the scientific process.[66] While it is unlikely that this interference will end in the foreseable future, the fact that the Soviet knowledge industry is becoming more dispersed than ever before inhibits the repetition of some of the more excessive ideological harrassment of the past. At a minimum, charlatans and political hacks should have an increased number of academic and bureaucratic opponents from a wider variety of institutional and geographic settings to contend with than was the case in the past.

Second, the new multiplicity of research centers in a given discipline creates a more complex forum for the discussion of basic academic issues. As scholars working under a more varied institutional and geographic environment turn to similar research topics, serious debate of issues fundamental to a discipline become more possible.

Third, the emergence of various regional research centers in the Baltic, Belorussia, the Caucasus, Central Asia, the central regions of the Russian Republic, Leningrad and the Ukraine adds yet another dimension to varied regional identities. This fact is of considerable significance given the importance of non-Russian nationalities for future Soviet economic and military development.

Fourth, it is no longer sufficient to know the work of one's colleagues at the USSR Academy or Moscow University to really understand what work is being done in a given discipline in the Soviet Union. The Western researcher must expend greater effort to find and to evaluate the work of scholars from non-Academy and non-Moscow institutions in order to know the state of a given field. This makes the work of the Western observer

of the Soviet scientific community more difficult, but ultimately more interesting and hopefully more rewarding than was the case when the Academy and Moscow totally dominated the output of the Soviet knowledge industry.

And finally, it may be possible to talk about a movement towards a more decentralized knowledge industry in the Soviet Union. "Decentralization" is not a term frequently associated with Soviet economic, political, or even social life. Therefore, the concept must be used carefully. It would not mean a change in authority relationships within the Soviet scientific community; nor would it suggest an end to censorship of scientific publications. However, if the term was limited to the output of Soviet scientific production and to the emergence of new institutional settings for scientific research, the concept could make a great deal of sense. Investment and institutional policies already in effect are creating a national knowledge industry in the USSR; significant research capabilities currently exist in nearly every corner of the Soviet Union. Indeed, it has become possible for the first time to suggest that changes in the geographic and institutional patterns of scientific research may eventually redistribute the locus of serious scholarship away from Moscow and out of the USSR Academy of Sciences.

TABLE 1: Number of Institutions and Personnel, USSR Academy of Sciences and Academies of Union Republics, 1960-1973

| ACADEMY | DATE FOUNDED | 1960 | | 1973 | |
|---|---|---|---|---|---|
| | | NUMBER OF INSTITUTES | NUMBER OF PERSONNEL | NUMBER OF INSTITUTES | NUMBER OF PERSONNEL |
| USSR | 1725 | 238 | 23,150 | 246 | 38,681 |
| Armenian SSR | 1943 | 28 | 1,074 | 31 | 2,581 |
| Azerbaidzhan SSR | 1945 | 24 | 1,612 | 32 | 4,067 |
| Belorussian SSR | 1928 | 30 | 1,250 | 33 | 4,289 |
| Estonian SSR | 1946 | 17 | 498 | 16 | 873 |
| Georgian SSR | 1941 | 44 | 2,084 | 40 | 4,838 |
| Kazakh SSR | 1945 | 37 | 1,500 | 33 | 3,472 |
| Kirgiz SSR | 1954 | 12 | 544 | 18 | 1,316 |
| Latvian SSR | 1946 | 20 | 819 | 16 | 1,674 |
| Lithuanian SSR | 1941 | 15 | 1,612 | 12 | 1,421 |
| Moldavian SSR | 1961 | * | * | 19 | 800 |
| Tadzhik SSR | 1951 | 27 | 709 | 19 | 1,140 |
| Turkmen SSR | 1951 | 21 | 466 | 16 | 796 |
| Ukrainian SSR | 1919 | 60 | 3,274 | 77 | 11,614 |
| Uzbek SSR | 1943 | 30 | 1,838 | 31 | 3,594 |
| TOTAL | | 603 | 40,430 | 639 | 81,156 |

*In Moldavia in 1960, the Moldavian Branch of the USSR Academy of Sciences employed 272 researchers in 8 institutes.

TABLE 1 (continued)

SOURCES: N. Dewitt, "Reorganization of Science and Research in the USSR," in Science, vol. 133, No. 3469. 1981-1991, p. 1983; "K 250-letiiu Akademii nauk SSSR," Vestnik statistiki, 1974, No. 4, 85-95, p. 86.

TABLE 2: Number of Universities; Number of Students, 1914-1977

| Year | Institutions of Higher Learning, of which Universities | Number of University Students |
|---|---|---|
| 1914 | 12 | 40,776 |
| 1940 | 29 | 75,682 |
| 1950 | 33 | 109,737 |
| 1960 | 40 | 248,962 |
| 1970 | 51 | 503,503 |
| 1977 | 65 | 560,000 |

SOURCES: Tsentral'noe statisticheskoe upravlenie pri Sovete Ministrov SSSR, Narodnoe khoziaistvo, 1922-1972gg. (Moskva: Statistika, 1972), p. 432; Bol'shaia Sovetskaia Entsiklopediia (third edition) (Moskva: Sov. Ents., vol. 27, p. 21.

TABLE 3: Total Number of Graduate Students 1945-1974

| Year | Number of Students |
|---|---|
| 1940 | 16,863 |
| 1950 | 21,905 |
| 1960 | 36,754 |
| 1970 | 99,427 |
| 1971 | 99,308 |
| 1972 | 98,945 |
| 1973 | 98,860 |
| 1974 | 96,939 |

SOURCES: L. R. Graham, "The Role of the Academy of Sciences," Survey, vol. 23, no. 1, 117-133, p. 124.

TABLE IV: INSTITUTES ASSIGNED RESEARCH BY USSR MINISTRY OF HIGHER AND SPECIALIZED SECONDARY EDUCATION, BY TOPIC AREA, BY LOCATION, 1976-1980

| TOPIC | PERCENT FOUND IN TYPE OF LOCATION | | | | | |
|---|---|---|---|---|---|---|
| | Moscow | Leningrad | Republican Capital | Other Location | Unknown Location | N |
| 1- Education and Communist Upbringing of Students | 15% | 7 | 13 | 58 | 7 | 357* |
| 1.1- Demands upon Graduates | 31% | 22 | 11 | 33 | 3 | 36 |
| 1.2- Content of Education | 21% | 9 | 15 | 49 | 6 | 67 |
| 1.3- Process of Communist Upbringing | 13% | 7 | 13 | 63 | 4 | 138 |
| 1.4- Principles and Methods of Upbringing | 17% | 4 | 15 | 60 | 4 | 167 |
| 1.5- Educational Planning | 21% | 8 | 9 | 49 | 13 | 135 |
| 1.6- Career Choice | 25% | 6 | 13 | 50 | 6 | 16 |
| 1.7- Long-Term Planning | 20% | 0 | 32 | 40 | 8 | 25 |
| 2- Educational Administration, Management and Long-Term Planning | 17% | 9 | 26 | 45 | 3 | 175* |
| 2.1-Management Goals | 20% | 0 | 20 | 60 | 0 | 5 |
| 2.2- Management of Specialist Training Programs | 19% | 24 | 14 | 38 | 5 | 21 |
| 2.3- Management of Science | 27% | 14 | 25 | 32 | 2 | 71 |
| 2.4- Management of Scientific-Educational Training | 28% | 29 | 14 | 29 | 0 | 7 |
| 2.5- Financial Management of Education | 29% | 9 | 13 | 45 | 4 | 24 |
| 2.6- Computerization of Educational Management | 17% | 7 | 28 | 47 | 1 | 93 |
| 2.7- System Development | 29% | 9 | 13 | 42 | 7 | 45 |
| TOTAL | 15% | 7% | 18 | 54 | 6 | 425. |

* Total of subtopics is greater than total number of institutes because many institutes have been assigned research topics in more than one area.

SOURCE: Ministerstvo vysshego i srednego spetsial'nogo obrazovaniia SSSR, Nauchno-issledovatel'skii institut problem vysshei shkoly, Koordinatsionnyi plan nauchno-issledovatel'skikh rabot po problemam vysshego i srednego spetsial'nogo obrazovaniia na 1976-1980gg. (Moskva: Minvisso, 1975).

TABLE V. RESEARCH ASSIGNEMNTS BY USSR MINISTRY OF HIGHER AND SPECIALIZED SECONDARY EDUCATION, BY TOPIC AREA, BY LOCATION, 1976-1980

| TOPIC | PERCENT FOUND IN TYPE OF LOCATION | | | | | N |
|---|---|---|---|---|---|---|
| | Moscow | Leningrad | Republican Capital | Other location | Unknown Location | |
| 1- Education and Communist Upbringing of Students | 29 % | 6 | 12 | 47 | 6 | 1167 |
| 1.1- Demands upon Graduates | 49% | 22 | 10 | 18 | 1 | 73 |
| 1.2- Content of Education | 35% | 8 | 19 | 34 | 4 | 108 |
| 1.3- Process of Communist Upbringing | 24% | 8 | 11 | 54 | 3 | 278 |
| 1.4- Principles and Methods of Upbringing | 25% | 3 | 10 | 55 | 7 | 338 |
| 1.5- Educational Planning | 28% | 6 | 9 | 46 | 11 | 279 |
| 1.6- Career Choice | 32% | 2 | 10 | 54 | 2 | 27 |
| 1.7- Long-Term Planning | 47% | 0 | 23 | 27 | 3 | 64 |
| 2- Educational Administration, Management and Long-Term Planning | 44% | 9 | 24 | 22 | 1 | 749 |
| 2.1-Management Goals | 44% | 0 | 6 | 50 | 0 | 16 |
| 2.2- Management of Specialist Training Programs | 33% | 26 | 10 | 28 | 3 | 39 |
| 2.3- Management of Science | 36% | 11 | 35 | 17 | 1 | 181 |
| 2.4- Management of Scientific-Educational Training | 34% | 22 | 22 | 22 | 0 | 9 |
| 2.5- Financial Management of Education | 54% | 5 | 10 | 30 | 1 | 44 |
| 2.6- Computerization of Educational Management | 46% | 7 | 26 | 20 | 1 | 373 |
| 2.7- System Development | 52% | 7 | 12 | 26 | 3 | 87 |
| TOTAL | 35% | 7 | 17 | 37 | 4 | 1916 |

SOURCE: Ministerstvo vysshego i srednego spetsial'nogo obrazovaniia SSSR, Nauchno-issledovatel'skii institut problem vysshei shkoly, Koordinatsionnyi plan nauchno-issledovatel'skikh rabot po problemam vysshego i srednego spetsial'nogo obrazovaniia na 1976-1980gg. (Moskva: Minvisso, 1975).

TABLE VI: RESEARCH ASSIGNMENTS MADE BY RSFSR PEOPLE'S COMMISSARIAT OF THE ENLIGHTENMENT, BY DISCIPLINE, BY LOCATION, 1935

| SUBJECT | MOSCOW | LENINGRAD | OTHER | N |
|---|---|---|---|---|
| Mathematics | 35% | 38 | 27 | 244 |
| Mechanics | 35% | 53 | 12 | 98 |
| Physics | 26% | 37 | 37 | 308 |
| Astronomy | 42% | 43 | 24 | 209 |
| Chemestry | 29% | 37 | 34 | 326 |
| Geography | 36% | 46 | 18 | 80 |
| Geology | 0% | 20 | 80 | 54 |
| Paleontology | 0% | 65 | 35 | 23 |
| Petrography | 0% | 47 | 53 | 19 |
| Mineralogy | 0% | 63 | 37 | 16 |
| Chrystography | 0% | 100 | 0 | 5 |
| Mineral Sciences | 41% | 23 | 36 | 70 |
| Microbiology | 80% | 15 | 5 | 97 |
| BOTANY | 19% | 14 | 67 | 184 |
| Genetics | 36% | 16 | 48 | 25 |
| Zoology | 38% | 32 | 30 | 241 |
| Histology | 43% | 43 | 14 | 37 |
| Physiology | 26% | 70 | 4 | 186 |
| Anthropology | 100% | 0 | 0 | 18 |
| History | 25% | 75 | 0 | 99 |
| Linguistics | 0% | 100 | 0 | 90 |
| Psychology | 62% | 38 | 0 | 64 |
| Party History | 0% | 100 | 0 | 46 |
| TOTAL | 31% | 42 | 27 | 2539 |

SOURCE: Upravlenie universitetov i nauchno-issledovatel'skikh uchrezhdenii NKP RSFSR, Svodnyi plan nauchno-issledovatel'skikh rabot institutov i kafedr universitetov NKP RSFSR na 1935g. (Moskva:UChPEDGIZ, 1935).

FOOTNOTES

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