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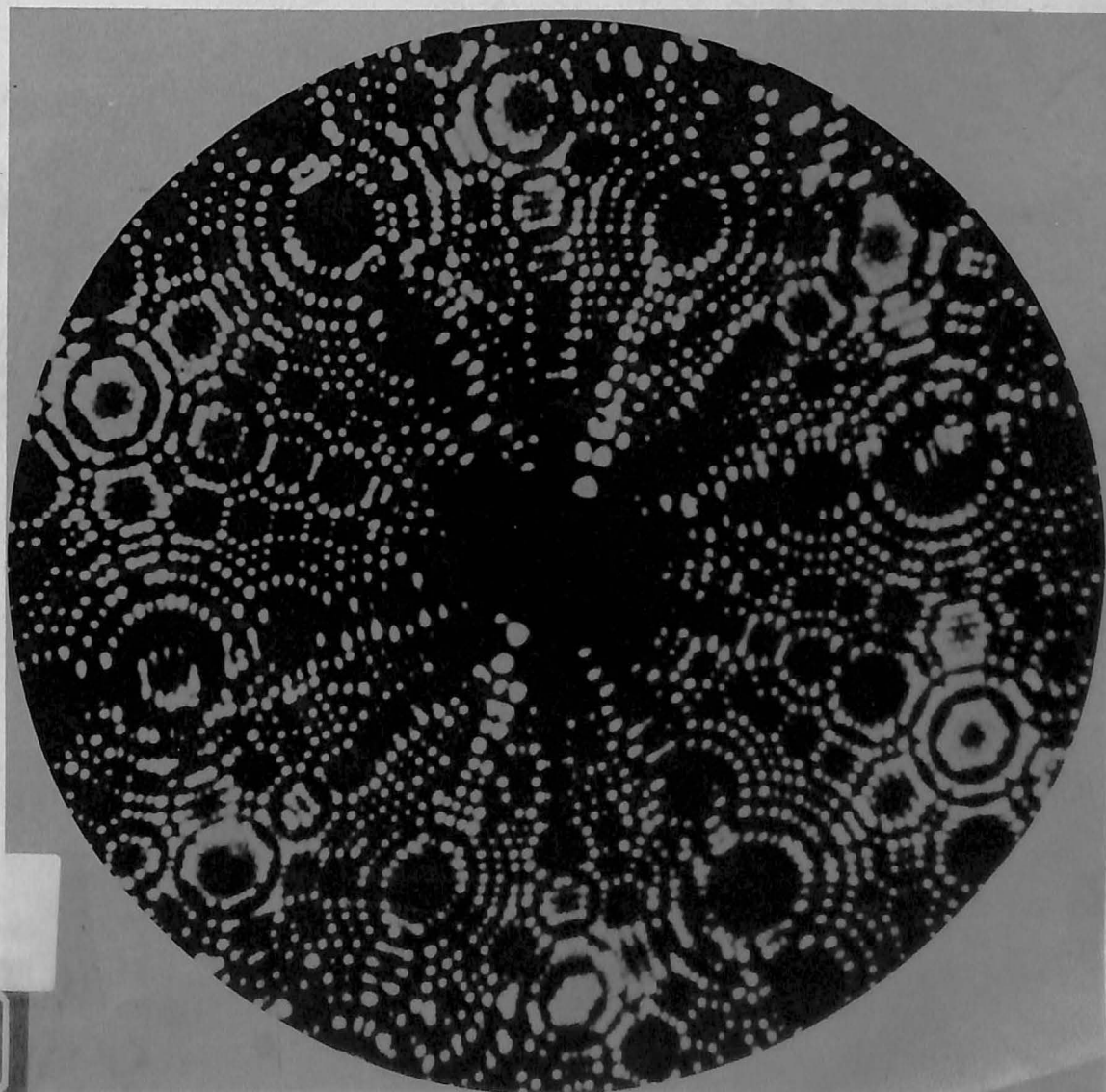
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Science policy and the organization of scientific research in the Socialist Federal Republic of Yugoslavia

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**Science policy and
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PREFACE

The Unesco series "Science policy studies and documents" forms part of a programme "to collect, analyse and disseminate information concerning the organization of scientific research in Member States and the policies of Member States in this respect", authorized by resolution 2.1131 b. adopted by the General Conference of Unesco at its eleventh session in 1960, and confirmed by similar resolutions at each subsequent session.

This series aims at making available to those responsible for scientific research and development throughout the world, factual information concerning the science policies of various Member States of the Organization as well as normative studies of a general character.

The *country studies* are carried out by the governmental authorities responsible for policy making in the field of science in the Member States concerned.

The selection of the countries in which studies on the national scientific policy are undertaken is made in accordance with the following criteria: the originality of the methods used in the planning and execution of the national science policy, the extent of the practical experience acquired in such fields and the level of economic and social development attained. The geographical coverage of the studies published in the series is also taken into account.

The *normative studies* cover planning of science policy, organization and administration of scientific and technological research and other questions relating to science policy.

This same series also includes *reports of international meetings* on science policy convened by Unesco.

As a general rule, the country studies are published in one language only, either English or French, whereas the normative studies and the

reports of meetings are published in both languages.

The present study on science policy and research organization in the SFR Yugoslavia was undertaken by the Federal Council for the Co-ordination of Scientific Activities, and a number of scientists and technical experts were directly engaged in the project. Mr. D. Maksimović was the co-ordinator of the study.

In order to supplement existing quantitative information on research institutions, staff and expenditures, a special collection of statistical data was organized for the purpose of this study. A full methodological and analytical verification of the data presented could not be carried out, however, and these should hence be considered as provisional. These methodological difficulties will be tackled in a much broader study which a number of institutions are currently undertaking jointly.

Part One gives a historical survey of scientific research in the SFR Yugoslavia.

Part Two describes the organization of science from the institutional standpoint.

Part Three deals with the financing of scientific and technical research.

Part Four concerns training, supply and demand problems relating to scientific workers.

Part Five describes the basic objectives of Yugoslavia's science policy.

Part Six gives an outline of the socio-political system and the main features of Yugoslavia's socio-economic development.

The *Annexes* contain the diagrams and tables referred to in the text and a list of definitions used as well as a bibliography.

The opinions expressed in the study are the sole responsibility of the authors and do not necessarily coincide with the views of Unesco.



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INTRODUCTION

The dynamic material and social advancement of the Yugoslav peoples after the Second World War rested, to an increasing extent, on the results of scientific research. The efforts that are being made in this field are also prompted by the desire to contribute to the general progress of science.

In spite of the shortage of qualified personnel and financial resources, as well as of a longer scientific tradition, substantial results have been obtained in the past twenty years. Numerous scientific institutes in many fields have been founded. Research in the economy has been intensified. University instruction has been greatly expanded and organized on new principles. The number of research workers has been considerably increased.

The situation Yugoslavia was faced with two decades ago required that priority be given to the activities directly related to the reconstruction and development of the country, and it was frequently impossible to deal with equal intensity with the questions concerning the advancement of research. As a result, a serious unbalance developed between socio-economic development, and scientific development, a disproportion that occurs more or less in all countries undergoing an accelerated economic growth and radical social transformations.

The raised level of economic development demanded a much more intense development of applied research so as to create conditions, through the application of modern technology, for more rational production and higher productivity and for more extensive participation in the international division of labour. Parallel to this, it was necessary to continue to develop fundamental research, as the scientific basis and methods provided by that kind of research constitute the prerequisite for the elaboration of an efficient and comprehensive mechanism of research.

It was also considered particularly important to promote social sciences, as the problems of economic growth could not be solved without reference to the entire context of socialist social relations.

This imposed on Yugoslavia numerous extensive and complex tasks in the field of scientific activities. It became essential to examine these tasks on a long-term basis and to define them in more precise terms. This was effected by the Federal Assembly's Resolution on Scientific Research of 1965 and by the Programme of Scientific Activities for 1966-1970. These documents formulated Yugoslavia's science policy in the forthcoming period and provided favourable material and social conditions for its implementation.

It goes without saying that these acts still left many problems unsettled. The specific character of the Yugoslav socio-economic system, in which science policy is decentralized, required above all the improvement of the system of co-ordination and guidance of research. It was necessary to evolve adequate forms of financing and to create conditions for a constant increase and stable flow of funds for the development of scientific activities. It was also essential to build up a system that would strengthen self-management in scientific organizations and the freedom of scientific activity.

Although much has been done so far, the changes and improvements still have the character of open processes. This is the reason why many aspects of the organization and financing of scientific activities, and of science policy in general, could not be considered in full detail in this publication. In spite of this, it may be said, in conclusion, that a favourable social climate and appropriate conditions have been established for the further development of scientific activities in Yugoslavia.

OUTLINE OF THE DEVELOPMENT
OF SCIENTIFIC INSTITUTIONS
IN YUGOSLAVIA.

I. SCIENTIFIC INSTITUTIONS

The beginning of the development of science in Yugoslavia dates back to the foundation of learned societies and academies of science and, somewhat later, of universities and advanced schools. As a result of specific historical conditions, this development occurred in the middle of the 19th century. After the fall of the independent mediaeval states, the peoples of Yugoslavia were subjected to foreign rule for a long period of time. The only free enclave in the area, the coastal merchant Republic of Dubrovnik, had more favourable conditions for development, and this was reflected in the flourishing of culture and science. The Republic of Dubrovnik gave to the world - during that dark age for the rest of Yugoslavia - two prominent scientists, Marin Getaldić (Ghetaldus, 1566-1626), physicist and famous pre-Cartesian mathematician, and Rudjer Bošković (1711-1787), mathematician, astronomer, physicist and philosopher, both of whom take an eminent place in the history of science. As a consequence of this situation, the first stages of the development of science in the Yugoslav regions follow and depend on foreign cultural trends. Because of the lack of domestic establishments for higher education, intellectuals from the Yugoslav regions were educated in foreign universities, especially universities of neighbouring European countries.

The first institutions set up for the purpose of organizing and developing educational and scientific activities were the academies founded in Ljubljana and Zagreb and in some coastal towns in the 16th and 17th centuries, following the example of foreign academies mainly Italian. These academies, seminaries, lyceums and similar institutions were mainly concerned with the cultivation of literature and the promotion of the national literary language. Later on, under the influence of the age of rationalism and at the initiative of the Venetian authorities and later of the French and Austrian authorities as well,

these academies became concerned with more practical subjects, turning into societies for the advancement of the economy. However, they did not produce any significant results, either in their earlier or later capacity, except in the field of education and in awakening national awareness.

During the same period, the first educational institutions were being founded also in other parts of the country (Sarajevo, Cetinje, Skopje). They are important for the subsequent development of scientific-pedagogical institutions (libraries, printing presses, religious schools, museum collections).

1. The first scientific-pedagogical institutions

The organized development of science, in the modern sense of the word, in Yugoslav regions, received a strong impulse from two historical events: the uprisings of the Serbian people (1804 and 1815), which resulted in the formation of the Serbian State, and the Illyrian movement, which helped to awaken national awareness, especially in Croatia and Slovenia, and resulted in intensified efforts to create national cultural and scientific institutions. The first learned societies were founded at that time (Ljubljana in 1839, Beograd in 1842, Zagreb in 1850), and somewhat later the first universities (Beograd in 1863, and Zagreb in 1864). The first academies of sciences were formed almost at the same time, the Yugoslav Academy of Sciences and Arts of Zagreb in 1866, and the Serbian Academy of Sciences of Beograd in 1886.

In keeping with the incessant struggle by the peoples of Yugoslavia for liberation from foreign rule, which covered the whole 19th century and the beginning of the 20th century, until the end of the First World War, cultural and scientific life also bore the imprint of the struggle for national assertion and renaissance. For that reason, university-educated persons, who were as a rule being educated in foreign countries, concentrated

in their work on research in the languages of Southern Slavs, their national history, popular customs and life, folklore, geography, geology, biology, etc. A similar pattern was followed in the activities of the existing scientific institutions, i.e. academies and universities.

The need to further national emancipation and to develop the national economy played the decisive role in shaping the character of the research activities of the newly-formed academies as well as of university syllabuses. The beginnings of industrialization in the Yugoslav regions, in the early 20th century, lent urgency to the need for establishing research institutions in the field of engineering and applied sciences. The desire to learn more about the natural resources of the country also provided incentives for developing research in the natural sciences. On the eve of the establishment of a common state of the Yugoslav peoples, in 1918, there already existed 31 scientific research institutions, 12 of them autonomous, and 19 attached to academies of science, universities or government bodies. The greatest number of these institutions dealt with research in agricultural, medical and engineering sciences (16 institutes), followed by 13 institutes for natural sciences, while only two research institutions dealt with social sciences and humanities. Most of these establishments were financed by individual patrons or foundations, and only a small number was supported by the authorities.

This initial period of the establishment of the first scientific institutions was characterized by the following features:

Compared with other European countries, the first educational and scientific institutions in the Yugoslav regions were formed with considerable delay. The main reasons for this lag are the fact that the peoples of Yugoslavia had no independent national states at that time and that, in the specific social structure that prevailed among them, those strata which in other countries became the initiators of the advancement of science and scientific institutions were still undeveloped,

The first educational-pedagogical institutions (seminaries, lyceums, faculties) were founded by the church for predominantly educational-ideological purposes,

Later on, when the first modern scientific-pedagogical institutions were founded, their main function was to awaken national awareness and to educate the people, i.e. their activities were subordinated to the aims of the struggle for national independence. It was only towards the end of the 19th century that these establishments began to develop research in natural and engineering sciences,

Research work had the character of an individual undertaking at that time. Most scientists were still trained in other countries. This had advantages, as it helped the young Yugoslav science to remain constantly in touch with the prevailing trends in world science of the time; Three Yugoslav peoples, the Serbs, the Croats and the Slovenes, already had the basis for the development of research in the form of institutions and scientists. At the time Yugoslavia was formed in 1918, the other Yugoslav peoples had a relatively modest scientific potential, apart from their cultural tradition.

2. Scientific institutions between the two World Wars

The institutional base of scientific research was expanded after the creation of the common state of the Yugoslavs. Between 1919 and 1940, 79 scientific institutions were founded on the territory of Yugoslavia, 10 of them autonomous institutes, and 69 attached to the academies of sciences, universities and other bodies and organizations. During that time, another university was founded in Ljubljana, in 1919, as well as another academy, the Slovene Academy of Sciences and Arts, also in Ljubljana, in 1938.

Consequently, research was carried out in universities, in academies of sciences and in a small number of autonomous scientific institutes. The slow development of university instruction and of scientific research during the period of the Kingdom of Yugoslavia should be largely attributed to the fact that Yugoslavia was at that time an underdeveloped agrarian country with very little industry, mostly owned by foreign capital. The advancement of technology in the industrial enterprises was in the hands of foreign firms, which used the scientific institutes of their own countries. Hence the majority (66) of newly established research institutions dealt with agricultural and medical sciences whereas in the field of natural sciences only eleven new establishments were founded, and only two in social sciences and humanities. Research conducted at these institutions mainly dealt with those disciplines and employed those methods which did not require costly equipment and experiments.

The number of university teaching staff rose to 1,000 persons during this period. Research carried out in universities was concentrated on advancing the scientific level of instruction.

The Second World War meant an almost complete interruption of all scientific activity in Yugoslavia. In several faculties, (in all of them at the University of Beograd), as well as in many other scientific institutions of the country, research work, to any practical extent, ceased completely. Scientific research was resumed after the war only, in 1945.

The development of scientific-pedagogical institutions between 1919 and 1940 manifested, on the whole, the same tendencies as in the preceding period. The national culture was still the centre of attention. Due to the fact that the basic branches of the economy, especially industry, were under the control of foreign capital, there was no incentive for the advancement of engineering sciences and applied research. Scientific and teaching staff were predominantly educated in the country and received advanced training abroad. Several institutions for human medicine (clinics), as well as bibliographical institutes and museums were founded at that time.

A number of scientists obtained in their respective disciplines results of lasting value, which won the young Yugoslav science recognition in international scientific circles. Although some scientific establishments were being financed from the State budget, individual patronage and foundations remained an important source of funds for research.

In spite of the fact that the State authorities gave some encouragement to scientific research, there was still no clearly defined science policy in the country.

3. *Scientific institutions after 1945*

For reasons related to the economic and cultural backwardness of the country, to war devastations and losses in scientific personnel, it was necessary to carry out as rapid as possible a reconstruction of the institutional base of scientific activity, to advance it and adapt it to the new conditions prevailing and to the requirements of social and economic development.

After the establishment of socialist Yugoslavia, a series of political and organizational measures were implemented in order to accelerate the development of the institutional base of scientific activities. Among other things, 490 new research institutions were founded between 1945 and 1965, 321 in the field of applied sciences, 70 in natural sciences and 99 in social sciences and humanities. Out of these, 243 were autonomous scientific institutions, while the others were attached to universities and academies of sciences.

The network of scientific institutions was extended to cover those republics and regions which had no research establishments prior to 1945. Four new research institutions were founded in Montenegro, 19 in Macedonia, and 51 in Bosnia and Herzegovina. The first scientific institutions were also founded in the Autonomous Province of Kosovo and Metohija. In 1964 the institutional base of scien-

tific activities in Yugoslavia comprised 605 establishments, 94 of them in the field of natural sciences, 405 in applied sciences, and 106 in social sciences and humanities. Out of this total number, only 269 establishments had been granted the status of autonomous research institutions.

Section III, below, will deal with the main characteristics of science policy during that period.

II. SCIENTIFIC AND SCIENTIFIC-PEDAGOGICAL ORGANIZATIONS

1. *Universities*

Universities are numerically the greatest source of scientific staff and the main component of the institutional base of research in Yugoslavia. There are seven universities in the country today, with a total of 96 faculties, 16 advanced schools and 14 academies of arts, located in 21 towns.

The origin of the University of Beograd is the Great School, founded in 1808. It trained experts for various functions in the newly formed public administration of the state of Serbia, established after the uprising against the Turkish rule. The work of the School was interrupted when Serbia again became ruled by Turkey. In 1838, a Lyceum was founded in the town of Kragujevac, to be moved to Beograd in 1841, and reorganized into the Great School in 1863, with three faculties - Humanities, Law and Engineering. In 1905, the name of the Great School was formally changed into University. Between the two World Wars, the University had six faculties. During the Second World War, the University ceased work and resumed it after the liberation of the country. The University of Beograd today has 26 faculties, two extra-mural departments, two advanced schools and four academies of arts. These institutions are located in five Serbian towns and in Titograd, the capital of Montenegro, which has no university of its own. Three faculties of that University have been opened in Priština, the capital of the Autonomous Province of Kosovo and Metohija,

Higher education in Croatia began in 1666, when the Lyceum of the Jesuit order founded a Faculty of Humanities. In 1669, the Faculty of Humanities in Zagreb was granted all the rights and privileges enjoyed by other Austrian universities. In 1776, the Faculty of Law was added to the existing Faculties of Humanities and Theology. During the period of Bach's absolutism these establishments for higher education were abolished; the University of Zagreb was formally founded in 1874 only. Between the two World Wars, the University of Zagreb had eight faculties. During the Second World War,

the difficult conditions created by the foreign occupation forced it to reduce its activity. It was reconstructed and expanded after the war. Today, it has 25 faculties, one extra-mural department, seven advanced schools and three academies of arts. These institutions are distributed among six towns of Croatia, Higher education in Slovenia began in the 16th century, and in the course of the 18th century studies were organized in four disciplines - philosophy, theology, medicine and surgery. Under the French occupation (1809-1813), the Central Great School with five faculties was established, only to be closed after the reinstatement of Austrian occupation. Formal higher education in Slovenia was organized again in 1919, when the University of Ljubljana was founded; at that time, it had four faculties. Between the two world wars, the University of Ljubljana expanded its activity, but during the Second World War it was reduced to the minimum until the University was completely closed in 1943. After 1945, the University of Ljubljana was reconstructed and expanded, so that today it has nine faculties, three advanced schools and three academies of arts located in two towns of Slovenia,

Higher education in Bosnia and Herzegovina began to develop after the First World War, but the authorities of the then monarchy put so many obstacles in the way of its advancement that the results obtained were extremely modest. The first faculty, the Faculty of Medicine, was founded in 1946, followed by the Faculties of Law, Agriculture and Forestry, and Engineering. The University of Sarajevo was formed in 1949. Today it has 15 faculties, two advanced schools and three faculties of art, located in four towns of Bosnia and Herzegovina, The beginnings of higher education in Macedonia date from the period between the two World Wars, when the University of Beograd opened in Skopje an extra-mural department of its Faculty of Philosophy, Arts and Humanities. The decision to found an autonomous university centre in Macedonia had already been made during the war. Immediately after the liberation of the country, a Faculty of Philosophy, Arts and Sciences was established, to be followed later by the Faculty of Agriculture and Forestry and the Faculty of Medicine, all of which constituted the basis of the University of Skopje, founded in February 1949. The Faculty of Philosophy, Arts and Sciences was later on split into two faculties, thus separating the natural sciences from the other studies. At the same time five other faculties were established.

The successive formation of individual faculties

in the capital of the Autonomous Province of Vojvodina, i.e. the Faculties of Arts and Humanities, Agriculture, Law, Medicine, Engineering and economics led to the foundation, in June 1960, of the University of Novi Sad. Today the University has eight faculties located in two towns of the Autonomous Province.

The youngest university in Yugoslavia is that of Niš, an industrial town in Serbia. This university comprises three faculties (Economics and Law, Medicine and Dentistry, Engineering), founded by the University of Beograd in 1960. These faculties were detached from the founding institution and integrated into the new University of Niš in 1965.

All Yugoslav universities are associated in the Association of Yugoslav Universities, founded in 1957. The Association deals with matters of common interest to all the universities, collects documents and issues publications on their activities and problems. It also organizes the exchange of experience in scientific-pedagogical work and submits proposals and suggestions to the appropriate organs of the Federation and the Republics on matters concerning universities.

The universities have played an important role, both pedagogically (by training scientific workers in post-graduate courses) and scientifically (by carrying out research in numerous institutes attached to them).

2. Academies of sciences and learned societies

The Yugoslav Academy of Sciences and Arts in Zagreb is the oldest institution of the kind in the country. It originated in the Learned Society founded in 1847, and was formally founded in March 1866 by an act of the Convention of Croatia. At the same time, the Convention nominated the first 14 members, who drafted the rules of the Academy and elected as its patron Josip Juraj Strossmayer, the Bishop of Djakovo and the spiritual initiator and benefactor of the Academy. The historian Franjo Rački became its first president. Three sections were established in the Academy: History and Philology, Philosophy and Law and Natural Sciences and Mathematics. The first issue of the journal of the Academy "Rad" (Proceedings) was published in 1867 and the journal continued to appear regularly until the beginning of the Second World War. The activity of the Yugoslav Academy of Sciences and Arts was interrupted in June 1941, immediately after the occupation of the country.

After the liberation of the country, the activity of the Academy was resumed and its organizational structure adapted to the new conditions. In March 1947, an extraordinary session of the Academy was held and a new Board was elected. In December of the same year, the Assembly of Croatia passed a law, which determined the basic tasks of the Yugoslav Academy of Sciences and Arts. Since that time

the Academy has founded 32 scientific institutions, among which 19 autonomous institutes. The academy has five standing commissions with special scientific functions. As a result of the expanded scope of its scientific activities, the research work conducted by the Academy is organized within eight departments : Social Sciences, Mathematics, Physical and Engineering Sciences, Natural Sciences, Medical Sciences, Philology, Contemporary Literature, and Fine Arts and Music.

The Serbian Academy of Sciences and Arts in Beograd was founded in 1886. Its origin can be traced back to the Serbian Scientific Society (1841-1864) and the Serbian Learned Society (1864-1892) which formally merged with the Academy in 1892. At the time of its foundation the Academy had four sections : Natural Sciences, Philosophical Sciences, Social Sciences and Humanities, and Fine Arts. The first 16 members were nominated by royal decree in April 1887, and Josip Pančić, the famous botanist, was elected first president of the Academy. The Academy has six departments today : Natural sciences and Mathematics, Medical Sciences, Literature and Linguistics, Social Sciences, Fine Arts and Music, and Engineering Sciences. The library and the archives of the Academy have become public institutions . The Academy has ten autonomous institutes, one laboratory and one committee.

The Slovene Academy of Sciences and Arts was founded in Ljubljana in 1938. It is historically linked with the first scientific institutions of the early 19th century. However, practical steps to found the Academy were first taken in 1921 only with the foundation of the Philological Society in Ljubljana. In 1925 the Society, together with other cultural and scientific institutions in Slovenia, submitted the first draft of the Law on the Founding of the Slovene Academy of Sciences and Arts ; this law was passed as late as August 1938. The first president was Rajko Nahtigal, linguist and specialist in Slavonic languages. The Academy began with its activities in 1939, when its first publications appeared. It has five departments : History and Social Sciences, Philology and Literature, Mathematical, Physical and Engineering Sciences, Natural and Medical Sciences, and Arts. There are nine institutes in the Academy.

The Academy of Sciences of Bosnia and Herzegovina was founded in 1966. In the course of the previous years the establishment of the University and of numerous scientific institutes and laboratories, as well as the growing number of scientific workers, made it necessary to create an organization which would work on the advancement of science in that Republic. The Learned Society of Bosnia and Herzegovina, established in 1951 and whose activities and tasks had been determined by a Republic law of 1952, met that requirement. It functioned through

three departments : History and Philosophy, Medical Sciences, Natural and Engineering Sciences. With the establishment of the Academy of Sciences, the work on the comprehensive advancement of scientific activities in Bosnia and Herzegovina was thus further intensified.

The Academy of Sciences of Macedonia was founded at the beginning of 1967.

The Federal Government set up in 1948 the Academic Council of SFR Yugoslavia, with the task of co-ordinating research and other activities of the then three existing academies of sciences. Another function of the Council was to promote co-operation between the academies and to assist in organizing joint projects in various fields of science, as well as to further contacts between scientists and to represent Yugoslav science abroad. In 1959 the Council was dissolved in its capacity of a government body and its functions were taken over by the Council of the Academies of Sciences of Yugoslavia, founded on the principle of the voluntary association of the academies. Co-operation between Yugoslav academies is also effected through inter-academic committees. The Council of the Academies of Sciences of SFRY issues the quarterly "Scientific Bulletin", which is published in French and which reports on all the significant papers from the field of natural sciences that appear in Yugoslavia.

In addition to universities, learned societies and science academies, some Yugoslav peoples founded special Centres in order to foster national awareness and the general cultural and educational advancement of the Yugoslav peoples. Three centres of this kind still carry out their activities in Yugoslavia, publishing books dealing with cultural and scientific subjects. These centres are the *Matica Srpska* of Novi Sad (founded in 1826), *Matica Hrvatska* of Zagreb (founded in 1842) and *Slovenska Matica* of Ljubljana (founded in 1864).

Associations of scientists and other professionals play an important role in stimulating scientific activity and in popularizing scientific results, as well as in dealing with various problems related to their profession. Such Associations are: the Union of the Medical Societies of Yugoslavia, the Union of the Associations of Engineers and Technicians, the Union of the Associations of Economists, the Union of Legal Associations, the Union of Chemical Societies, the Union of Mathematicians, Physicists and Astronomers, the Union of Geological Societies, etc.

3. Federal Commission on Nuclear Energy

The Commission on Nuclear Energy takes a special place in the advancement of research in the post-war period. It was established in 1948 as a government agency in charge of research in the nuclear sciences and on nuclear raw materials. The Commission set up the following institutes: the Institute

of Nuclear Sciences "Boris Kidrič" in Vinča near Beograd (1947), the Nuclear Institute "Jožef Štefan" in Ljubljana (1949), the Institute "Rudjer Bšković" in Zagreb (1950), the Institute for research in geology and mining and for the testing of nuclear and other mineral raw materials in Beograd, and the Institute for the technology of nuclear and other mineral raw materials in Beograd. These institutes belong among the largest in the country, possess the most up-to-date equipment and closely co-operate with corresponding research institutions in other countries, and with appropriate international scientific organizations. In addition to their main activity, in the nuclear field, these institutes also carry out research in physics, electronics, automation, applied mathematics, chemistry, biology and biochemistry. Their great influence on the development of science in Yugoslavia is not only due to their own research potential but also to the assistance which their experienced scientific personnel bring to other research and scientific-pedagogical institutions in the country.

4. *Specialized institutions for the advancement of the application of science*

For the purpose of co-ordinating practical policies with scientific research in various fields, the Federal Executive Council established a number of professional-scientific institutions with some administrative competences, whose function is to further the application of science and the co-operation between scientific organizations. Such institutions are: the Federal Institute for Town and Country Planning, Communal Affairs and Housing; the Federal Institute of Geology; the Federal Institute for Labour Productivity; the Yugoslav Institute for Standardization; the Federal Institute for International Technical Co-operation; the Yugoslav Institute for the Study of School and Educational Affairs; the Federal Institute for Economic Planning; the Patent Office of SFRY; the Office for Measures and Precious Metals, etc.

5. *Scientific and technical information services*

The Yugoslav Centre for Technical and Scientific Documentation, established in 1952, was entrusted, with the task of collecting and systematizing scientific and technical documentation and disseminating scientific information; The Yugoslav Bibliographical Institute was founded in 1948. It is the central bibliographical institution, systematically studying and recording the entire current production of published material in Yugoslavia. In addition, it is the national centre for the publication of bibliographical information for foreign countries

and for the international exchange of bibliographical information.

The Yugoslav Institute of Lexicography was established in 1950 with the main function of preparing and publishing encyclopaedic and bibliographical editions, monographs and similar works. Its foundation was prompted by the desire to foster encyclopaedic activities in Yugoslavia.

In addition to these institutions, a considerably well developed network of institutions and services for scientific documentation and information has been organized in the country. The possibility is being currently examined of integrating all of these centres into a comprehensive system of scientific information and documentation, as well as of introducing planning in the establishment of new centres, in keeping with the needs of working and other organizations and their associations.

III. BASIC CHARACTERISTICS OF SCIENCE POLICY AFTER THE SECOND WORLD WAR

After the liberation and the revolution in 1945, Yugoslavia was confronted with manifold tasks in her efforts to advance science and to define the concepts of a modern science policy. The central issue was the training of scientific personnel, especially in view of the heavy losses suffered during the war. The reconstruction of the country, the requirements of economic growth and industrialization, conferred on this task a character of extreme urgency. In order to meet these requirements, the capacity of universities was extended and several persons were sent abroad for specialization.

At the same time, a planned acceleration of the development of scientific institutions was initiated. The academies of sciences founded a number of institutes, predominantly in the field of humanities and natural sciences. The state administration established various institutes which performed some administrative functions, in addition to purely scientific activities.

Great attention had to be devoted to applied research institutions, with regard to both the needs of industrialization and the modernization of an underdeveloped agricultural production.

Special efforts were made to develop scientific institutions in the field of nuclear energy and electronics.

According to its main characteristics and methods of implementation, science policy in post-war Yugoslavia went through three stages: before 1957, 1957-1963, after 1963. This last period is dealt with in part five, below.

The first stage was characterized by centralistic planning and guidance of the scientific development, by budgetary financing, by the extensive development of scientific capacities, and by the forming of the first state bodies in charge of science policy.

Immediately after the Second World War, it was the academies of sciences which were entrusted with the task of advancing scientific activities, because they had the longest tradition, and because of the scientific reputation of their members. In the course of the first years they founded a considerable number of institutes in the fields of natural sciences and humanities. By decision of the Government, the Academic Council was set up in 1948 for the purpose of co-ordinating their work. This co-ordination consisted mainly in organizing research in astronomy, geophysics and geology, primarily with respect to the international research projects in which Yugoslavia was participating. The Academic Council assisted in the implementation of these projects but had no right of control over them and was, therefore, unable to provide efficient guidance in scientific research. The institutes attached to the academies concentrated predominantly on fundamental research.

The need to build up an independent industrial base, arising from the fact that Yugoslavia was a developing country, and from the specific political situation in which it had found itself, made acute the question of research in the fields of construction of electric power plants, heavy industry, transport and communications, etc. The backward agriculture also had to be modernized. Since the academies and their institutes were mainly concerned with fundamental research, some of the economic ministries began setting up their own laboratories and institutes. All the present research institutes for agriculture, veterinary medicine and forestry were founded at that time, together with a number of institutes for construction, water-economy, electro-economy, geological research, and many others. With a view to developing research on the utilization of nuclear energy, a separate federal commission was formed in 1948 in order to co-ordinate the work of the scientific institutes working in that field.

Throughout this first period the entire scientific activity was financed from the budgets of the Federation and of the Republics. In order to ensure more financial resources for research with direct practical applications, in addition to the allocations from the budgets, funds for the advancement of industry and agriculture were set up in corresponding chambers in 1954. The financing of specific research projects was effected by means of contracts between the research institutions or enterprises carrying them out and the bodies administering these funds.

Because scientific institutions were being financed from the budgets of state organs, their research programmes were being mainly determined on the basis of the internal criteria of science as set up by the scientific workers, and the actual needs of economic growth played a minor role. The problem of establishing organic links between research and higher

education, on the one hand, and between research and the economy, on the other, did not get effectively solved during that period. This situation remained in spite of the fact that the bodies of the Federation and of the Republics were then practically the only founders or financiers of scientific institutions (apart from the academies and universities, which continued to organize research in keeping with their traditional autonomy and in proportion to their financial possibilities). Furthermore, the economy was not having any serious impact on the development of scientific institutions. The developing industries used predominantly imported licences and equipment. They could not even find enough technical personnel for production, let alone for research. For that reason, only those research activities developed in which there had previously existed some scientific tradition, e.g. construction, the water-economy, geology and agriculture.

Despite the fact that considerable progress was achieved during the first post-war period (up to 1957) compared with the situation before the war, with regard both to scientific staff and to the establishment of new scientific institutions, the organization of research manifested a number of shortcomings, among which the main ones were: a lack of co-ordination due to the existence of a great number of small and inadequately equipped institutions, a lack of systematic co-operation between them, and an insufficient co-ordination between research programmes in dealing with current social problems, especially with regard to the efforts to accelerate economic growth.

The second period, between 1957 (when the Law on the Organization of Research was passed) and 1963 (when the new Constitution of SFRY was adopted), represents a kind of transitional period in the forming of science policy on a new conceptual basis and the application of new measures in that field. This period was characterized by the setting up of new social bodies (Federal and Republic research councils) and by the creation of permanent sources of financing for the systematic advancement of scientific research (Federal and Republic Funds for the financing of research). The budgetary form of financing research institutions is being gradually abandoned, and the method of contracts for the financing of research programmes or specific projects adopted. A further characteristic of this period was the growing financial independence of scientific institutions. They began to establish ever closer links with the economy, orienting their work towards topical social and economic problems.

The principle according to which science ought to be one of the chief factors of economic and social development is being gradually put into practice. Applied research activities have been

stepped up and the network of research institutions in engineering sciences and in industry expanded. The elements of science policy are being elaborated in an increasingly detailed manner, and they are put into effect predominantly through the participation of the Federal and Republic Funds for the financing of research. Funds are provided for all types of research (fundamental, applied and development-technological) in those branches of science which lag behind and which are considered indispensable for economic growth.

The Law on the Methods of Financing Scientific Institutions, passed in 1960, facilitated even more the materialization of the practical aims of science policy, inaugurated by the Law on the Organization of Research. Under that law, research expenditures of enterprises became exempt from income tax. Somewhat later a regulation was passed to the effect that equipment for scientific research could be imported free of duty. By inducing scientific institutions to accrue an increasing portion of their financial resources by means of direct contracts with interested parties (a process which, admittedly, does not go completely smoothly), spendings on research are being rationalized and its range narrowed down - a problem common to most of the small countries. The existing funds for the financing of research (Federal and Republic) are, among other things, an efficient instrument for guiding scientific development and for mobilizing funds from other sources. Such financial policy has had the effect of augmenting the resources invested by economic organizations in applied research and development. It was also instrumental in expanding the network of development laboratories and research units attached to economic organizations. The available personnel is used more rationally, since the research units attached to enterprises are staffed by persons who would not otherwise work in research. Some of the larger enterprises already set aside a fixed percentage of their revenue for research.

IV. STANDING BODIES IN CHARGE OF SCIENCE POLICY

The first bodies dealing with science policy were set up directly after the establishment of socialist Yugoslavia. The nature and competences of these bodies changed in keeping with the changes in the constitutional system and with the requirements of the scientific and technical development of the country.

As early as 1946, a year before the first five-year plan was adopted, the Government set up a Committee on Schools and Science, whose functions were to take measures to stimulate research activities, to prepare normative acts on education and science, to define the general principles of the organization and work of higher education establishments, to be in

charge of the running of scientific institutions founded by the Federation, and to determine personnel policies. Side by side with that Committee, committees on universities, advanced schools and scientific institutions were set up in the constituent republics. With the gradual transfer of competences from federal bodies of administration to the appropriate republic bodies, the Council for Culture and Science was set up in 1950, with the task of exercising general control over the affairs of education, science and culture coming under federal jurisdiction.

The relatively great number of research institutions made it necessary to create a body which would co-ordinate, stimulate, assist and follow up the advancement of science. The bodies mentioned so far did not discharge the function of co-ordination in this sense. The most pressing problem was co-ordination between economic organizations and scientific institutions, as well as between scientific institutions themselves. To this end the Federal Assembly adopted in 1957 the Law on the Organization of Research. This Law determined the status of scientific institutions, academies of sciences and bodies in charge of science policy. The central questions regulated by the act are the foundation and dissolution of scientific institutions, their management, the financing and supervision of their work, the status of their scientific workers, and the tasks and organization of the Federal and Republic research councils. The Law also contains general provisions on the academies of sciences and arts. Prior to the adoption of that Law there had been no regulations on the foundation, management, supervision and financing of scientific institutions valid for the whole country.

An important innovation was the introduction of social self-government in all scientific institutions, except in small university or faculty institutes, where social self-government is exercised indirectly through the council of the university or faculty. Under this law, scientific institutions are managed by bodies elected by the members of their respective working communities. The founder and the assemblies of the relevant socio-political communities appoint a certain number of their representatives to these bodies.

Under the Law on the Organization of Research, research councils were set up in the Federation and in the Republics. Their main task is to encourage that scientific activity which contributes to solving the problems posed by the country's development, to organize and convene meetings and consultations on matters of interest to science, to propose to the Federal and Republic assemblies appropriate regulations and measures for stimulating scientific activities or settling some questions of importance for these activities. The councils also issue recommendations to scientific institutions, assist in

publishing scientific papers, and follow up the work of scientific institutions, the development of science and the training of scientific staff. To this end, the councils keep records. It has been also foreseen that the councils should be concerned with the participation of Yugoslav scientists and scientific organizations in international scientific gatherings and in international associations, that they should give opinions on the fostering of relations and cooperation with foreign scientific institutions and on

the participation of Yugoslav institutions in international scientific projects. Finally, the councils have been entrusted with the administration of research funds, and their opinion is asked on matters concerning the utilization of these funds for research in various branches of science.

The present organization and functions of the Federal Council for the Co-ordination of Scientific Activities and of the corresponding republic bodies in charge of research are described in Part two, section IV, below.

ORGANIZATION OF SCIENTIFIC AND TECHNICAL RESEARCH

I. GENERAL CHARACTERISTICS OF ORGANIZATION

The present organization of scientific activities in Yugoslavia can be characterized by two major features, which play a determinant role in shaping up their future development:

the efforts made by the entire community to put into practice, by means of systematic measures, the provisions of the Yugoslav Constitution, proclaimed in 1963, referring to the place, role and position of scientific activities in the country; and the diversity of organizational forms, for both scientific and technical research institutions and socio-political bodies and other bodies in charge of the development of scientific activities.

Being aware of these two facts is an essential prerequisite for the understanding of the social relations prevailing in the sphere of scientific activities in Yugoslavia, as well as of the relationship between science and society and of the dynamic changes occurring in the institutional structure and the organization of these social bodies.

The provisions of Article 45 of the Yugoslav Constitution state: that scientific and artistic creativity is unrestricted; that the authors of scientific and artistic works, as well as of scientific discoveries and technical inventions, have moral and financial rights in their products, and that the scope, duration and protection of these rights will be determined by federal law; and that the social community provides conditions for the advancement of scientific activity, since scientific activity is of particular importance for society.

In the course of the implementation of the constitutional provisions, the following major socio-political and legislative acts have been passed: Resolution of the Federal Assembly on Scientific Research, of January 1965; General Law on the Organization of Scientific Activities, of March 1965; General Law on the Federal Council for the Co-ordination of Scientific Activities and on the Federal

Fund for the Financing of Scientific Activities, of March 1965.

Apart from their constitutions, which, like the Federal Constitution, define the place of science in society and the relation between society and scientific activities the legislative activity of the constituent republics also covers the adoption of resolutions on scientific research. The republic laws on the organization of scientific activity are under preparation. The first in the series, the Law on the Organization of Research, has been adopted by the Assembly of the Socialist Republic of Bosnia and Herzegovina in June 1966.

II. ORGANIZATIONAL FORMS OF RESEARCH INSTITUTIONS

1. *Number and types of organizations dealing with research*

(a) *Autonomous research institutions* : The main organizations for scientific research in Yugoslavia are scientific institutes, established in various scientific branches and disciplines or in various fields of research (construction, automation, etc.). This organizational form developed as the result of the autonomy granted to research activities within the social division of labour. In addition to scientific institutes, there are several types of research units which carry out research within the framework of universities or faculties and academies of sciences.

In addition to research units in universities and science academies, other working organizations, especially production enterprises, frequently set up institutes or research and development units for their own needs.

Accurate data on the number of scientific research institutions in the whole country can be given only for the years 1964 and 1965.

Table I

Autonomous research institutions according to branches of scientific activity

Year	1964	1965
Total	269	289
Natural Sciences	36	31
Engineering Sciences	81	111
Medical Sciences	16	15
Agricultural Sciences	59	53
Social Sciences and Humanities	77	79

The figures quoted in the above table refer only to those institutions whose sole activity is research; faculties, as scientific and educational institutions, and academies of sciences, are not included. The figures do not also cover a whole series of institutions which carry out research of a certain type but whose activities are predominantly of a routine or commercial and technical nature (e.g. financial consultants, market research bureaux, institutes for labour productivity, etc.). The differences in the number of institutions for the years 1964 and 1965 reflect the differences in the classifications utilized and in the scope of the censuses rather than the actual creation of new institutions.

Despite the fact that it does not cover all scientific organizations or units (e.g. those which do research but have not yet reached the required level of attainment to be registered as scientific research institutions), the table still shows the basic structure and distribution of autonomous research institutions according to branches of scientific activity.

This particular type of organization is primarily the result of the multinational structure of the country, since each constituent republic and autonomous province feels the need to found its own scientific institutions. These institutions specialize mainly in the field of social sciences and humanities but also in some other branches.

- (b) *Affiliated research units* : The status of these units is somewhat different from that of autonomous scientific institutes. The difference is due to their being affiliated to economic and other working organizations or to their associations, or to science academies, universities, faculties, etc. They can be required by the statute or by the founding act to carry out research primarily

or exclusively for the needs of the parent organization. Their self-governing rights are determined by the relevant legal regulations and by the stature of the organization to which they belong. They are not required to register with the appropriate republic authority in charge of scientific research.

Table II

Research units affiliated to universities and academies of sciences

Year	1964	1965
Total	328	386
Natural Sciences	58	58
Engineering Sciences	71	69
Medical Sciences	90	117
Agricultural Sciences	80	100
Social Sciences and Humanities	29	42

As concerns the differences in the number of research units in 1964 and 1965, the same remarks apply here as for table I, above.

Table III

Research units affiliated to economic and other working organizations

Year	1965
Total	119
Natural Sciences	7
Engineering Sciences	105
Medical Sciences	1
Agricultural Sciences	5
Social Sciences and Humanities	1

There were no statistics available on the number of research units run by economic and other working organizations in 1964. Also the coverage of such units in the 1965 census was only partial.

2. The founding of scientific organizations

The right to found institutes and other scientific organizations is accorded to socio-political communities, universities and faculties, academies of sciences, economic and other organizations and their associations, as well as to groups of scientific workers. Each of the enumerated institutions or organizations has this right, individually or jointly with another organization. It must be stressed, however, that the history of the development of Yugoslavia, especially the development of its political institutions, resulted in the majority of the existing institutes being founded by republics and only in exceptional cases by the Federation.

With a view to facilitating a normal course in the process of founding new scientific institutions and of harmonizing their number with both the needs and possibilities of the country and with the principles of autonomy and self-management, two basic social criteria have been adopted:

- (a) the assurance that the conditions necessary for the founding of a scientific organization exist;
- (b) the regulation of the relationship between the founder and the newly established institution in a way which best satisfies the interests of both parties.

The federal law provides that adequate staff and organization of research are the requirements for the founding of scientific organizations and for the performance of scientific activities, leaving other requirements to be formulated in the republic laws. Furthermore, the federal law makes provision, in order to ensure social control over the existence of the required conditions and as a condition for using certain facilities granted to scientific organizations, that scientific institutes and other scientific organizations which meet the prescribed requirements should be entered in a special register, a public record kept by the republic authority in charge of science affairs.

With regard to the relationship between the founder and the newly established institution, the regulations state that academies of sciences, universities and faculties, as well as working and other organizations, are entitled to assign specific tasks to the new institution, and to determine other conditions, set forth in the statute of the daughter institution or any other general act they adopt, and relating to the performance of its scientific activity, provided that these conditions are in conformity with the laws and that the necessary resources have been allocated to the institution. As a rule, this relationship is regulated by contracts. The Basic Law on Institutions stipulates that the founder of the institution provides the financial resources necessary for its establishment and for the initial phase of its operations. If the founder is a socio-political

community, an association, or a group of citizens, these funds become socially owned assets on the day the institution is entered in the register. When a scientific unit is founded (institute, development centre, laboratory, etc.), provision may be made in its statute or the founding act, as was previously mentioned, that it should carry out research and other scientific activities primarily or exclusively for the needs of the organization to which it is affiliated.

Table IV

Autonomous research institutions, according to year of foundation

Year	Total SFRY	Natural Sciences	Applied Sciences	Social Sciences and Humanities
before 1918	12	3	8	1
1919-1944	14	2	8	4
1945-1954	103	11	57	35
1955-1962	114	20	61	33
1963	19	-	17	2
1964	7	-	5	2
Grand total in 1964	269	36	156	77

* The group "Applied Sciences" covers engineering (81), medical (16) and agricultural (59) sciences institutions.

It can be observed in the table that, as opposed to the rapid growth of the previous years, the rate at which new autonomous research institutions were founded decreased during the last year in the statistical series. Thus, for example, while in 1963 there were 19 new autonomous research institutions, in 1964 the figure amounted to only 7. The majority of these new scientific institutions carry out research in the field of engineering sciences.

Table V

Autonomous research institutions, according to founders (1964)

Founders	Total	Natural Sciences	Applied Sciences	Social Sciences and Humanities
1. Assemblies and executive councils	76	8	43	25
2. Academies of sciences	12	2	1	9
3. Universities, faculties and other higher education establishments	61	16	27	18
4. Economic organizations	31	2	28	1
5. Other	20	7	8	5
6. Groups of founders	69	1	49	19
Grand total	269	36	156	77

3. *The status of scientific institutions in the system of self-management*

Scientific institutes are autonomous and self-managed working organizations, whose socio-economic status within the system of self-management, and especially within the system of the distribution of the social product, is identical with that of other working organizations.

A scientific institute, regardless of who founded it, is directly managed by the members of its working community, which consists of the scientific workers and other workers who are employed in the organization.

In exercising self-management, the workers of a scientific institute, in conformity with the law and the statute, entrust certain functions of self-management to various bodies: Council, Scientific Board, Administrative Board, and to the director.

Every scientific institution adopts a statute which determines, in keeping with general legal regulations, which of the above-mentioned bodies of self-management are to be set up in the given scientific institute, their composition and competences and the method of their election or appointment.

The Council of the institution adopts the statute and other general acts; the plan and programme of activities; the financial plan and the annual balance

sheet; and basic decisions on the utilization of the socially-owned assets which are under the control of the institution. The Council also takes decision on the modifications or the extension of the activities of the institution; on the association and business co-operation of the institution with other working organizations; and on mergers of the institution or the granting of autonomy to its working units, as well as on other general matters concerning the organization and work of the institution. It also performs other functions, in accordance with the law or the statute of the institution.

The Administrative Board takes decisions on current matters in the running of the institution, prepares drafts of general acts, and plans and programmes of work and supervises the implementation of the acts and decisions adopted by the Council. It also supervises the legality of the measures taken, and performs other functions conferred on it by the law or by the statute.

The Scientific Board is set up in every scientific institution. It drafts the plans and programmes of research and takes part in their adoption; gives opinion on the appointment of scientific and technical workers; analyses the organization, methods and results of research; proposes the publication of scientific papers; and performs other functions determined by the law or the statute of the institution. The Scientific Board consists of a chairman and members, who are elected or appointed from among scientific and technical workers.

The director of the institution is in charge of its operations, implements the decisions of the Council and Administrative Board and of other bodies of management in the institution, and represents the institution. The director is independent in his work, within the scope of the rights which are conferred on him by the law and the statute of the institution; he is personally responsible for his actions to the Council, the Administrative Board and to the whole working community. The director is responsible for the observance of the laws and other regulations in the activities of the institution and for the fulfilment of the obligations prescribed by the law; in this respect, he is responsible before the state organs. The director has the right to participate in the proceedings of the Council but not to take decisions.

The right of scientific institutions to distribute independently the income they derive from the performance of their activities, in conformity to the general system of the distribution of the social product, constitutes the basis of their autonomous and self-managing status. The system of income which applies to scientific institutions, as well as to the majority of research units affiliated to economic organizations, makes it possible for scientific workers and their organizations :

- (a) to obtain compensation for their work commensurable to its results and to derive the revenue needed for their personal incomes, operational expenses and for the expansion of the material base of the institution; this is effected by determining the value of their work (projects, studies, research) in direct contact with the utilizers of those services, irrespective of whether the utilizer is another institution or organization or a social fund;
- (b) to decide on the future policy and orientation of their activity, by means of independent control over the acquired revenue. In this manner, the needs of the social community are brought into harmony with the requirements of creative scientific work.
- (c) to establish such relations among scientific and other workers in a research organization as will produce maximum incentive for the creative talents of every individual scientist to manifest themselves. This is effected through independent decision-making on the distribution of personal incomes among individual scientific workers, in proportion to the contribution of every scientist to the results obtained by a team or the whole scientific organization.

The diversity of organizational forms in scientific research, together with the consolidation of self-management in scientific research organizations, has produced a number of specific forms of association, which, in addition to the classical forms (academies of sciences, learned societies, etc.), complete the intricate system of the organization of scientific activities in Yugoslavia. Association mainly assumes two forms: territorial - at republic and federal level - and disciplinary or interdisciplinary, that is, according to branches of science, research activities or individual scientific disciplines. Thus, for example, in addition to the Council of Academies of Sciences and Arts and the Association of Yugoslav Universities, unions of research organizations have been founded in some republics, as well as associations of scientific institutions according to disciplines or branches of science or types of research activities.

III. DECISION-MAKING BODIES

Although the assemblies of socio-political communities, from the commune to the Federation, are the supreme bodies of authority and of self-government, nevertheless, with respect to the system of decision-making involving the status and development of scientific activities, distinction can be made between decisions that are within the competence of State authorities and decisions made by special social bodies immediately responsible for the advancement of scientific activities. However, both the general

and special procedure of preparing and taking decisions has been formulated so as to ensure the greatest possible influence of scientific workers and their organizations on social bodies as well as on State authorities.

Decisions on the basic relations and principles of the organization of scientific activities, owing to their importance for the unity of the social and economic system of the country, are made by the Federal Assembly.

The Federal Assembly, that is, the Federal Chamber and the Educational-Cultural Chamber, also considers matters of interest to scientific organizations, together with other related questions. These two Chambers have committees which consider questions of science policy. The other three Chambers (the Economic Chamber, the Chamber of Social Welfare and Public Health and the Organizational-Political Chamber) examine matters from their respective fields of activity which have a bearing on research. When necessary, they set up ad hoc bodies to examine various questions of interest to them. In addition to resolutions and laws which provide guide-lines or regulations for scientific activities, the Federal Assembly regulates, by means of the Social Development Plan, certain other matters, primarily of a financial character. For example, the Plan for 1966-1970 contains a separate part devoted to the place and role of scientific research in the socio-economic development of the country. Apart from assessing the situation and the level of development of scientific activities, that section of the Plan emphasizes the extraordinary importance of scientific activities, states the tasks to be performed by various factors in furthering scientific work, and defines the general and special conditions which are expected to facilitate the intensification of these activities in the forthcoming period. The Plan specifically defines the sources of financing for scientific activities and provides estimates for the participation percentages of these activities in the distribution of the social product or national income. Provision has also been made for certain facilities to be granted to research organizations and units. These facilities will be described in greater detail in Part five, Section IV, below.

IV. SOCIAL BODIES FOR THE CO-ORDINATION OF SCIENTIFIC ACTIVITIES

1. *Federal Council for the Co-ordination of Scientific Activities*

The Federal Council for the Co-ordination of Scientific Activities was set up in April 1965. Prior to this, similar functions were discharged by the Federal Council for Scientific Work, established in 1957.

The competences of the new Council are defined by

the special Law on the Federal Council for the Co-ordination of Scientific Activities and on the Federal Fund for the Financing of Scientific Activities. The Law States that:

the Council follows up and analyses the situation in the field of scientific activities; assists in harmonizing these activities; submits to the appropriate federal authorities proposals and opinions on matters of interest to that field; co-ordinates the work of federal bodies and organizations in matters of interest to scientific activities; encourages co-operation between scientific and other organizations; proposes measures for creating favourable conditions for the performance of scientific activities; co-ordinates relations and co-operation with other countries in the field of science; and discharges other functions within federal jurisdiction relating to scientific activities, provided they are not within the competence of another body or organization;

the Council adopts a general programme of scientific activities in keeping with the objectives and tasks determined in the Social Development Plan, it also determines the research programmes and projects which the Federation will support through financial allocations from the Fund, as well as the criteria and other general terms for the financing of these programmes and projects;

the Council provides facilities for statistics on the state and development of the organization of scientific activities, and encourages the compiling and processing of data of importance for the advancement of science;

the Council takes initiative and provides assistance, as a rule at the proposal of scientific organizations or groups of scientific workers, in furthering relations and co-operation with other countries in the field of science, in publishing scientific papers and works of general social and scientific interest, and in holding symposia and other scientific gatherings.

The Council can have up to 34 members; the president and the vice-president are appointed by the Federal Assembly, at the proposal of the Federal Executive Council; one half of the members are appointed by the Federal Assembly from among prominent scientists and other public workers, while the rest of the members are delegated by scientific and other organizations and bodies, as defined by the Federal Assembly.

In keeping with the above-cited provisions, the present Council is composed of the president and the vice-president, of the director of the Fund for the Financing of Scientific Activities, of 17 members appointed by the Federal Assembly, and of the representatives of the following bodies and organizations: Council of the Academies of Sciences of SFRY, Federal Secretariat for Education and Culture,

Council for Scientific Work of the Yugoslav Army, Federal Institute for International Technical Co-operation, Federation of the Associations of Engineers and Technicians of Yugoslavia, Federal Commission on Nuclear Energy, Association of Yugoslav Universities, Central Council of the Confederation of Yugoslav Trade Unions, Federal Institute for Economic Planning, Federal Chamber of the Economy, Yugoslav Community of Social Insurance, Council for the Co-ordination of Scientific Research of Serbia, Research Council of Croatia, Association of Research Organizations of Slovenia, Research Council of Bosnia and Herzegovina, Secretariat for Education, Science and Culture of Macedonia, Council for the Co-ordination of Scientific Activities of Montenegro.

The functions of the Council, its domain of competence and its organization are defined in its statute, which must be approved by the Federal Assembly. The Council deliberates and takes decision in plenary session; for certain affairs within its jurisdiction, it sets up standing or ad hoc working bodies, and it appoints their members, which can be taken from outside.

The standing working bodies of the Council are commissions and committees, and the ad hoc working bodies are commissions and working parties.

At its meetings, the Council: adopts its statute and amendments and additions to it, subject to approval by the Federal Assembly; considers, in general and on principle, matters of importance for the adoption and implementation of science policy; examines the situation and the organization of work in individual fields, branches and disciplines; adopts a general programme of activities, in accordance with the objectives and tasks determined by the Social Development Plan; determines specific research programmes, together with the criteria and other general terms of the financing of these programmes; takes decision on the setting up of its working bodies, defines their competences in detail, and appoints the chairman and members of these working bodies; considers the proposals submitted by the working bodies relating to the advancement of the organization of research in individual scientific fields, branches and disciplines, and expresses views on these proposals; gives opinion on the statute, financial plan and annual balance sheet of the Federal Fund for the Financing of Scientific Activities (hereinafter referred to as the Federal Fund); examines the annual report on the activities of the Federal Fund; formulates proposals for the appointment of the chairman and members of the Administrative Board and of the director of the Federal Fund; adopts by-laws on the method of allocating the resources of the Federal Fund assigned to the special activities financed by the Council; gives opinion on the conformity of the

decisions taken by the Administrative Board of the Federal Fund with legal regulations, with the general development programme of the Council and with the financial plan of the Federal Fund; decides on the annulment of a public competition organized by the Administrative Board of the Federal Fund, if it considers that the competition is in contradiction to the general programme of the Council and to other regulations; informs on these matters the Federal Executive Council, which takes the final decision; examines the objections to the decisions of the Administrative Board of the Federal Fund concerning public competitions.

The Council considers at its meetings other matters within its jurisdiction, takes up positions and adopts recommendations or decisions.

The commissions of the Council are its main standing working bodies; they are formed for one or more disciplines or branches. They are composed of scientific workers and experts in the field of the economy and the general public services, who carry out this duty on an honorary basis.

Within a given branch (or discipline), a commission drafts the general programme of scientific activities and the programme of specific research projects financed from the Federal Fund and relating to the given branch; proposes to the Council measures and decisions concerning the advancement and development of these activities; gives advice; opinion and proposals on the implementation of these decisions; informs the Council on the development of scientific activities in its branch; follows up and analyses the situation, trends and needs for the training and specialization of scientific workers and research technicians, submits proposals to the Council on measures to be taken; follows up and analyses questions concerning the status of scientific organizations and of scientific workers and research technicians in its branch; gives to the Commission on International Scientific Co-operation proposals and opinions on ways of furthering these relations, assists in the preparation of the draft programme for the advancement of international relations and co-operation in the field of science, relating to its branch; and submits to the Council reports on its work, and performs other tasks entrusted to it by the Council.

The Council has 28 commissions of experts:

Natural Sciences

1. Commission on Astro-Geo Sciences
2. Commission on Biological Sciences
3. Commission on Physics
4. Commission on Chemistry
5. Commission on Mathematics and Mechanics
6. Commission on Cosmic Research

Agricultural Sciences and Forestry

7. Commission on Plant Production
8. Commission on Livestock Production and Veterinary Medicine
9. Commission on Forestry and Timber Technology

Medical and Pharmaceutical Sciences

10. Commission on Medical Sciences and Dentistry
11. Commission on Pharmaceutical Sciences

Engineering Sciences

12. Commission on Electro-Engineering
13. Commission on Electronics and Automation
14. Commission on Geological Sciences
15. Commission on Construction
16. Commission on Chemical Technologies
17. Commission on Machine Building
18. Commission on Mining and Metallurgy
19. Commission on Transport
20. Commission on the Technology of Foodstuffs
21. Commission on the Water Economy

Social Sciences and Humanities

22. Commission on Economic Sciences
23. Commission on Humanities
24. Commission on Historical Sciences
25. Commission on Pedagogical and Psychological Sciences
26. Commission on Sociological, Legal and Political Sciences

Special Commissions

27. Commission on Scientific Documentation and Information, and
28. Commission on International Scientific Co-operation.

The Commission on International Scientific Co-operation performs the following functions: it analyses the situation in the sphere of scientific co-operation with other countries and proposes to the Council measures for its development and advancement; promotes co-ordination between bodies, institutions and organizations concerned with relations and scientific co-operation with other countries; drafts the long-term and annual programmes of scientific co-operation with other countries, to be adopted by the Council, and supervises the implementation of these programmes; follows up on the implementation of international agreements on co-operation and proposes appropriate measures; and performs other tasks entrusted to it by the Council.

The setting up of such a considerable number of commissions was prompted by the wish to cover all fields of scientific research, especially those disciplines and branches whose development needed greater assistance, and to gather within them as many scientific and other workers as possible (about 250 at present), in order to make the adopted solutions and decisions as appropriate and competent as possible.

The Council has also a number of technical services which perform the necessary analytical, technical, administrative, financial and related work for the needs of the Council and its working bodies, and which supervise the implementation of the decisions of the Council and of its working bodies.

The technical services are composed of five organizational units :

- Sector for programming and development
- Analytical and information centre
- Sector for international scientific co-operation
- Sector for questions of status and organization, and Accounting and administration.

The technical services prepare, or organize the preparation of studies of the items contained in the annual plan of the work of the Council and of its working bodies, as well as of the proposals of the acts adopted by the Council or of the acts relating to scientific activities and adopted by the Federal Executive Council or the Federal Assembly.

The technical services also perform other tasks connected with the work of the Council and its working bodies, entrusted to them by the Council or its president.

2. Republic bodies for scientific affairs

Whereas, at federal level, the Federal Council for the Co-ordination of Scientific Activities assumes a definite form, that is a social body with administrative powers, at republic level the organization of state and public bodies responsible for the development of scientific activities has been dealt with in different ways, according to circumstances.

There are two types of organization in the constituent republics :

Some republics, like the Federation, have councils for the co-ordination of scientific activities in the capacity of social bodies with administrative powers or of organs of public administration ; Other republics, which have not formed a separate council for scientific work, retained decision-making in the field of scientific activity within the organizational system of political and administrative authorities, while transferring some of their competences to the associations of scientific organizations and units.

Thus, for example, while in the Socialist Republic of Serbia the Republic Council for the Co-ordination of Scientific Research is a public administration body, there is no council of that type in the Socialist Republic of Slovenia and the organization of scientific activities there comes within the competence of the Republic Secretariat for Education and Culture ; at the same time, decisions are taken jointly, in a number of cases, with the Association of Research Organizations of Solvenia.

V. SOCIAL FUNDS FOR THE FINANCING OF SCIENTIFIC ACTIVITIES

A special place in the system of organization of scientific activities is occupied by the funds for the financing of scientific activities. Such funds exist at the level of the Federation (Federal Fund), of republics (republic funds) and of autonomous provinces (Vojvodina, Kosovo and Metohija).

The main purpose for which these funds has been created is to ensure proper financial support from socio-political communities of those research projects which they consider to be important and which are not likely to receive support from other sources. At the same time, another result was achieved, namely, the separation of these funds from the budgets (for the time being, the resources are allocated from budgets), thus creating a separate regime of their utilization.

In keeping with this idea, the Law on the Federal Council for the Co-ordination of Scientific Activities and on the Federal Fund for the Financing of Scientific Activities states that the Federal Fund is a fund of the Federation established for the purpose of financing certain scientific activities of general social and scientific interest, as defined in the programme of the Federal Council.

The Federal Fund is independent in its work, and observes the above-mentioned Law and other federal regulations as well as the acts of the Federal Council. It is run by a Board of Management and by the director. The Board of Management is appointed by the Federal Assembly, at the proposal of the Federal Council. Most of its members are scientists. The director of the Fund is appointed by the Federal Executive Council, also at the proposal of the Federal Council. The Fund adopts its statute, which is approved by the Federal Assembly. The same procedure is applied in approving the financial plan, the annual financial account and the annual work report. Every year, the Federation allocates resources to the Federal Fund, at present through the medium of the Federal Budget ; the amount of these resources is determined by the Federal Assembly, on the basis of the programme of the Federal Council.

The republic funds are conceived and function in a manner similar to the Federal Fund, except for their being organized according to the legislation of the republics ; they have statutes and the same administrative bodies, and the relationship between them and the republic councils for the co-ordination of scientific activities is in principle the same as at federal level.

The situation is somewhat different in Slovenia and Croatia. In the former Republic, the Fund for the financing of scientific activities (Foundation "Boris Kidric") has a considerably more autonomous

status, namely the programme of scientific research is not drawn up by a separate council, which does not exist in that Republic, but by the Fund; however the Board of Management of the Fund is composed in such a way as to ensure that the interests both of research organizations and of the community as a whole are represented. In the latter Republic, the Council for Scientific Work acts at the same time as Board of Management for the Republic Fund for Scientific Work.

VI. BODIES DEALING WITH PLANNING AND CO-ORDINATION

There is no separate central body for the planning of research programmes in Yugoslavia. The factors which participate in the planning of scientific activities and research are scientific organizations, other working organizations and bodies, and the Federal and Republic councils for the co-ordination of scientific activities.

Each of these organizations or bodies adopts its own development and research programme. The Social Development Plan and the accompanying economic instruments of the Federation ensure co-ordination in the programme orientation of all of these factors in scientific research. Their plans constitute therefore a more or less harmonized, interdependent and co-ordinated reflection of the needs and possibilities of each of them.

The methods of co-ordination of research are diversified, and co-ordination is achieved partly by means of an appropriate composition of bodies or organizations having research programmes of their own and partly through the public character of the preparation and adoption of these programmes, as well as by the regular publication of information on the way in which these bodies and organizations are carrying out their research programmes (public competitions, methods of allocation, reports on progress in the implementation of the programmes; evaluation of the results obtained, etc.).

FINANCING OF SCIENTIFIC AND
TECHNICAL RESEARCH

I. THE SYSTEM OF FINANCING SCIENTIFIC
RESEARCH ORGANIZATIONS

Under the new Yugoslav Constitution, adopted in 1963, all working organizations have the same socio-economic status. Consequently, research organizations, as any other working organization, derive their financial resources on the basis of the results of their work and the internal distribution of income is effected according to the personal performance of each individual member of the staff.

A research organization derives its revenue from the remuneration it receives for its work. This revenue constitutes its total income, which covers operational costs and depreciation rates on the value of capital assets and out of which taxes and other obligations towards the community provided for by law are paid. The remaining portion of the total revenue is the research organization's income proper. It distributes this income independently, according to the standards and criteria defined in its by-laws and in conformity with the general legal regulations.

The portion of the income to be used for the personal remuneration of the staff is determined by the research organization according to the size of its revenue and to the needs for further investment. The proportions in the distribution of personal incomes among the individual members of the staff are determined by separate regulations, in which rules and criteria are set for this purpose. These regulations also are adopted completely independently by the appropriate management body of the research organization.

A part of the income is put into the funds of the research organization, the amount depending on the needs for further development. Every scientific research organization has a business fund, a joint projects fund and a reserve fund. The business fund is used for the purchase or expansion of capital and current assets, and the joint projects fund is used to finance projects which will improve the standard of living of the entire staff (housing,

cultural and health centres, training programmes, etc.). The reserve fund is established for the purpose of covering possible business losses and for the payment of personal incomes when the total income earned during the current year has not been sufficient. In addition to these funds, a research organization is entitled to set up other funds as well, for example, a special fund for scientific research. The management bodies of a research organization are completely independent in distributing the resources available among the various funds.

This general pattern of the formation and distribution of income applies in principle to all research organizations. Distinction should be made, however, between autonomous research institutions and research units which are part of other working organizations (university, science academy, production enterprise, etc.). Whereas the former earn and distribute their income independently, the latter may be more or less restricted in that respect, depending on the regulations of their parent organization. Nevertheless, there are a number of basic principles which apply to all research organizations, whether autonomous or affiliated.

Firstly, the remuneration they receive for their work must be economic. This is the only way by which they can be made to earn and distribute their income according to the results of their work. The principle of subjecting the remuneration to economic criteria clearly indicates that a research organization does not derive its revenue through the automatic mechanism of allocations.

The logical outcome of this principle is the second principle, according to which the remuneration for the work performed by a research organization should be provided by those who benefit by that work. In other words, all those who are interested in the specific activity of a research organization, from various working organizations to socio-political communities participate in its financing.

The third principle, also linked with the foregoing two, is the system of contracts between research

institutions and those who utilize their services. By mutual agreement, the contract stipulates the amount of remuneration, the nature, volume and quality of the work to be performed, and all other rights and obligations of both parties. In the case of research units attached to other working organizations, this relationship is often regulated by the internal acts of the organization (statute and by-laws) instead of by a contract.

II. SOURCES AND METHODS OF FINANCING

The chief source of finance for scientific and technical research is the funds provided by working organizations, which control today close to 70 per cent of the national income. Due to their economic strength and their need to utilize the results of research, economic enterprises occupy the main place among them. A large number of working organizations related to public services (education, culture, health, etc.) also feel the need to improve their work by applying scientific methods and utilizing the results of research. They have appropriate funds at their disposal for this purpose. Working organizations finance scientific and technical research and utilize the services of various research organizations to further their own interests and needs.

Another important source of finance is the funds for the financing of scientific research established by socio-political communities. Today, such funds exist at federal, republic and province level. They are financed from the budgets of the relevant socio-political communities, their size depending on the financial possibilities of the individual community. To ensure that the resources of the Federal Fund are stable and grow constantly, provision has been made for them to be increased in proportion to the increase of the social product.

The main purpose of these funds is to finance those research projects which will benefit society as a whole and which are specified as such in the programme of scientific development of the relevant socio-political community. In view of the increasing possibilities for economic and other working organizations to finance research independently, these funds are primarily allocated to those research projects in which working organizations cannot be expected to be greatly interested. This applies, above all, to fundamental research, to research in social sciences and humanities, and to large-scale projects in the field of applied research. In certain cases, especially in the case of fundamental research and research in the social sciences and humanities, the resources of these funds are used for the purchase of equipment and for the construction of new facilities for scientific organizations. Furthermore, these funds contribute to the financing of training programmes for research workers, various scientific gatherings, and the printing of scientific publications.

Although the Federal Fund and republic funds frequently finance certain research projects jointly there exist differences in the purposes for which they have been established. The Federal Fund is playing a steadily smaller role in financing research on specific subjects and short-term projects in general, concentrating its attention more and more on large-scale and long-term undertakings. The funds of the republics and provinces mainly provide financial assistance when the resources of working organizations are insufficient to carry out a research project.

These funds are allocated, as a rule, by means of public competitions, which are organized for various groups of research projects. However, allocations for specific purposes can also be made out of these funds without competitions.

In addition to determining the procedure for obtaining the funds, the terms of the competition also state the conditions which the utilizers have to fulfil. These conditions can vary, and primarily depend on the nature of the research project. The money is allocated without repayment, particularly when no immediate results can be expected, e.g. in the case of fundamental research and in the field of social sciences and humanities. In applied research, it is becoming a practice to provide funds in the form of loans, under more favourable terms however, than are generally offered (lower interest rate, longer term of repayment, etc.).

One important condition for allocating money from these funds is the obligatory participation of the interested working organizations in financing specific research projects. The requirements as to the degree of participation vary depending on the nature of the project and the policy adopted in relation to a particular branch of science. This system of participation provides incentive for working organizations and channels their available funds towards the projects covered by scientific and technical research development programmes.

The third source of finance is the budgets of individual socio-political communities. There is no difference between the origin of these funds and the origin of the funds for the financing of research, since in both cases they come from the budgets. The difference lies, however, in the method of financing. The budgets provide resources, directly and in the form of grants without repayment, for individual projects, and their purpose is strictly defined, whereas, when allocating money to the fund for scientific research, the provisions of the budget only generally state that it is to be used for research, and it is left to the management bodies of the fund to formulate their own policy with respect to the distribution of that money, in keeping with the adopted programmes.

All the larger socio-political communities make provision in their budgets for funds for research. So far, the budget of the Federation has financed the

work of the institutes of nuclear sciences and some institutes in the field of social sciences and humanities which were originally founded by the organs of the Federation. The republic budgets also provide resources for projects in the field of fundamental sciences, and of social sciences and humanities. In addition, they grant funds for research projects carried out in institutes attached to the academies of sciences. The budgets of provinces and of large towns also make provision for the financing of research projects.

The republic funds for schools, from which universities and other institutions of higher education are financed, may be also taken as a separate source of finance for research, as they provide means not only for the regular instruction but also partially for some research work to be carried out in these institutions. However, due to the fact that this system is only currently being introduced and that funds for these purposes were formerly granted directly from the republic budgets, school funds cannot be yet considered as an independent source of finance for research.

In accordance with the adopted policy of reducing the scope of competences of the State, there is a tendency to diminish budgetary resources used for directly financing scientific and technical research. This method of financing contains indeed a number of shortcomings, particularly because the criteria applied in determining the amount of money needed for a project are unreliable, and also because budgetary revenues are subject to fluctuations and, therefore, also the sums allocated to scientific research.

III. EXPENDITURES ON SCIENTIFIC AND TECHNICAL RESEARCH

1. *Preliminary note*

Before quoting any figures on the volume of funds available for scientific and technical research and supplying information on them, some preliminary remarks should be made.

The socialist character of production has abolished the differences between the public and the private sector in Yugoslavia. Further, numerous functions that were formerly discharged by State organs have been transferred to various bodies of self-management and have thus assumed the characteristics of social functions. For these reasons, it is not possible to classify the data on the funds for scientific and technical research according to the headings contained in the instructions and publications of Unesco (public sector, industrial sector, etc.). It was, therefore, necessary to present the required data in a different manner, adapted to the specific circumstances.

Yugoslav statistics do not include data on the resources invested in research in the institutions

of the Yugoslav Army and in the enterprises which work for defence purposes. Consequently, this survey does not cover defence expenditure on scientific research.

The present system of financing, in which economic and other working organizations appear as the main factors in all the economic activities of the country, has been in force since 1965/66 only. Although previously the economy also provided financial resources for scientific research, it did not constitute the main source of financing. The funds invested in research by economic organizations were not cited under separate headings. Hence, no statistics were compiled on the volume and pattern of the funds spent by economic and other working organizations on scientific research. These data began to be recorded more systematically only in 1965, and even then in an insufficiently detailed manner, e.g. without breakdown according to branches of activity (industry, agriculture, construction, etc.). Consequently, it is possible to quote the data on the financial resources provided by economic and other working organizations for 1965 only; the data are not broken down into branches of activity but into branches of science, in accordance with the methodology of Yugoslav statistics (natural sciences and mathematics, engineering sciences, medical sciences, agriculture and forestry, social sciences and the humanities). On the other hand, the data on the financing of research from special public funds and directly from the budgets of socio-political communities are quoted according to years, branches of science and purposes, following the methodological pattern of Yugoslav statistics.

The method applied in compiling these statistical data omits that portion of the income of research organizations which is derived from their secondary activities (almost 30 per cent of their total income). Consequently, the figures quoted present a realistic survey of the situation, regardless of the fact that the question of distinguishing between routine and strictly scientific work in the organizations still remains to be settled.

The figures in dinars have been converted into U.S. dollars on the basis of real parities which take into account changes in the price structure according to years, as well as other elements. The method used for determining the parities, and the specific rates, are given in Annex I. The growth indices pertain to values as expressed in U.S. dollars. The domestic currency is always quoted in terms of new dinars (1 new dinar = 100 old dinars).

In spite of the fact that many methodological questions in compiling data of this kind have not yet been solved and that the data are incomplete, especially as regards trends according to years, they nevertheless present a picture of the efforts made by Yugoslavia to provide the best possible

material base for the development of scientific research. This is particularly apparent from the statistics on the ratio between research expenditures and the national income, as well as from other general indicators.

2. Resources from economic and other working organizations

During an earlier period, when the material base of economic organizations was extremely modest, they were neither interested in nor capable of financing scientific research to any substantial extent. Their main interest was to find solutions to more or less current problems. Larger and more broadly conceived research projects, which required long-term investments, were mainly financed from the budgets and special research funds of socio-political communities, primarily those of the Federation and the constituent republics.

In the course of the economic reform changes were brought in 1965 to the system of the distribution of income, the price regime and the credit system, which have placed all working organizations in a qualitatively new position with respect to control over resources for investment and expansion. A process of more effective economic selection has at the same time been launched. The application of up-to-date techniques, modern technology and scientific methods of work has become the basic prerequisite for the survival of economic organizations, in their capacity of commodity producers, since this is the only way by which productivity can be increased and a participation as equals in the international division of labour can be ensured.

These new conditions have had the effect of inducing economic and other organizations to set aside considerably more funds for financing research. They are setting up numerous research institutions of their own or establishing closer ties with the already existing autonomous scientific organizations. There is also more contact now between economic organizations and research units in universities. As a consequence, economic and other organizations allocated, already in 1965, more funds to scientific and technical research than in previous years, although this was still insufficient from the point of view of both their possibilities and needs. (Table I)

The data have been drawn from the list of scientific organizations compiled by the Yugoslav Institute of Statistics. The list covers over 90 per cent of scientific organizations. The revenue derived by these organizations from secondary activities has not been included. The list does not comprise, however, a considerable number of research units attached to other working organizations who could not furnish data on their outlays because they were not recorded in their book-keeping separately from their main activity.

Table I

Expenditure of economic and other working organizations on scientific and technical research in 1965, according to branches of scientific activity

Branch	in 000 din.	in 000 dol.	%
Natural sciences	104,097	16,316	27.7
Engineering sciences	226,783	35,546	60.3
Medical sciences	3,606	565	1.0
Agricultural sciences	23,202	3,637	6.2
Social sciences and humanities	18,088	2,835	4.8
Total	375,776	58,899	100

Total in per cent of total national expenditure on scientific and technical research : 56.5%

The data cover the expenditure of both economic and other working organizations. However, since the outlays of economic organizations alone constitute over 90 per cent of the total, it can be considered that the changes that are occurring in the structure of the investments in scientific research should be chiefly attributed to the changes in the economic policy of these organizations. The relatively high percentage of expenditures on technological research is also due to this fact.

The figures on the expenditure on natural sciences and mathematics are partly the result of the method of classifying research organizations according to their main activity. Owing to the fact that the research organizations which have been classified under the heading "Natural Sciences and Mathematics" also conduct technical research, the relatively high rate of expenditure on natural sciences and mathematics cannot be considered to be fully accurate. Nonetheless, such a high percentage of investments in research in natural sciences and mathematics indicates that economic organizations are beginning to turn to the problems of fundamental research, which was formerly almost exclusively financed from the federal and republic funds for scientific research.

Economic organizations, for the most part, utilize the services of autonomous scientific institutes, some of which were established by these organizations. Autonomous scientific institutes received 89.8 per cent of the total expenditures of economic

organizations for research. Another 8.7 per cent was allocated to scientific research units attached to universities, and this represents a relatively high figure, considering that there used to be very little connexion between the economy and the universities.

As indicated by the foregoing data, economic and other working organizations provided substantial portion (56.5%) of the financial resources allocated to scientific research in 1965. Considering that their participation in the 1961-1964 period can be estimated at approximately 30-40 per cent, it can be concluded that, in the economy and in other spheres, there is a growing awareness that without continuous and increasing investment in scientific research there can be no intensive production, increased labour productivity and equitable participation in the international division of labour. This awareness arose from the growing needs of economic organizations for the results obtained by scientific and technical research, as well as from their greater material prosperity.

3. Resources from funds for the financing of scientific research

Unlike the previously mentioned sources of finance, these funds have been in existence for a considerable time, so that more comprehensive data can be presented, particularly with respect to time series.

Table II

Total expenditure of funds for the financing of scientific research

	in 000 din.	in 000 dol.	Index	In per cent of total national expenditure on scientific and technical research
1961	40,310	10,231	100.0	-
1962	64,810	15,542	151.9	-
1963	84,951	19,176	187.4	-
1964	118,063	22,836	223.2	-
1965	124,596	19,529	190.9	18.7

The above figures have been obtained from the federal, republic and province funds. Their methodological verification has not yet been carried out, and they cannot be considered definite. Furthermore they do not refer to the resources allocated to these funds but to their actual annual expenditure. If we compare the annual allocations to these funds with the volume of the national income in the same

years it becomes evident that the funds have increased at a slower rate than the national income and that, consequently, their relative share in the national income has been diminishing. Thus, for example, their share in 1961 amounted to 0.20 per cent, whereas in 1965 it was only 0.16 per cent. This, together with the fact that the percentage of these funds in the total expenditures for scientific research has been constantly diminishing, indicates at the same time that a gradual change is taking place in the composition of the agents in the financing of scientific research in general. With the improvement of the material position of economic and other working organizations, their relative share in the financing of research is becoming greater and, consequently, the relative share of the funds is decreasing, in spite of the fact that their resources are becoming larger in absolute value.

There have also been changes in the purposes for which financial allocations were being made from these funds, as shown in table III.

The recent policy of increasing expenditure on investments at a faster rate than current expenditure on research is the result of the need to establish new research organizations and to provide the existing ones with more up-to-date equipment, especially in some fields which were inadequately developed. For that reason, there are substantial differences in the pattern of purposes for which the resources were granted each year in the statistical series. The high rate of increase of expenditures under the heading "Other" is due to the research organizations having intensified their activities in organizing scientific gatherings, publishing scientific works and giving grants to younger members of their staffs for further training.

Significant changes have also occurred in recent years in the pattern of the financial allocations in individual branches of science (table IV).

The changes in the structure of the expenditure from these funds were brought about by the improvement of the financial position of economic organizations, as well as by changes in the policy of the funds. This was particularly apparent in 1965 in relation to the preceding years. With the strengthening of the financial position of economic organizations, the volume of financial resources granted to them for research by the funds has been gradually reduced, e.g. in engineering and in agriculture and forestry. On the other hand, the participation of the funds in financing research in natural sciences and mathematics, as well as in social sciences and humanities, has increased. The relatively small allocations to natural sciences and mathematics from the resources provided by the funds in previous years was due to the fact that substantial sums were granted to these branches by the Federal Commission on Nuclear Energy and through the budgetary allocations to universities.

Table III

*Expenditure of funds for the financing of
scientific research according to basic purposes*

	1961	1962	1963	1964	1965
1. Research:					
in 000 din.	33,195	50,918	52,828	82,336	93,068
in 000 dol.	8,425	12,211	11,925	15,926	14,587
index	100.0	144.9	141.5	189.0	173.1
2. Investment:					
in 000 din.	6,682	13,329	26,091	32,572	27,512
in 000 dol.	1,696	3,196	5,890	6,300	4,312
index	100.0	188.4	347.3	371.5	254.2
3. Other:					
in 000 din.	433	563	6,032	3,155	4,016
in 000 dol.	110	135	1,362	610	629
index	100.0	122.7	123.8	554.5	571.8
4. Breakdown:					
research	82.3	78.6	62.2	69.7	74.7
investments	16.6	20.5	30.7	27.6	22.1
other	1.1	0.9	7.1	2.7	3.2
Total	100.0	100.0	100.0	100.0	100.0

Table IV

*Total expenditure of funds for the financing of scientific
research according to branches of scientific activity*

Branch	1961	1962	1963	1964	1965
1. Natural sciences	6.2	4.1	6.6	9.2	22.7
2. Engineering sciences	38.3	45.2	38.3	40.5	25.4
3. Medical sciences	4.5	6.4	4.4	6.5	5.0
4. Agricultural sciences	36.4	32.5	33.3	28.9	26.8
5. Social sciences and humanities	13.4	10.9	10.3	12.2	16.9
6. Other	1.2	0.9	7.1	2.7	3.2
Total	100.0	100.0	100.0	100.0	100.0

In the 1961-1965 period between 16.5 and 22 per cent of the allocations made by these funds were in the form of loans. These loans were granted under more favourable terms than usual. The period of repayment was between 5 and 20 years and the interest rate up to 3 per cent, depending on the purpose of the loan.

4. *Budgetary expenditure on scientific research*

The figures quoted below cover only those funds that were allocated from the federal, republic and province budgets; the funds allocated to research from the budgets of towns, which are estimated to be relatively modest, are not included. As explained in the preceding sections, these resources were allocated from budgets to various scientific institutes for specific purposes or as lump sums to universities and science academies, which used them to finance their regular activities, setting aside part of them for research (table V).

The above-quoted figures on budgetary expenditure on scientific research at universities and other institutions of higher education are based on estimates of the portion of the total funds allocated to these institutions which serves to finance research work. This calculation does not however include the salaries of university teaching staff who are engaged part time in research activities at universities. The figures, further, do not cover the funds for capital investment, which were provided by the republic budgets for the construction of faculties and other educational establishments. Only a small portion of the expenditure on the equipment of research units at universities is included in the given figures. It is estimated, therefore, that the funds allocated for research at universities and other institutions for higher education are considerably larger than the ones shown above.

It can be seen that the percentage of expenditure on scientific research in the total budgetary expenditure of socio-political communities remains almost the same throughout the time series. The expenditure on specific research projects is also uniform and results from the constant flow of funds allocated to nuclear research and to specific institutes. The relatively small expenditure on research at universities and academies of sciences, in spite of substantial growth from year to year, could not affect to any appreciable extent the ratio between the total budgetary expenditure and budgetary resources allocated to scientific research. However, the percentage of expenditure on research at universities and other establishments for higher education allocated from the budgets of these institutions shows an upward trend; in 1965 it amounted to 4.5 per cent as compared with 3.5 per cent in 1961.

In assessing budgetary expenditure on scientific research, the breakdown according to purposes is also an important indicator (table VI).

The most striking feature of the structure of budgetary expenditure on scientific research according to purposes is the preponderant share of allocations to nuclear research. The annual percentages are almost identical, with the difference that during the first years more funds were used for investment in nuclear institutes, while during the last year in the series investments were decreased in favour of current research. The expenditure under the heading "Other" is also more or less evenly distributed and refers to the financing of international scientific gatherings and specialization courses of scientific workers abroad.

5. *Total expenditure of the country*

Accurate statistics on the expenditure of economic and other working organizations could not be made available for the 1961-1964 period. Hence figures on the total national expenditure on scientific and technical research are given for 1965 only (table VII).

Although complete data on the expenditure of economic and other working organizations for the earlier years in the series are not available, it may be claimed, on the basis of a general estimate, that the funds allocated by these organizations constituted a gradually increasing portion of the total expenditure on scientific and technical research. This, in turn, resulted in the decrease of the relative share of the funds provided by socio-political communities, especially from their budgets.

The foregoing data and the accompanying methodological explanations indicate that the country's total expenditure on scientific and technical research in 1965 represents a lower limit, since incomplete coverage made it impossible to include all research expenditures (the portion of the expenditure of economic organizations on scientific and technical research which was not recorded separately in the book-keeping systems of these organizations, the salaries of the university staff who are engaged in research in their faculties, the portion of the investment capital for the construction and equipment of establishments for higher education, etc.). However, in spite of the fact that the true total expenditure is higher than the figure quoted above, it is still relatively lower than in other countries with approximately the same level of development as Yugoslavia. This is best exemplified by the relatively low share of the total expenditure in the national income, i.e. 0.90 per cent, regardless of the fact that the different methodology employed in computing the national income and the structure of expenditure make a precise comparison difficult

Table V

*Total budgetary expenditure on
scientific research*

	1961	1962	1963	1964	1965
1. Specific research projects:					
in 000 din.	116,070	105,059	111,751	105,230	134,693
in 000 dol.	29,459	25,194	25,226	20,354	21,112
index	100.0	85.5	85.6	69.1	71.7
2. Scientific research at universities and science academies:					
in 000 din.	11,921	17,902	20,393	24,153	29,534
in 000 dol.	3,025	4,293	4,603	4,672	4,629
index	100.0	141.8	152.1	154.4	153.0
3. Total (1 + 2):					
in 000 din.	127,991	122,961	132,144	129,383	164,227
in 000 dol.	32,484	29,487	29,829	25,026	25,741
index	100.0	90.8	91.8	77.0	79.2
in per cent of total budgetary expenditure	2.9	2.4	2.7	2.2	2.3
in per cent of total national expenditure on scientific and technical research	-	-	-	-	24.8

Table VI

*Budgetary expenditure on scientific research
according to basic purposes*

	1961	1962	1963	1964	1965
1. Research:					
in 000 din.	97,786	92,735	104,191	101,315	151,652
in 000 dol.	24,819	22,239	23,519	19,596	23,770
index	100.0	89.6	94.8	79.0	95.8
2. Investment:					
in 000 din.	28,734	28,627	25,673	26,016	10,151
in 000 dol.	7,293	6,865	5,795	5,032	1,591
index	100.0	94.1	79.4	69.0	21.8
3. Other:					
in 000 din.	1,471	1,599	2,280	2,052	2,424
in 000 dol.	373	383	515	397	380
index	100.0	102.6	137.9	106.3	101.8
4. Breakdown:					
research	76.4	75.4	78.9	78.3	92.3
investment	22.5	23.3	19.4	20.1	6.2
other	1.1	1.3	1.7	1.6	1.5
Total	100.0	100.0	100.0	100.0	100.0

between their proportions in our country and in other countries.

Table VII

Total national expenditure on scientific and technical research in 1965 according to origin of funds

Origin of funds	in 000 din.	in 000 dol.	%
1. Economic and other working organizations	375,776	58,899	56.6
2. Funds for the financing of scientific research	124,596	19,529	18.7
3. Budgets of socio-political communities	164,227	25,741	24.7
Total	664,599	104,169	100.0

Per capita expenditure on scientific and technical research:
34.10 din. 5.35 dol.

Total expenditure in per cent of national income: 0.9%

IV. FORECASTS OF FUTURE EXPENDITURES

In view of the general socio-economic policy of Yugoslavia, it is anticipated that, in the coming years, the rate of growth of the total expenditure on scientific and technical research will be higher than the rate of growth of the national income. The programme of scientific activities for the 1966-1970 period foresees that the approximate volume of expenditure in research will be as follows:

Table VIII

Forecast total of national expenditure on scientific and technical research until 1970

Year	in 000 din.	in 000 dol.	index	% of national increase
1965	600,000	94,040	100	0.80
1966	693,000	108,620	115	0.85
1967	783,000	122,730	130	0.89
1968	890,000	139,500	149	0.94
1969	1,015,000	159,090	169	0.99
1970	1,160,000	181,820	193	1.05

The values in dollars have been computed on the basis of the 1965 parity. If the above-quoted data

on the expenditures on scientific and technical research in 1965 are compared with the figures for the same year given in the preceding section, a substantial discrepancy may be noted. This is explained by the fact that, at the time when the programme of scientific activities was adopted, the figures for 1965 represented estimates, both with respect to total expenditures in scientific and technical research and to the national income. The data in the preceding section refer to the resources actually spent in that year.

As indicated by the foregoing figures, it is anticipated that the expenditures for scientific and technical research will have almost doubled by 1970 - representing an average annual increase of 14 per cent. This increase will be higher than the average rate of growth of the national income foreseen by the five-year plan (8 per cent).

It is also anticipated that the resources for scientific and technical research allocated by economic and other working organizations will increase considerably more rapidly than the resources accumulated in the funds of socio-political communities.

Table IX

Forecast of total national expenditure on scientific and technical research according to the origin of funds until 1970

Year	Indices		% Participation	
	economic and other working organizations	social funds	economic and other working organizations	social funds
1965	100	100	58.4	41.6
1966	118	110	59.6	40.4
1967	139	117	62.2	37.8
1968	164	124	64.6	35.4
1969	194	131	66.8	33.2
1970	229	138	69.0	31.0

1 Social funds : Federal and republic funds for the financing of scientific activities + funds coming from the budgets of socio-political communities.

The extremely important tasks assigned to industrial research and to other types of applied research in the coming period require that the share of the resources provided by economic organizations in relation to the total expenditures on research be continuously and rapidly increased. The economic reform has established the basic prerequisites for such trends by considerably extending the scope of competence of economic organizations in controlling the financing of expanded reproduction. It is believed that the economy, as the main agent in that process,

should logically become the main factor in financing the research programmes which serve the needs of expanded reproduction. At the same time, measures are being taken to ensure a continuous in growth

absolute terms and the stability of the social funds for the financing of research, together with other incentives, which are described in greater detail in Part Five, below.

SCIENTIFIC WORKERS AND
RESEARCH TECHNICIANS

I. HIGHER EDUCATION

1. *Establishments for higher education in the general educational system*

Higher education in Yugoslavia is integrated into a comprehensive school and educational system.

The Yugoslav school system is uniform throughout the country. It begins with compulsory eight-year education (primary school), continues in various types of secondary schools (technical and general education), and is completed in institutions of higher education - higher schools, advanced schools, academies of arts and faculties. The school system and the organized system of adult education constitute an integral whole - the educational system. Each level of education is part of a unified system but represents, at the same time, a separate and complete entity, with its own specific social role and educational functions. All three levels of education are integrated and complementary, enabling all those who successfully complete their schooling at one level to continue their education in an establishment at a higher level.

Instruction at all levels is free in principle. All schools are public. All citizens, regardless of nationality, sex, social background and religion, have the right to obtain education and training under the same conditions.

Data pertaining to secondary schools are shown in Table 1, Annex III. For purposes of comparison, data for the 1938/39 school-year are also quoted.

The most striking feature of these statistics is the gradual decrease in the number of students graduating from the secondary schools for general education (gymnasias) and a constant increase in the number of students in secondary technical and vocational schools. This trend is the result of the growing interest among young people in obtaining technical education and of the demands of the economy. However, although the number of technical and vocational schools has been growing in the

post-war period at a higher rate than any other type of schools, they are still unable to admit all the young people who wish to enrol.

2. *Organization and development of higher education establishments*

Higher and advanced schools, faculties and academies of art train their students for various expert jobs or professions which require advanced or specialized education at third level. Faculties, and advanced schools associated with universities, constitute, according to the law, the highest level of scientific educational establishments. Their function is accordingly twofold: train experts for all social activities and be centres for scientific research and for the training of scientific workers.

In addition to universities or faculties, there are advanced schools with faculty rank, set up to offer courses in narrower, more specialized, fields. Universities comprise all the faculties and most of the advanced schools.

The academies of art provide higher education in the field of the arts.

There are today 126 higher education establishments: 96 faculties, 16 advanced schools and 14 academies of art.

The higher education system covers also the so-called higher schools, which provide training at a level that is between secondary school and university. The network of higher schools grew after the Second World War (in 1939 there were only two, compared to 140 in 1965). These schools developed out of the need to adapt the school system to contemporary requirements, that is, to raise the educational level of the technical personnel so that, instead of the former secondary education (after completing the eight-year primary school), they should obtain a higher level of training, after the completion of a secondary school (technical or general education). Experts of that rank are now trained also in faculties (first level university

education). They have the right to continue university studies and to obtain a university degree.

The number of higher education establishments was greatly expanded after the Second World War. This expansion has slowed down only in recent years.

Table I

Number of higher education establishments in the period 1938 - 1965

Academic Year	Faculties, advanced schools, academies of art	Higher schools
1938/39	24	2
1945/46	35	6
1959/60	77	66
1965/66	126	140

The development of higher education has produced new types of establishments which did not exist before and substantially changed its structure. The most vigorous growth was manifested by the faculties of engineering, numbering 39 today.

Higher education was formerly concentrated in a small number of urban administrative centres. Now there are higher education establishments in numerous medium-sized and small towns, usually those with developed industries.

3. Organization of instruction

Because they developed under different conditions, faculties of the same kind attached to different Yugoslav universities had their own particular systems of instruction, so that there were considerable differences among them with regard to curricula, programmes and conditions of study. These differences still exist, although to a lesser extent.

Until 1960, Yugoslav faculties provided instruction at one level only and correspondingly granted only one degree. This degree was obtained after a course which lasted four, five or six years, depending on the subject. The duration of the course was the same for most of the faculties of the same kind belonging to different universities. A new law was adopted in 1960, introducing instruction at several levels in faculties, advanced schools and academies of art. Studies at first level train experts with higher qualifications (such as were formerly trained in higher schools only), predominantly for jobs of a practical and operational character. Experts qualified for independent work are trained at the second level (corresponding to the previous normal university degree). Higher education at the third level

(post-graduate studies) provides training for experts with advanced knowledge in a special technical or scientific field, who are able to carry out research independently. After the completion of each course of studies, the student is awarded a diploma stating the level of training and academic title.

In faculties where teaching is organized so as to combine the first two levels into an integral whole, a university course lasts four years, exceptionally five (e.g. medicine) or three years (for some advanced schools). Where teaching is organized according to levels, each course lasts, as a rule, two years.

The introduction of higher education at first level was effected in a relatively short period, but in recent years a number of faculties have abolished this type of training and resumed the traditional four-year education. Reliable analyses of the results of that system are still not available. In the 1965-66 academic year first level studies existed at 53 out of 126 faculties, advanced schools and academies of art.

Post-graduate studies last, as a rule, two years and take two forms: advanced scientific training (master's degree) and advanced technical training (specialization).

A number of faculties provide, in addition to post-graduate training, permanent or periodic refresher courses. These courses are organized to meet the requirements of the economy and the public services familiarizing those attending them with new methods and discoveries related to their own profession and with their practical applications. A tendency has developed lately to maintain permanent contact with graduates and to invite them systematically to attend courses, seminars or lectures in order to extend their knowledge or to acquaint them with the latest scientific discoveries. However, this form of instruction is still small in scope, and the rapid development of technology requires more intensive acquisition of new knowledge by university-trained personnel. It is generally considered that, in the future higher education establishments should devote particular attention to the supplementary education of experts.

4. Professional titles and academic degrees

Graduates of the first or second level studies at a faculty or an advanced or higher school receive a diploma granting them a professional title, while a student who completes a third level course is awarded an academic degree. These professional titles and academic degrees are not titular degrees in the sense in which a doctorate is. Professional titles are identical at all faculties, advanced and higher schools of the same kind in the country. A list of professional titles is given in Annex V.

There are only two academic degrees - "master" and "specialist".

5. Number and distribution of students

The term "student" denotes a person who has been admitted to a faculty, advanced school or academy of art (higher education) or to a higher school (higher-school education). Since there is a difference between the two types of higher education establishments, the subsequent text and the tables specify whether reference is made to students in one type of establishment or the other, or to all students. Furthermore, in both types of establishments, with the exception of some faculties, there are regular and part-time students.

Since the war, the number of regular and part-time students in faculties, advanced schools and academies of art has undergone a seven-fold increase. During the last five years, the rate of increase has been moderate (1). The distribution of students by scientific disciplines has also changed.

Table II

Students enrolment in higher education by scientific disciplines

Academic year	1938/39	1959/60	1965/66
Total	16,719	*85,500	116,273
Natural Sciences	...*	3,169	9,171
Engineering Sciences	2,671	19,436	31,957
Medical Sciences	2,096	11,040	13,923
Agricultural Sciences	1,874	7,955	7,642
Social Sciences and Humanities	10,078	43,900	53,580

* Number unknown; the discipline was then taught at the faculties of arts, and the students are included under the heading "Social Sciences".

The largest and most significant increases occur in the field of engineering sciences and of natural sciences and mathematics. The rate of increase has slowed down at the faculties of engineering in recent years because of limited possibilities of enrolment (2).

During the 1965/66 academic year, 32.6 per cent of all students were women (3). The largest number of women students are enrolled in faculties of social sciences and humanities (46 per cent) and the

smallest number in faculties of agriculture, forestry and veterinary medicine (6.6 per cent).

The rate of increase in the number of students in higher schools is even greater than in faculties and advanced schools; this number was 9,994 in 1956/57, 19,286 in 1959/60 and 68,650 in 1965/66 (2).

In 1965, regular students in higher education establishments (including the higher schools) represented 5.2 per cent of the population in the 19-23 years age group. This significant increase was caused partly by the democratization in the admission process, partly by a geographical decentralization of these establishments, which enabled many students to stay in their home town. Moreover, the possibility of enrolling as a part-time student has made these institutions accessible to young employed people working in a regular job.

In 1965 there were 593 students per 100,000 inhabitants in faculties, advanced schools and academies of art, and 352 in higher schools.

6. Graduates

Between 1945 and 1965, 141,895 students graduated from faculties, advanced schools and academies of art (second level studies), an annual average of 6,757 students. The annual average number of graduates during the last three years has reached a figure of over 13,000.

Table III

Number of graduates in higher education by scientific disciplines.

Academic year	1939	1960	1965
Total	2,502	10,248	13,010
Natural Sciences		920	598
Engineering Sciences	379	1,959	3,355
Medical Sciences	184	1,649	1,808
Agricultural Sciences	327	1,158	1,276
Social Sciences and Humanities	1,612	4,562	5,973

Tables 6 and 7 in Annex III give a detailed breakdown of graduates in the 1960-1965 period. The increase in the number of engineering sciences graduates indicates that this discipline has gained

(1) See Table 3, Annex III - (2) See Table 5, Annex III
 (3) See Table 5, Annex III - (4) See Table 4, Annex III

in popularity, whereas in the field of natural sciences and mathematics the situation is exactly the reverse (a decrease from 9.0 per cent in 1960 to only 2.2 per cent in 1965), a fact which gives cause for anxiety since these graduates are equally important for the advancement of research and for the development of the school system.

In most cases, students who have obtained a diploma in first level university studies, and some graduates of higher schools as well, go on directly to the second level to continue their studies.

A great number of students fall behind in their studies, and the average duration of studies, especially in faculties of engineering and medicine, is considerably longer than that prescribed by the programme (on the average, 1.8 year longer). A number of measures have been taken during the past few years (revision of curricula and syllabuses, stricter conditions of study, etc.), and the duration of studies has as a result been somewhat reduced. The same situation prevails in higher schools. Besides, a very large number of students leave university without having taken a degree, especially after the first year, when the main selection of students is carried out.

The number of higher school graduates has grown from 4,507 in 1960 to 9,278 in 1965 (an increase of 105.8 per cent). By the end of 1965, the first four generations to enrol in academic courses at the first level had completed their studies, a total of 19,071 persons, of whom 5,664 graduated in 1965.

7. Admission

In Yugoslavia, the right to enrol in the first semester in all higher education establishments is granted to two categories of persons: those who have completed secondary school education (general or technical education) and, since 1959/60, those adults without formal education who have worked, at least 4 years, in certain specified jobs. The latter must take an entrance examination in order to prove that they possess a knowledge equivalent to that acquired in secondary school. This possibility is open only to exceptionally talented persons who were unable to obtain a regular education in their youth and who have acquired a high level of technical skill in their practical work, as well as the necessary general education, by individual effort. On the average only 17 per cent of the candidates are successful in these examinations.

Candidates who have attended a secondary school for technical education may enrol under equal conditions, but only at faculties corresponding to the type of school they have attended. Those who attended a secondary school for general education (gymnasium) may enrol at any faculty or advanced school.

The number of first-year students has been growing annually in the post-war period. In faculties, advanced schools and academies of art, their number increased from 35,614 in 1959/60 to 54,313 in 1965/66; during the same period the number of students in higher schools increased from 12,782 to 49,283.

Table 8 in Annex III (distribution of first-year students) shows the tendency for enrolment in engineering sciences to increase and in social sciences and humanities to decline. Whereas in 1959/60 only 17.6 per cent of all first-year students studied engineering, and 60.4 per cent studied social sciences and humanities, in the 1965/66 academic year these ratios were 27.9 and 49.1 per cent respectively.

The majority of faculties make provision for so-called part-time studies. Admission as part-time student is granted to persons who satisfy the requirements for enrolment but who hold full-time jobs and cannot, therefore, fulfil the conditions of study valid for regular students. Centres for part-time studies have been opened in many places under the auspices of a faculty. Some faculties, again, hold evening classes for their part-time students or organize special seminars for them once or twice a year.

As shown in Table 3, Annex III, there were during the 1965/66 academic year 26,012 part-time students in faculties, advanced schools and academies of art (i.e. 22 per cent of the total number of students enrolled in these establishments). There were 37,087 part-time students in higher schools during the same academic year (i.e. 54 per cent of the total number).

8. Financing of higher education

The financial resources for higher education establishments are provided from a special social fund for the financing of education by the Republics in which they are located. The internal distribution of the funds allocated is carried out completely independently by each institution (Table IV).

The constant increase of expenditures on education in general and on higher education in particular coincided with a rapid expansion of the number of educational establishments and students, so that the material standards of education grew at a considerably slower rate. In the period 1961-1965, the costs of teaching staff (in percentage of total expenditure on higher education) showed a constant rise, while the percentage of other recurrent costs dropped to one-fifth of the total, an alarmingly low ratio (Table V).

Capital expenditure on higher education, as a percentage of the total capital expenditure on education in general, gradually decreased in the course of the three years for which separate statistics have been kept (1963-1965), amounting in 1965 to only one-fifth of the total capital expenditure on education in general (Table VI).

Table IV

*Expenditure on education in general and on higher education
(excluding capital expenditure) - Units : millions of dinars ; millions of dollars,*

Year	Education in general			Higher Education			Number of students
	din.	\$	index	din.	\$	index	
1961	1,018.8	258.6	100	152.3	38.7	100	158,010
1962	1,488.2	356.9	138	248.6	59.6	154	160,092
1963	1,720.5	388.4	150	287.9	65.0	168	160,595
1964	2,142.0	414.3	160	376.3	72.0	188	170,499
1965	2,956.8	463.4	179	478.3	75.0	194	184,923

Table V

*Expenditure on higher education, by type of cost
Units : millions of dinars ; millions of dollars.*

Year	Total		Teaching staff costs			Other recurrent costs			Depreciation		
	din.	\$	din.	\$	% of total	din.	\$	% of total	din.	\$	% of total
1961	152.3	38.7	101.2	25.7	66.4	44.2	11.2	29.0	6.9	1.8	4.6
1962	248.6	59.6	171.7	41.2	69.1	71.6	17.2	28.8	5.3	1.3	2.1
1963	287.9	65.0	203.7	46.0	70.8	75.1	17.0	26.2	9.1	2.1	3.2
1964	376.3	72.8	267.0	51.6	71.0	96.6	18.7	25.7	12.7	2.5	3.3
1965	478.3	75.0	358.8	56.2	75.0	103.6	16.2	21.6	15.9	2.5	3.3

Data provided by the Social Accounting Service of the National Bank of Yugoslavia.

Table VI

*Breakdown of capital expenditure on education,
according to type of establishment - Units : millions of dinars ; millions of dollars.*

Type of establishment	1963			1964			1965		
	din.	\$	%	din.	\$	%	din.	\$	%
Primary education	197.8	44.6	44.5	256.8	49.7	50.0	236.2	37.0	49.6
Secondary education	77.7	17.5	17.4	98.2	19.0	19.1	102.4	16.1	21.5
Higher education	107.3	24.2	24.1	116.1	22.5	22.6	104.3	16.3	21.9
Other	61.8	14.0	14.0	42.0	8.1	8.2	32.9	5.2	6.9
Total	444.6	100.3	100.0	513.1	99.3	100.0	475.8	74.6	100.0

Data provided by the Federal Secretariat for Education and Culture.

During the 1961-1965 period, capital expenditure on higher education amounted to 554.1 million (new) dinars. The greatest portion of this money was allocated from the funds of the republics. However, between 1958 and 1965, according to a special arrangement, the Federation participated with about 140 million dinars in the construction and the purchase of equipment for faculties of engineering, agriculture, forestry, veterinary medicine and natural sciences and mathematics, some one hundred establishments altogether. The Federation thus utilized its funds to guide investments in the desired direction, that is, the opening of new educational establishments to train those types of experts for whom there was the greatest need.

9. *The demand for and the training of personnel with university education*

There is no system of detailed planning in the field of training and education, although a need is felt for it. According to a study of the Federal Institute of Economic Planning, during the 1962-1970 period, the country will need 110,000 university graduates and 59,000 graduates from higher schools. It has been estimated that during the same period 131,000 persons will obtain university degrees (76,500 of them between 1965 and 1970) and that 93,000 students will graduate from higher schools (44,700 of them between 1965 and 1970). A surplus of graduates is thus expected. It should be here pointed out that changes in the distribution of graduates are being planned, in keeping with the present needs. The analyses that are currently being carried out in this field are expected to provide more precise information.

The data available indicate that the number of higher education graduates will be fully sufficient to cover the country's needs. This also goes to prove that the existing network of higher education establishments and the present number of students have reached a satisfactory level. Consequently, the Economic and Social Development Plan for the 1966-1970 period and the corresponding plans of the republics are laying stress on the consolidation and improvement of the existing higher education establishments including the necessary changes in their structure the adjustment of the curricula to the present requirements of the economy and public services, the improvement of their material base and the quality of instruction, and the strengthening of the role of these establishments as scientific institutions. New establishments will be founded only in exceptional cases.

In keeping with this policy, it is foreseen that the percentage of regular students of the 19-23 age group enrolled in higher education will rise at a very slow rate and that it will level off at

approximately 5.5 per cent. It is also expected that a smaller percentage of secondary school graduates will directly continue their studies than has been the case so far (60 per cent in 1960 as compared to the expected 38 per cent in 1968). This decrease can be achieved by means of a stricter selection at the time of enrolment.

It is furthermore expected that during the 1969/1970 academic year the number of students in universities will amount to 125,000 and in higher schools to 80,000. It is also considered that the number of students should be increased in favour of natural sciences and engineering, bringing their number up to 50 per cent of all first-year students.

10. *The reform of higher education*

The 1960-1965 period marks an important stage in the development of higher education in Yugoslavia, especially the first two years of the period, which were characterized by a particularly vigorous growth. This growth occurred simultaneously with the reform of higher education, whose chief objectives were determined in the Resolution of the Federal Assembly on the training of highly-skilled personnel, adopted in June 1960, and in the General Law on Universities and Faculties.

The main factors which gave rise to the reform and defined its basic aims were the growing demand for university-trained experts in various fields, the need to shorten the average duration of studies, the requirements imposed by the reform of secondary schools, the inadequately defined position of higher schools within the general educational system and their inadequate links with universities, and the need to make higher education accessible to a greater number of citizens.

The reform of higher education is still at the implementation stage. In addition to the substantial expansion of the school network during the first years and the stabilization in the last few years, its main results so far have been an administrative and geographical decentralization of establishments, the introduction of studies at two or three levels at most faculties, the establishment of numerous new departments, an increase in the number of students and graduates, greater possibilities for part-time studies, the further democratization of the enrolment procedure, the integration of higher schools into the system of higher education, and the modernization of curricula and programmes.

The principal tasks of the reform in the forthcoming period are: to raise the standards of instruction, especially in newly established institutions; to adapt curricula and methods of instruction to the demands of the national economy for highly-skilled experts; to abolish the division into first and second level studies at some faculties and to

integrate higher schools into first-level studies at others; to promote co-operation of faculties of the same type in organizing post-graduate courses; to introduce uniform and stricter criteria for the admission of students, and for the appointment of the teaching staff, and to achieve greater integration of pedagogical and scientific work. Moreover, measures are being taken to improve the system of part-time studies.

II. SCIENTIFIC WORKERS AND RESEARCH TECHNICIANS

1. Preliminary note

Scientific workers are divided into three groups, according to the type of scientific institution they work in :

- (a) scientific workers in autonomous scientific institutions and in institutions attached to the academies of sciences ;
- (b) lecturers, assistants and other university teaching staff ; and
- (c) research workers in the research units of production enterprises.

Scientific workers are assisted by research technicians. Although some of the latter have university education, they are not considered to be scientific workers because they do not perform research but only technical operations connected with research.

Until 1945, research was mostly conducted in universities and academies of sciences, and scientific workers were mainly university professors and their assistants as well as academicians, who were generally elected from among the ranks of university professors. Later, together with the establishment of autonomous scientific institutes, a new type of scientific worker developed, whose sole occupation was research. In recent years, production enterprises have also begun to found an increasing number of institutes or research units, staffed by experts who are engaged full time in research and development work.

2. Number of scientific workers and research technicians

Statistics on the number and distribution of scientific workers are kept according to republics. A certain lack of uniformity in the criteria applied in this process creates some difficulties in the utilization of the data.

A general census of scientific institutions and of their staff was made at the end of 1964. It covered all autonomous institutes founded by industrial enterprises but left out research units attached to enterprises. Statistics compiled at the end of 1965 included such research units, but it is believed that they are incomplete due to the fact that this was

the first census of research units in industry, and that there was not enough clarity as to what should be considered research and development and what was design and production preparation or control. Detailed results of this census have not yet been summarized. Only a small number of general data are available at present.

Some basic statistical data are given below for both of these years. It should be noted that the differences between data pertaining to different years reflect, besides real changes, changes arising from differences in the methodology and classification used (Table VII).

The heading "Other" mainly comprises workers in workshops and in farms of agricultural institutes.

The survey of scientific workers according to branches of scientific activity is based on the branch in which the institutions specialize and not that of the individual members of their staff (Table VIII).

Among the 6,143 scientific workers employed in scientific institutions and research units in 1965, 920 persons held a doctor's degree in science.

Taking into consideration the small number of scientific institutions and the considerable number of research and development units attached to production enterprises that were not included in the 1965 census, it can be estimated that approximately 6,500 scientific workers were being employed in various scientific institutions during that year (Table IX).

The above survey classifies university teaching staff according to the branches of sciences to which their faculties belong, not according to their own specialization.

The large number of part-time lecturers and assistants is partly due to the rapid expansion of university education¹ which made it difficult for the new faculties to find full-time teaching staff. As a result, many full-time lecturers from one faculty teach at another faculty on a part-time basis. Others, again, work in various scientific institutions or in industry, devoting part of their time to teaching.

Only a rough estimate can be made of the amount of time spent by university lecturers and assistants on research. It has been calculated that this amount ranges between 30 and 50 per cent of their working time. For the purpose of estimating the total scientific potential of the country, it will be assumed here that university teaching staff devote 40 per cent of their working time to research. Only full-time lecturers and assistants have been included in the calculations. These elements have been used to arrive at the total number of scientific workers engaged full-time in research at the end of 1965. (Table X).

1. See Table 8, Annex III.

Table VII

*Number of staff in scientific institutions
(excluding universities)*

	1964	%	1965	%
Scientific workers	4,682	21	6,143	25
Research technicians with university education	1,511	7	1,618	6
Research technicians, graduates of higher and secondary schools. . .	6,724	31	7,736	31
Other staff (workers, auxiliary personnel, administration)	9,061	41	9,356	38
Total	21,978	100	24,853	100

Table VIII

*Number of scientific workers according to branches
of scientific activity (excluding universities)*

Branch	1964	1965*
Natural sciences	889	1,566
Engineering sciences	1,778	2,184
Medical sciences	300	406
Agricultural sciences	745	844
Social sciences and humanities	970	1,143
Total	4,682	6,143

* The 1964 and 1965 data are not strictly comparable, due to the utilization of a different classification.

Table IX

*Number of teaching staff at universities, advanced
schools and academies of sciences
(1965/66 academic year)*

Scientific activity	Full-time staff	Part-time staff	Total
Natural sciences	659	182	841
Engineering sciences	2,134	1,882	4,016
Medical sciences	1,894	483	2,377
Agricultural sciences	1,240	183	1,423
Social sciences and humanities	2,489	730	3,219
Total	8,416	3,460	11,876

Table X

Total number of scientific workers engaged in research (full-time) at the end of 1965

Scientific activity	Research staff	Teaching staff (x 0.4)	Total	%
Natural sciences	1,566	264	1,830	19
Engineering sciences	2,184	854	3,038	32
Medical sciences	406	758	1,164	12
Agricultural sciences	844	496	1,340	14
Social sciences and humanities	1,143	996	2,139	23
Total	6,143	3,368	9,511	100

There are 4.85 full-time scientific workers employed in scientific institutions per 10,000 inhabitants. This figure can be raised to 5 if those scientists not covered by the census are also included in the calculation.

Scientific institutions and research and development units in production enterprises employ 1,618 university-trained persons who have been classified as research technicians. The majority of them work in institutes and research units in the field of engineering.

3. Recruitment of scientific workers

The constant increase in the number of university graduates¹ provides a favourable basis for the recruitment of scientific workers. Many faculties and their specialized departments can train experts in all basic disciplines, so that there is no need to send students abroad for further specialization.

Following the introduction of post-graduate studies in numerous faculties, new research personnel is being recruited more and more from among students who have completed such courses and obtained the master's degree.

Faculties and scientific institutions are completely independent in appointing their teaching and research staff. Some of them grant scholarships to the most promising students during the last years of their studies or when they enrol in a post-graduate course: they are thus enabled to supervise their work and performance closely and hence base their choice soundly. Some institutions provide the best students with the necessary laboratory facilities for their dissertations; this also helps the scientific

staff to spot the ablest candidates for recruitment in their institution.

Many autonomous research institutions in the field of engineering recruit part of their staff from among the experts employed in production enterprises who have obtained outstanding results in their work and also showed an inclination towards academic and research work. These experts have proved to be particularly useful in establishing closer links between scientific institutions and industry.

In most cases, research institutions and units founded by enterprises recruited their research staff from among their employees, mostly engineers, selecting those who showed ability and inclination for research. This was normal in the beginning, and many factories still follow this procedure when they set up research units. However, there is a growing tendency for them to hire young people who have completed graduate or post-graduate courses. Bigger research units employ graduates in physical sciences and mathematics in addition to engineers. In recent years it has become customary for the largest industrial enterprises to give grants to a great number of students so as to ensure a sufficient number of young experts for production and research.

4. Training of scientific workers

The need for more and better qualified research and technical staff resulted in the introduction of post-graduate studies in Yugoslavia². The requirement for admission is that the candidate has taken a first degree with distinction.

According to the law, post-graduate studies may be organized by faculties, and also by the most developed autonomous scientific institutions, subject to special permission. The latter possibility, however, is seldom applied in practice. On the other hand, post-graduate courses in engineering and in basic sciences are frequently organized by a faculty with the assistance of a larger research institution. The instruction is then conducted by the regular teaching staff and by prominent scientists from that institution. Laboratories in institutes often offer better facilities to students for their dissertations; and in many instances students select subjects from the programmes of those institutes.

There are two main types of post-graduate studies: courses leading to the master's degree and specialization courses.

Courses leading to the master's degree last two years (exceptionally, only one) and their purpose is to train research personnel. The emphasis is on theoretical subjects and on the problems and methods of research in a given branch of science. At the end

1 See Tables 6 and 7, Annex III.

2 General Law on Universities and Faculties, 1960.

of the course, the candidate presents a master's thesis, which must be based on some personal research work. Upon the successful completion of such a course, the candidate is granted the academic title of master.

Specialization courses last between one and two years. Their purpose is to provide advanced professional training in a given scientific discipline, including its practical application. In some instances, these courses are organized in order to acquaint the students with new important techniques.

Post-graduate courses are being introduced gradually. In the 1964/65 academic year there were 45 faculties offering one or more post-graduate courses.

Table XI

Number of post-graduate courses and students in the 1964/65 academic year

Scientific activity	Courses	Students
Natural sciences	45	472
Engineering sciences	44	710
Medical sciences	28	431
Agricultural sciences	78	409
Social sciences and humanities	72	1,448
Total	267	3,470

As seen from the table, post-graduate studies in natural sciences and engineering have not yet reached a satisfactory volume.

In 1964, 289 students completed their post-graduate studies, and in 1965 their number rose to 361. A rapid increase in the number of holders of the degrees of master or specialist is expected in the coming years.

Students who take a first degree and directly continue their studies in a post-graduate course constitute approximately one third of all post-graduate enrolments. Another third is made up of young scientific workers from institutes and assistants in universities who attend these courses simultaneously with their regular work but with certain facilities. Experts from economic organizations and public services make up the last third; they are thereby completing and systematizing their theoretical knowledge.

Distinction should be made between specialization in medicine and specialization through post-graduate courses in other fields. The former has been practised for several decades and is effected through a course lasting between 3 and 5 years.

It is a combination of work in a well-developed health institution and in the faculties of medicine, and is terminated by an examination before a board that has been specially set up for that purpose. Persons who complete these courses obtain the title of specialist in a given branch of medicine. There are 30 types of specialization courses in medicine. Specialization in veterinary medicine is organized on the same principle.

The doctorate is the only scientific degree. It may be conferred by faculties and by some advanced schools and research institutions offering post-graduate courses, subject to special authorization by law.

A doctor's degree may be obtained by candidates who have graduated from a faculty or advanced school, who have distinguished themselves by the results achieved in research or in practical work, and who have published some of these results. In addition, candidates who have obtained the master's degree may be awarded a doctorate, after having proved by their work that they possess the ability for independent research.

The candidate submits the subject of his thesis for approval at the faculty where he wishes to defend it. A doctor's thesis, which must represent an original contribution to science, is defended in public before a special board appointed by the faculty and consisting of professors and prominent scientists.

A person who has obtained the doctor's degree has the right to the title of doctor of sciences (e.g. doctor of engineering sciences, doctor of physics, etc.) and is entitled to use the prefix "Dr." with his name. The doctor's degree has been adopted as one of the conditions for appointment to certain university and scientific posts.

During the 1945-1965 period, a total of 4,171 doctor's degrees were conferred by Yugoslav universities. A number of Yugoslav citizens were awarded doctorates by foreign universities. These degrees have to be officially recognized by a Yugoslav university.

At the time they were awarded their doctor's degree, 39.3 per cent of candidates were under 35 years of age, and 30.1 per cent were between 36 and 40. In recent years the average age of the candidates has been decreasing.

Of all the doctorates conferred in 1965, 573 were awarded to university lecturers and assistants, 295 to scientific workers employed by various institutes, and the remaining 416 to persons working in other public services or in economic organizations.

A striking feature of the survey of doctorates according to years and scientific activity¹ is the considerable increase in the number of successfully defended theses during the last two years.

1. See Table 10, Annex III.

There are a number of reasons for this, the main one being that the work and effort accumulated during the previous years have borne fruit. Another characteristic is the large number of doctorates in social sciences and humanities, which should be attributed to the long tradition these sciences have in our country. The number of doctorates in engineering sciences is exceptionally small. The percentage of doctorates in basic sciences is also relatively low.

Yugoslav universities also grant honorary doctor's degrees as a special recognition. The title of doctor "honoris causa" is granted in all scientific disciplines in which doctorates may be obtained. In addition to this, honorary doctorates may be conferred without specifying the discipline. Both kinds of doctorates may be conferred on foreign citizens.

The advanced training of scientific workers is carried out both in Yugoslav and foreign scientific institutions. Some domestic research institutes provide advanced training for the staff of other related institutions, and some of them organize special courses.

The advanced training Yugoslav scientific workers received in foreign scientific institutions has had a very favourable influence on the advancement of our research staff and research in general. It is estimated that about one-third of the research and teaching staff have profited by this form of professional training. This is all the more important in view of the fact that, in the course of the past twenty years, research has begun in several scientific disciplines and on many scientific problems which were formerly either not treated at all or treated to a very modest extent. Furthermore, the rapid advancement of science is constantly producing new methods, techniques and instruments in research. The training of Yugoslav scientists in foreign research institutions - together with other forms of international scientific co-operation, which Yugoslavia advocated and promoted - have helped Yugoslav scientists and institutions to catch up with the development of world science, enabling them to make their own contribution to that development. It should also be mentioned that, in recent years, an increasing number of young scientific workers from other countries, mostly from developing countries, have received professional training in Yugoslav research institutions.

5. Ranks of research and teaching staff

Scientific workers in research institutions are elected, according to their professional qualifications and abilities, into a number of scientific ranks. These ranks are: assistant, research worker, senior research worker, and research councillor.

Under the Law on the Organization of Scientific Activities, the general requirements for election into one of the ranks of scientific workers are as follows:

for assistants - university degree and ability to undertake research ;
for research workers - post-graduate degree, or doctorate, and publication of scientific papers, or any other proof of the ability to carry out independent research work ;
for senior research workers - doctor's degree and the publication of scientific papers of considerable importance ; and
for research counsellors - doctor's degree and scientific work which has contributed to the advancement of a given scientific branch.

The individual republics are entitled to pass other laws, specifying in greater detail other requirements for these ranks and even introducing additional ones.

The Council of a scientific institution elects research workers into ranks on the basis of the opinion of the scientific board of the institution. The election procedure is public. The Council of the institution nominates rapporteurs who must be scientific workers in the same discipline and of the same rank as the candidate or higher. The rapporteur presents a critical appraisal of the work of the candidate and proposes his election to a given rank. These reports are then published in special bulletins.

In view of the public character of scientific ranks and for the purpose of introducing uniform criteria, all elections of scientific workers (except assistants) formerly had to be confirmed by the republic research councils. The new Law on the Organization of Scientific Activities leaves it to the legislative acts of the republics to decide whether these elections should be confirmed and which body is to be responsible for that. At present, the institutes and research units of economic enterprises do not employ this system of ranks.

Scientific rank does not automatically grant the scientific worker any strictly defined and permanent rights in the institution. However, most scientific institutions have made provision in their statutes for certain posts (e.g. head of a department, sector, laboratory or team) to be occupied only by persons who hold a certain rank.

These ranks, as recognition of the performance and ability of scientific workers, are used as a stimulant for greater efforts and better results. The election procedure offers at the same time a good opportunity for analysing and appraising the work of individual scientists and has a favourable effect on the selection of the research staff.

The ranks of university teaching staff follow the traditional pattern: assistant, docent, associate professor, full professor. Two more categories have been introduced recently: lecturer (with the same rank as docent) and senior lecturer (equal in rank to associate professor), mostly at faculties of engineering and higher schools.

According to the law, faculties are scientific institutions at the highest level of the educational

system. According to academic tradition in Yugoslavia, university teachers must be scientific workers and assistants should develop into scientists. For that reason, scientific performance is the main criterion for election to teaching posts, and these enjoy a high reputation in the country.

Every faculty is independent in electing the members of its staff. Election to all posts is effected on the basis of a competition. Rapporteurs are nominated with the task of reporting on the scientific performance and other qualities of the candidate. These reports are published, and all interested parties have the right to submit objections, within the stipulated time. These objections must be considered at the time of the election of the candidates. These elections need no confirmation on the part of the university to which the faculty belongs.

All members of the teaching staff are appointed for a definite period of time - assistants for three years and docents and associate professors for five years. When their term expires, a new election is held, and new applicants, both from inside and outside the faculty, have the right to compete. Lecturers and assistants can be re-elected to the same or a higher rank; if they are not re-elected they cease to be members of the faculty staff.

Both senior and junior members of the staff carry out their scientific work within the following institutions: scientific-pedagogical units of faculties (departments, institutes, laboratories, seminars, clinics, etc.); autonomous scientific institutions of faculties or universities; other autonomous institutes, as well as institutes and research and development laboratories of enterprises (e.g. faculties of engineering in larger industrial centres).

Apart from this, university professors often act as experts, advisers or consultants for design or production enterprises, state authorities and public services and organizations.

6. *Social status of scientific workers*

The social status of scientific workers depends on the place and role scientific institutions occupy in society and on the status of scientific workers in these institutions. The autonomous status of a scientific institution precludes any outside administrative interference in its work. Self-management establishes democratic relations within it and eliminates the possibility of hierarchical rule. In this manner, conditions have been created for an atmosphere conducive to scientific activity and to the full development of the creative talents and personalities of scientific workers.

Scientific workers take an active part in the life of the country. The system of democratic discussion and collective decision-making on all public affairs

through the numerous forms of self-government offer to scientists opportunities to contribute with their knowledge to finding the most appropriate solutions to social problems. Scientific workers hold numerous important offices in social and professional bodies, beginning with the Federal and the Republic assemblies and their committees on science, thus participating in deliberations on the major issues of social policy and practices.

The social recognition of scientific workers is growing, parallel to the increasing importance attached by society to science and the growing part played by research in the solution of production and social problems. The clearest expression of the high reputation scientific workers enjoy in society is the number of awards granted to them every year. In addition to the prizes awarded by the Federation and the republics, all larger towns and some learned societies, and even a number of enterprises have founded their own awards. All prizes are granted by boards composed of prominent scientists. They are usually awarded on important national holidays, to ensure them great publicity.

Under the Law on the Organization of Scientific Activities, scientific work is public and subject to public criticism. The methods by which this public character is lent to scientific work are determined by the statutes of scientific institutions, in keeping with these principles. The public character of scientific work and scientific criticism are essential prerequisites, from the social standpoint, for the unimpeded advancement of science; to the scientific workers themselves, they provide scope for freer activities and for the assessment of the results of their work.

Some institutes of engineering had to include in their statutes certain restrictions concerning patents and technological research projects carried out under contracts with industrial enterprises. However, these restrictions do not involve scientific discoveries themselves but only some aspects of their applications. The financial rights deriving from a patent belong to the scientific organization in which it was discovered. Individual scientific workers who were instrumental in a discovery have all moral rights over it and they are entitled to a percentage of the revenue derived from its exploitation.

7. *Forecast of the increase in research staff*

The programme of scientific activities during the 1966-1970 period foresees that the number of scientific workers will be increased from 6,500 in 1965 to 9,000-10,000 in 1970. This would constitute an increase of about 44 per cent, an average annual increase of 7.5 per cent. This estimate is based on an extrapolation of the statistical trends on the

increase in the number of scientific workers during the preceding period and on the prevailing trends in the field of the financing of research.

It is also foreseen that the majority of the new scientific workers will be employed in the institutes and research and development units founded by industry most of which work in the field of engineering sciences. This tendency is in keeping with the needs of the national economy in general and of industry in particular. It is believed that, in the coming years, there will be no difficulties in obtaining new research staff, since the number of undergraduate and

post-graduate students is large enough to give sufficient scope for selection.

The increase in the university teaching staff, which has been considerable in recent years, owing to the establishment of new faculties¹, will depend on the requirements of academic instruction. The present forecast in this field is that a period of consolidation will follow the present period of expansion and that the rate of increase in university teaching staff will not be as high as during the past few years.

1. See Table 9, Annex III.



BASIC OBJECTIVES OF THE NATIONAL SCIENCE POLICY

It is for science policy to formulate the basic objectives of research and determine the appropriate methods and measures for attaining these objectives.

Science policy in Yugoslavia has passed through several stages, reflecting, to a greater or lesser extent, the level of the social and economic development of the country. The national science policy in Yugoslavia should consequently be regarded as an integral part of the country's general policy on social and economic development.

I. SYSTEM OF PLANNING AND SCIENCE POLICY

Self-management and the economic independence of all working organizations, including scientific institutions, constitute the basis of the Yugoslav socio-economic system. Working organizations, as the main protagonists of social reproduction, control the largest portion of social accumulation and decide independently on expanded reproduction. Socio-political communities co-ordinate and guide economic and social development with the aid of social plans and various economic instruments, as well as by employing that part of the social accumulation over which they exercise control.

In accordance with this system, planning in Yugoslavia does not aim at regulating all the manifestations of social and economic growth but determines the general proportions of that growth, permitting within that range the free action of the market laws. Planning in Yugoslavia thus essentially consists in analysing the prevailing situation and trends and determining therefrom such global proportions in production, distribution and consumption as will ensure stability, co-ordination and dynamic growth in social and economic development.

The policy defined in the social plans is obligatory for all those participating in the social reproduction process. The plans are supplemented by appropriate legal measures and regulations, which - in keeping with the socio-economic system - leave

increasingly greater scope for the free activities of economic and other working organizations.

Apart from taking into account the general social plans and the accompanying legal measures, economic enterprises are independent in adopting their policies and programmes. The plans of working organizations determine production, investment and other targets; they are drafted on the basis of their own analyses of the market situation, of their own economic interests, on their financial resources and on the loans provided by banks.

Science policy and the planning of scientific development, as an integral part of the policy of economic and social development, have to take into consideration the nature of the protagonists of that development and of planning in general.

In addition to working organizations, society as a whole has interests in, and makes requirements on science. The interest of society in science is much broader, since it is motivated not only by long-term economic objectives but also by the needs of culture, education, public health, by the advancement of socialist social relations, etc. Following the logic of its own development, science constantly formulates new tasks and aims in the sphere of fundamental research which can be materialized primarily, although not exclusively, with the assistance of the social community.

Yugoslavia is a multinational community consisting of republics with their own national, cultural and economic interests, operating within the framework of a common economic system, and sharing a common interest in furthering and encouraging the development of scientific research.

These are the main elements which characterize the Yugoslav policy for the development of scientific research.

In January 1965, the Federal Assembly adopted the Resolution on Scientific Research, which defined the basic political guide-lines of the development of research.

A number of the points made in the Resolution were incorporated in the Law on the Organization of Scientific Activities, the Law on the Federal Council for the Co-ordination of Scientific Activities and the Law on the Federal Fund for the Financing of Scientific Activities, which determined the general character of the organization of research. The principles of this organization are described in Part Two, above.

Following the guide-lines contained in the Resolution of the Federal Assembly and in the Social Development Plan, the Federal Council for the Co-ordination of Scientific Activities :

adopts the general programme of scientific activities, which embodies the programme of research activities and outlines the science policy for a period of e.g. five years.

adopts a special multi-annual programme of scientific activities which includes projects of general social interest and in whose financing the Federation will participate through the Federal Fund for the Financing of Scientific Activities. The programme makes provision mainly for large-scale applied research projects and for specific fields of fundamental research. This programme is later broken down into one-year¹ parts or special sub-programmes whose financing is then entrusted to the Federal Fund.

The general programme of research activities is considered by the Federal Assembly. The main features are incorporated in the Social Development Plan, and the measures aimed at creating favourable conditions for the planned development are embodied in comprehensive or separate legal regulations.

The special annual and multi-annual programmes of scientific activities of general social interest are also submitted to the Federal Assembly. The resources of the Federal Fund are allocated on the basis of these programmes.

Both the general and the special programmes are drafted after a comprehensive analysis of the situation and trends and after assessment of the needs in all scientific disciplines "are made". These analyses and appraisals are carried out by the commissions of the Federal Council, consisting principally of scientists but also of the representatives of economic organizations and public bodies. In the course of their work, the commissions consult scientific institutions and their associations, learned societies and the relevant economic branches, and give their appraisal of the situation and needs of research in each branch. They do not draft explicit and elaborate programmes but only define the basic directions and dimensions of development and assess the conditions for the attainment of the planned development and the role of the individual social factors (the economy, etc.) in that process. They make special mention of scientific activities and research projects of particular social interest, which should be included, in their

opinion, in the special programme of the Federal Council and financed by the Federal Fund.

The Federal Commission on Nuclear Energy drafts its own programme. The Federal Assembly adopts this programme and allocates the necessary funds.

The republic research councils or research funds follow a similar procedure in drafting their programmes, in keeping with their aims, interests and available funds and on the lines of the general programme of research activities. The republic assemblies consider these programmes and allocate funds for their financing.

The Federal and the republic chambers of the economy co-operate with the councils in the adoption of the general programme of scientific development and of the measures aimed at implementing the science policy, on the basis of their own interest in the advancement of research and in the more extensive application of its results in production. They also adopt programmes relating to the majority of their member economic enterprises or to specific economic branches, and allocate appropriate funds.

Economic organizations, individually or through their business associations, draft their research programmes or make provision for specific research projects, providing funds for their financing.

Likewise public services, in the first place social and health insurance, have their research programmes and allocate the necessary resources.

Scientific institutions, which are completely independent in their work, draw up their research and investment programmes in keeping with the general policy and programmes of the councils, of the economy and of other factors. They endeavour to interest social funds and economic organizations in these programmes to ensure their financing.

It follows from the foregoing that the planning of scientific development is conducted at various levels, from working organizations and their associations, up to the Federation. Each of these elements acts on the basis of its immediate or long-term interests and provides the necessary resources. The national programme of research activities is the integrated expression of all these programmes.

There is no doubt that the problems of co-ordinating these programmes are many and complex. They are not resolved by administrative co-ordination or by adjusting plans set up at various levels, as they are all equally valid. The main principle of that co-ordination is voluntary participation on the basis of self-interest. The role of the Federal and republic councils is extremely important

1. The annual programme contains research projects which will be launched during the current year; when the contracts are concluded, financing is carried out automatically for the number of years stipulated in the contract.

in that respect, since they use their funds to further co-ordination and to orient scientific activities.

The co-ordination of applied research and development is in practice largely effected through direct contacts between scientific organizations and economic enterprises; enterprises often consult research institutions, and the latter, in turn, undertake to solve some of the problems of economic organizations. This is obviously the case for those scientific institutions which specialize in technological research. However, this situation has created a problem of overlapping research and development projects carried in many institutions or enterprises at the same time. This problem will exist as long as economic considerations will not induce enterprises either to unite in their efforts or to agree on the division of tasks.

In fundamental research, which is principally financed from social research funds, scientific institutions and scientific workers have a considerable influence on the formulation of research programmes which serve as the basis for the allocation of resources.

Each social fund for the financing of research has a definite policy and definite criteria, which makes co-ordination easier.

The republic research councils or funds are important factors in the co-ordination of scientific activities. This is effected by means of consultations, with the interested parties, recommendations and financial incentives. The republics finance the greatest part of research in social sciences and humanities, including research conducted at universities; in this last case, research is completely financed by the republic bodies. The universities are also entitled to participate in the research projects incorporated in the programme of the Federal Council. In addition to this, the Federal Council has initiated a special project whose aim is to provide the universities with modern research equipment, although the financing of research at universities still remains predominantly within the competence of the republics.

The multi-annual research programme of the Federal Council makes provision for large-scale and long-term research projects only, while the others are financed from the republic funds, by enterprises and from other sources.

An important method of co-ordination is joint financing. The Federal Fund finances only a small number of research projects in their entirety. Most projects are financed only partially by the Federal Fund (between 30 and 60 per cent). The remaining outlays are covered by republic funds or by the enterprises which are interested in a given research problem. Republic funds employ a similar system of partial financing. Scientific institutions set up, in turn, their own research funds with the income

earned by work under contract with enterprises. They offer to participate, together with social funds, in the financing of the projects in which they are particularly interested. Joint financing presupposes previous agreement of the parties involved in the most concrete terms.

The execution of the general programme of scientific development and the implementation of the appropriate measures are entrusted to the Federal Council for the Co-ordination of Scientific Activities and its bodies. They study the developments and trends in a given field and examine the effects of the relevant regulations and measures, taking or proposing steps to overcome difficulties and to facilitate the planned development. The Federal Assembly periodically considers these analyses and proposals of the Federal Council.

The execution of individual research projects is entrusted primarily to scientific institutions. Under the terms of the contract, the financier has the right to supervise the work.

Parallel to the adjustment of science policy to the objectives of socio-economic development, efforts were made to find the most practical ways of asserting the influence of science and scientists on the planning of economic and social development. For example, in the course of the preparations for the last Social Plan, at the request of the Federal and the republic institutes of economic planning, scientific institutions elaborated a great number of economic and technological studies dealing with individual economic branches and various general economic problems, which served as the basis for the drafting of the Plan. Numerous prominent economists participated in the final stage of its elaboration.

A growing number of economic enterprises draft their development plans on the basis of economic and technological studies prepared at their request by scientific organizations.

II. BASIC OBJECTIVES OF SOCIO-ECONOMIC DEVELOPMENT AND SCIENCE POLICY

The principal objective of science policy in Yugoslavia is to increase the volume and quality of research with special attention to the application of its results in production and in social practices, in order to make science the integral part of all social activities. For that reason, the policy of research development is based on the main objectives of economic and social development and applies methods which are in keeping with the socio-economic system and its development.

The economic reform (July 1965) and the Social Development Plan for 1966-1970 strongly affected the development policy of scientific activities. The economic reform and the Social Plan determine the

basic objectives and methods of socio-economic development. Some of the main elements of their provisions have a strong bearing on the subject discussed in this study.

The economic reform pursues the following aims: the permanent intensification of production and the raising of labour productivity through the application of up-to-date techniques and of the full utilization of current research results; this process relies on the economic interest of working organizations;

a more extensive and economically rational inclusion of the Yugoslav economy in the world market; the elimination of the remaining stagnant elements in the economic system and socio-economic relations, accompanied by an appreciable strengthening of the role and responsibility of working organizations;

the free and economically purposeful distribution of the accumulation through the medium of the market and prices, with a view to furthering the independent growth of economic branches.

The Social Development Plan for 1966-1970 anticipates that the national income will grow at the annual rate of 7.5-8.5 per cent, and industrial production at the rate of 9-10 per cent. According to the Plan, approximately 70 per cent of the total increase in industrial and agricultural production is to be effected by the improvement of labour productivity, and the remaining 30 per cent by the employment of new workers. It is foreseen that the export of goods and services will grow at the high rate of 13-15 per cent per annum. These basic data indicate the determination to change from extensive to intensive economic growth.

During the last two decades, the Yugoslav economy, and especially industry, introduced a great number of new technological processes and launched the production of numerous new articles. In this phase, industry had recourse principally to imported equipment and licences. There was a shortage of technical experts, who were mainly employed in assembling and running the new plants. There was not sufficient awareness for the need to work simultaneously on modernizing technological processes which soon became obsolescent. The high rate of growth of industrial production at national level was achieved more by intensive investment than by the modernization of production and increased productivity of labour.

Under the new socio-economic conditions brought about by the economic reform, production enterprises find themselves in the position of having to make incessant efforts to modernize production, to apply new technical and technological inventions, and to improve labour productivity and rationalize their business management, being as they are, exposed to the full impact of the economic laws of the market.

The financial position of the workers in every enterprise depends on its success in production and in the market. The means for the modernization of technology and the expansion of production capacities are in the hands of enterprises. In 1963, personnel with university and higher school diplomas constituted 1.3 per cent and 0.8 per cent respectively of all persons employed in the economy. These ratios have been increasing since then.

The level of development reached by the Yugoslav economy makes it capable of expanding the utilization of research results and the development of research activities, with respect to technological base, financial possibilities, and qualified personnel. Intensified research activities and the efficient application of their results have become an imperative of accelerated economic growth.

Because the processes taking place in all walks of social life and in non-economic activities are currently becoming increasingly complex and cannot be successfully mastered through exclusive reliance on experience, social sciences are taking an increasingly prominent place in science policy. Science policy must be able today to analyse and critically appraise social practices and act as a corrective of these practices. This is all the more necessary as Yugoslavia is developing on the new foundations of self-management.

The above-mentioned economic and social interests demand that more emphasis should be laid in the forthcoming period (1966-1970) on short-term targets and on applied research. It is believed that useful changes will be effected in this manner in the overall structure of research capacities and that more direct links will be established between scientific institutions and working organizations which are interested in their work. The fostering of these direct links is the only way to achieve the organic integration of science and practice, and to allow the beneficial influence of one to be exerted on the other. At the same time, this will be in line with the general aims of loosening state control and furthering self-management in all walks of social life.

The decision to give priority to the organic integration of the economy and science stems from the current development of science, which bears many marks of a technological revolution, being principally founded on economic interests. This is not essentially in contradiction with the cultural mission of science and its other functions in society.

Stressing these aims of science policy does not imply that fundamental and long-term research will be neglected and that society is not interested in the organized and harmonious development of scientific research. The only intention is to accelerate the advancement of applied and developmental research within the framework of the entire scientific

advancement and to intensify the interest and the flow of funds from the economy and from other factors which will directly benefit by the application of the results of research.

The Resolution of the Federal Assembly on Scientific Research defined the following basic objectives of the national science policy :

the intensification of research and its orientation towards the needs of economic and social development ;

the increase in the extent and efficiency of the application of scientific results in production and in social practices ;

the fostering of direct links between scientific institutions and those who benefit by the results of research ;

the harmonious development and co-ordination of research, particularly of fundamental and long-term research, entrusted to the Federation and the republics ;

the appropriate allocation of financial resources and the provision for the stability of the flow of funds and for increasing them at a rate faster than the rate of growth of the national income ;

the improvement of the efficiency of education and training of research staff.

These basic objectives of the national science policy are further elaborated and, to a certain degree, put in concrete terms in the general programme of scientific activities for the 1966-1970 period. This programme provides the guide-lines and determines the sources of funds for the attainment of the aims of this policy.

III. GENERAL GUIDE-LINES FOR THE DEVELOPMENT OF RESEARCH

The objectives set forth in the Yugoslav science policy require gradual changes in the programme orientation, in the network structure and further establishment of scientific institutions, in the influence of social factors (state, the economy, etc.) on scientific development, and in the structure of the sources of financing.

In the development of scientific institutions and research, as indicated in the foregoing sections, the principal role was played by the Federal and Republic state organs. The academies of sciences and the universities also exerted some influence on the development of research. It was only natural that in such a situation the establishment and development of scientific institutions and their programme orientation were predominantly guided by the so-called internal scientific criteria and that they were, consequently, extensive and lacked co-ordination, without sufficient adjustment to the actual needs and to the financial and human potentialities of a small country. Administrative decision-

making and budgetary financing only facilitated such developments.

Co-operation between a number of scientific institutions and the economy was initiated in the middle of the last decade. It had a rather slow course and did not cover all economic branches evenly, although it can be claimed that considerable progress was made during those years. In the 1960-1965 period, the Federal and the republic research funds encouraged this trend. Greatest progress was made in the electronic, pharmaceutical, chemical and electrical equipment industries, in metallurgy, in construction and in exploration of mineral deposits.

In spite of the positive changes that took place between 1960 and 1965, there are still considerable disproportions in the global structure of scientific institutions and personnel. The number of small institutes is still too great. Scientific institutions in the fields of natural sciences, agriculture, medical and social sciences and especially universities, are well staffed by scientific workers. At present, the chief task is to raise the professional level of the staff, improve the equipment, and achieve greater co-ordination in their work. On the other hand, the number of research workers in engineering sciences constitutes only one-third of the total research personnel in the country. The number of technological research institutions is unsatisfactorily low, and their equipment inadequate. Industrial enterprises especially have still too few research units and personnel. It is, therefore, expected that the number of research institutions and staff in the field of engineering sciences, especially in industry will grow at an accelerated rate, thus making the general distribution of scientific institutions and research staff more purposeful.

So far, scientific institutions have developed considerably in isolation from one another. This is the result of the system of budgetary allocations made on the basis of the programmes drafted individually by scientific institutions. This shortcoming could not be eliminated only by administrative measures, or by scientific gatherings in which the results of research were made public. The present policy of financing from social research funds large-scale projects in whose implementation several scientific institutions take part, as well as the research contract system with economic enterprises, increasingly orient scientific institutions towards concrete common efforts, gradually fostering co-operation and integration among them.

The general orientation of research and the selection of research programmes will depend more and more on direct understanding between scientific institutions and working organizations, primarily economic enterprises, which wish to benefit by the results of research. This is expected to ensure an adequate selection of programmes and a more rapid

utilization of these results. Although it cannot be denied that economic enterprises require scientific institutions to perform tasks whose character is somewhere between that of scientific research and that of technical engineering and that they demand quick results, this is, nevertheless, a natural course of co-operation, which will gradually assume a higher quality. Research units in economic enterprises are expected to serve as the connecting link between science and production.

The principal objectives of science policy presuppose a constant increase in the influence of the economy on research programmes. This in turn implies that the share of the economy in the total expenditure on research will become predominant. The trends that have appeared so far are encouraging in this respect.

The processes occurring in the economy itself, and above all the various forms of integration from straight mergers to associations between enterprises and business concerns, will play a decisive role in achieving the intensified and planned engagement of the economy in research. Economic integration not only provides greater possibilities and demand for the advancement of research but, moreover, makes research the basic requirement for modern large-scale and highly specialized production.

It is anticipated that direct links will also be established between scientific institutions and utilizers of the results of research other than economic enterprises. The Social Plan lays particular stress on the need for social and health security services, whose funds are formed from the contributions of all employed persons, to take over the financing of medical research programmes, thus facilitating better and cheaper curative and preventive services.

As already mentioned, society as a whole makes its own demands on science, mostly of a long-term character, and it undertakes the responsibility to guide its development according to the accepted priorities. This refers particularly to research, in the basic sciences which is essential for the advancement of applied and developmental research, as well as to social sciences. Hence the Federation, the republics and the autonomous provinces all make provision for this requirement by financing special programmes. These programmes, in addition to determining priorities, have the function of engaging scientific institutions in common large-scale projects and of diminishing in this manner the number of isolated, sporadic, small-scale projects, which predominated in the work of scientific institutions in the past. It is believed that this will help to narrow down the range of research and intensify it.

The planned development of research, in the first place in the economy, necessitates a greater number and higher quality of the staffs trained in universities. Moreover, the university teaching staff comprises

over one half of the total number of scientific workers in the country. In spite of the undeniable and considerable success in furthering research at the universities and in improving the work of the teaching staff in autonomous scientific institutions, it is considered that the potential represented by that portion of scientific workers has not been fully exploited. It has, therefore, been decided that one of the major tasks in the forthcoming period was for socio-political communities to provide greater assistance to research in universities, primarily in training scientific personnel and raising the level of post-graduate studies. It has also been planned that closer relations and co-operation were to be established between individual faculties, or their departments, and autonomous scientific institutes, as well as economic organizations. There are numerous examples indicating that this co-operation is both possible and necessary.

It is a well-known fact that one of the primary conditions for the efficient functioning of a scientific institution is the assurance of continuity in its work, and this primarily depends on financial resources. It is hence necessary that the agencies for the financing of research have constant and growing sources of revenue and that they conclude long-term contracts with scientific institutes. For that reason, one of the objectives is to separate the channelling of social research funds from the budgets and to ensure the automatic flow of funds for several years in advance (as has already been done in the case of social security funds, educational funds, etc.).

The Social Plan makes provision for economic enterprises to adopt internal rules ensuring that part of their annual income is set aside for research and that they pool their resources, directly or through their business associations, and on the basis of their own interest, for the purpose of financing joint research programmes or for investments in scientific institutions in whose work they are interested. There are numerous positive examples of both alternatives in the practice of economic organizations, indicating that better results can be expected from these arrangements.

It is further planned that funds would flow to scientific research more than before in the form of bank credits. These credits will be used by scientific institutions for their expansion and by economic organizations for the financing of institutions and projects by which they wish to benefit. These credits will be granted under more favourable terms than is generally the case.

The general programme of research activities and the Social Development Plan for 1966-1970, in conformity with the objectives enumerated in the preceding sections, sets forth the following targets for the coming five-year period:

the total (current and capital) expenditure on

research is expected to increase from 600 million dinars (1) (94 million U.S. dollars), as foreseen in the programme for 1965, to 1,160 million dinars (182 million U.S. dollars) in 1970. The index of growth will be 1.93 and the annual rate of increase 14 per cent ;

the share of the expenditure on research in the national income is to be increased from 0.8 per cent (1) in 1965 to 1.05 per cent in 1970 ;

the funds allocated to research by the economy and by its other utilizers are expected to grow at a higher rate (about 18 per cent annually) and the resources provided by social funds at a slower rate than before (about 8 per cent). It is also planned that the allocations from the republics should grow faster than those of the Federation. In this manner, the share of social funds in the financing of research is expected to be reduced from approximately 40 per cent in 1965 to approximately 30 per cent in 1970, although there would be an increase in absolute magnitude, and the share of the economy and of other sources would correspondingly grow from 60 per cent to 70 per cent ;

the number of full-time scientific workers in scientific institutes and research units in economic enterprises is planned to increase by about 44 per cent, i.e. at the annual rate of 7.5 per cent. Since the increase in total funds will be greater than the increase in the number of scientific workers, there will result a constant annual increase in expenditure per research worker. This is considered necessary in view of the need to expand technological research and provide scientific institutions with up-to-date research equipment .

It should however be recalled that, although these forecasts have been made on the basis of quantitative analyses of the situation, trends, needs and possibilities, they remain guiding indicators only.

IV. INSTRUMENTS FOR THE IMPLEMENTATION OF SCIENCE POLICY

With a view to materializing the development plan for research and ensuring co-ordination in the activities of all the factors of that development, the Social Development Plan for 1966-1970 and the accompanying regulations make provision for a number of measures and instruments with direct or indirect effect.

The direct influence of the Federation, as well as of the republics and autonomous provinces, is exerted through the councils for the co-ordination of research, which formulate special research programmes, and through the research funds, which finance these programmes. The main function of the programmes adopted by the research councils is to co-ordinate and intensify scientific development as a whole. For that reason, they cover those research

and investment projects and other scientific activities which have been given priority, those which lag behind the others to an appreciable extent, and those which cannot be expected to receive financial assistance from other sources. The policy of the funds to make their financial participation conditional on other participation is designed to mobilize resources from other, decentralized, sources. The same aim is pursued by the research funds in their practice to compensate scientific institutions or economic enterprises by refunding a portion of the interest on the loans they obtain from banks for the purpose of developing research.

According to the social Development Plan for 1966-1970, the federal budget should allocate 0.2 per cent of the social product to research. This figure does not include expenditure on research for defence purposes. In this way, the allocations from the Federation will be stable, will gradually grow and will not depend any longer on the current budget situation. This guaranteed stable flow of funds for several years in advance will make it possible to achieve a better quality of programming and ensure the continuity of financing.

In the light of the accepted policy that the total expenditures on research are to grow faster than the social product, the decision of the Federation that it would allocate to it 0.2 per cent of the social product must be interpreted as a tendency to the gradual decrease of its proportionate participation to be compensated by the increased share of other financial sources.

The Social Plan also anticipates greater participation of the republics in the financing of research. The trends manifested in the course of the last five years and the Social Plans adopted by the republics bear out the forecast of the Plan.

Measures and instruments with *indirect effect* are intended to create favourable financial conditions for the development of scientific activities on the whole. They have the character of supplementary incentives and presuppose the existence of favourable basic conditions for the development of research, above all, in the economy. These basic conditions have been discussed in Section II above.

These indirect measures and instruments pursue two aims : to improve the position of scientific institutions, including research units attached to economic organizations, and to stimulate these organizations and the banks to invest in research.

The following measures are currently in force : scientific institutions are exempted from paying customs duties on imported equipment and raw materials ; scientific institutions are exempted from turnover tax when purchasing domestic or imported equipment and raw materials ;

(1) See part three, Section IV, above.

scientific institutions are exempted from paying interest rate on their capital and working assets.¹ Although all non-economic organizations are covered by the exemption, the significance of this measure lies in the fact that economic enterprises are exempt from paying interest on that part of their assets (buildings, equipment, working assets) which are used by their institutes and research units ;

banks and working organizations do not pay interest rates on that part of their capital which has been granted in the form of loans to scientific institutions or to other working organizations for investments in research ;

the Federation adds from its resources an additional 3 per cent interest rate on all the loans

granted by banks and working organizations for investments in research .

Some of these measures have been in force for some time and have had a positive effect. It is, therefore, expected that the new measures will also act favourably in orienting scientific development and in increasing expenditures on research. The effect of these measures will be closely examined and, if necessary, other incentives would be adopted.

1. Economic organizations, depending on the branch to which they belong, pay to the Federation from 1.7 to 3.5 per cent of the value of their capital and working assets as the interest rate on the socially-owned property they use. The banks also pay to the Federation an annual rate of 2.5 per cent of the value of the social funds they use as their credit fund.

THE SOCIO-POLITICAL SYSTEM
AND ECONOMIC DEVELOPMENT

I. GENERAL INFORMATION ON THE
SOCIO-ECONOMIC ORDER

On the basis of their common struggle and of their free will, expressed in the course of the national liberation war and the socialist revolution, and pursuing their historical aspirations, the peoples of Yugoslavia became united in the Socialist Federal Republic of Yugoslavia. It is a federation of free and equal peoples and nationalities, promoting socialist social relations, national liberty and independence, brotherhood and unity of her peoples, and the solidarity of working people. The basic principles of the socio-economic system of Yugoslavia are the same for the whole country. These basic principles are free associated labour founded on social ownership of means of production, self-management of working people in all walks of social life, and the distribution of income according to work performed in every working organization and socio-political community.

The social ownership of means of production was introduced gradually. Its foundation was laid already in the course of the armed struggle of the Yugoslav peoples against foreign invaders and their domestic collaborators. The property of enemies and domestic traitors was confiscated. At a later date the nationalization of the remaining economic enterprises was carried out as a supplementary measure, so that, as early as 1948, social ownership was extended over all enterprises in the field of industry, construction, transport, trade and catering. Banks, insurance companies, as well as cultural and health institutions were likewise nationalized.

The nationalization of means of production was not effected in agriculture. In that branch of the economy Yugoslavia inherited predominantly small-scale production units with primitive means and the mentality of small-holders. Moreover, agricultural producers were mainly acquiring their means of production by their own work. In such circumstances,

it was not possible to begin immediately developing socialist relations in agriculture, at least not with the same methods as those employed in industry. After the implementation of the land reform, which restricted land ownership to ten hectares of cultivated land, the socialization process of agricultural production took a variety of forms, particularly through the establishment of large socialist agricultural enterprises and agricultural co-operatives and through the co-operation between private agricultural producers and the socialist sector in agriculture.

In the period immediately after the war, the socialization of means of production and the predominant role of the State machinery in running the economy created conditions for the normal functioning of enterprises and for their mobilization in accomplishing the major targets of the Plan. Extensive industrialization of the country was initiated, with emphasis on basic industry. The economic structure was changed to a substantial extent in favour of industrial production; in consequence, labour productivity and the national income rose at an increased rate. Nevertheless, in spite of the excellent results obtained by means of centralized state actions, several drawbacks were experienced, especially a growing bureaucracy and stagnation tendencies, a slackening of the producers' initiative and a failure to take advantage of market mechanisms. For this reason, changes were introduced in the socio-economic system, aiming at providing conditions for a continuous rapid growth of production forces and of socialist social relations. The Law on Workers' Management in Enterprises was passed in 1950, initiating the process of the self-management of working people in the economy and in other spheres of social life. Workers' management and social self-government became the foundation of the socio-economic system of the country.

The substance of social self-government is reflected, first of all, in the right and obligation of working people to manage independently, in their

working organization, the means of production, to distribute the income of that organization and to conduct all other affairs of common interest (appointment and dismissal of workers, working conditions, merger with another working organization or the separation of one of its units, etc.). In conformity with the Constitution and other laws, the working people are independent in adopting plans and programmes of work and development. In the statutes, by-laws and other acts of their organizations, they determine their activities and objectives and regulate internal relations as well as other matters of importance for work and self-management. All these rights and obligations are exercised by the working people directly, through the meetings of working people and the referendum, or indirectly, through their management bodies, which are voted into and out of office by means of a general, direct and equal vote by secret ballot.

The self-management of the working people goes beyond their participating in decision-making in the working organization. Through their representatives in the assemblies of socio-political communities, from the commune to the Federation, they deliberate and take decision on all matters of common interest, within the scope of the rights and duties defined in the Constitution and other laws. For the purpose of guiding and co-ordinating the development of the economy and of non-economic activities, they adopt social plans, determine the conditions of economic activities and of mutual relations, etc. They also exercise social control over the utilization of social property and over the way in which working organizations meet their obligations towards society. In this manner, decision-making in working organizations based on self-management is democratically linked with the functions of the bodies of socio-political communities in the field of planning, regulations and control.

The system of self-management brings to full expression the distribution of income according to work performed, thus putting in practice the principle that only labour and its results can determine man's material and social status. The principal feature of such a distribution is that it stimulates every working organization to greater activity and better management of its affairs, in order to earn a higher income and have greater resources for the personal incomes of workers and for the expansion of its material base. The size of the personal income of each worker is determined individually, as this does not depend only on the performance of the worker in his job but also on the income derived by his working unit and his organization as a whole. This implies that the material situation of the organization, as well as that of each worker, greatly depends on the results of the work of the entire organization. The worker is thus interested both in

obtaining the best possible results in his job and in improving all the factors which affect the business success of his organization.

The principle of the distribution of income according to work performed has been applied also with respect to the resources of socio-political communities serving to meet the common needs. Their chief sources of income are the contributions paid by citizens out of their personal incomes. The higher these incomes, that is, the higher the activity, the employment and the productivity, the larger the revenue of socio-political communities and the greater the possibility to satisfy the common needs. This system of distribution of income therefore essentially fosters the interest in obtaining the best possible results from each working organization and each worker as well as from each socio-political community and of the entire social community.

The essence of self-management and of the distribution of income according to work performed is not only in the material stimulation of working people to meet the requirements of an intensified economic growth. Of equal importance is the fact that such self-management and distribution of income create conditions for much more profound changes in the life of the working people and for a more rapid development of socialist relations. This system places the working man in a qualitatively new social position. He has become the decisive factor in the entire process of social reproduction. Through control over production and distribution he has ceased to be a wage labourer. The emancipation of labour produces new social relations which are not based on administrative rule but on co-operation, discussion and exchange of experiences. The abolition of differences between intellectual and physical labour has been initiated, although this is a long and complex process, which will necessitate the overcoming of many obstacles created by the inadequate material and cultural level and by the remnants of the past which still linger in the minds of the people.

II. THE SOCIO-POLITICAL SYSTEM

The socio-political system has been built on the foundations of the socio-economic order which was described in the preceding section. The assemblies of socio-political communities are the supreme bodies of the sovereign people and the highest bodies of social self-government. These assemblies combine legislative and executive powers and take decisions on all the major issues of social, political and economic life. For this purpose, they independently adopt regulations, social plans and budgets, determine the organization and competences of their organs, exercise control over the activities of

executive and administrative organs, and deal with other matters of general interest for the advancement of the socio-political community.

The assembly of a commune, province or republic and the Federal Assembly consist of two or more chambers. One of these chambers is the general political body of all the citizens, and all citizens over 18 years of age participate in the election of the deputies in that chamber. The other chambers of the assemblies are chambers of working communities. Their members are elected by people employed in working organizations. Every chamber is conceived as a part of the integral social function of the assembly; they are independent and equal in the conduct of their affairs. The division of competence between them has been effected either by placing certain powers within the joint jurisdiction of two chambers (decisions made jointly by the general political chamber and another chamber) or within the exclusive jurisdiction of one chamber, or by specifying that certain decisions can be taken only by all chambers in joint session.

The assemblies do not all have the same number of chambers of working communities. The assemblies of communes have, as a rule, only one chamber, which is the representative body of the working people in all the working organizations on its territory. The assemblies of the republics, of the autonomous provinces and the Federal Assembly each have four chambers of this kind, covering various areas of social activity, i.e. the Economic Chamber, the Chamber of Education and Culture, the Chamber of Social Welfare and Public Health and the Organizational-political Chamber.

In addition to these chambers, the Federal Assembly has also a Chamber of Nationalities, which consists of an equal number of deputies from all the republics and provinces, ensuring in this way the equal status of all peoples and of all republics regardless of their size and providing an efficient means of protecting their interests. However, in certain cases, the Chamber of Nationalities sits as a separate body and has independent rights (e.g. when amendments to the Constitution are considered, and at the request of the majority of the delegates from a republic or of ten members etc.).

The members of communal assemblies (councillors) are elected, by direct vote, by the citizens who live and the working people who are employed on the territory of a commune. The members of the assemblies of other socio-political communities (deputies) are elected by communal assemblies and directly by the citizens. For example, deputies in the Federal Chamber must be elected in the communal assembly, by a legally determined majority, and this election must be confirmed by the majority of all the voters in a constituency; if several candidates are elected by the communal assembly, the candidate who obtains the largest number of votes in the constituency

becomes deputy. In the chambers of the working communities of the Federal Assembly, the deputies are those candidates who are elected in the communal assemblies by a legally determined majority. The participation of communal assemblies in the election of deputies in the assemblies of larger socio-political communities is the tangible expression of the concept that the commune is the basic cell in the social order of the country. The commune is the vehicle of the most direct forms of social self-government, and it elects bodies to whom the functions of authority are entrusted. It is therefore natural for its representative body to be elected by direct vote and for the representative bodies of other socio-political communities to be formed as delegations of communes. In this manner, the entire mechanism of assemblies becomes integrated into the system of social-self-government.

One of the main principles of the Yugoslav political and parliamentary system is the principle of rotation, i.e. of the non-re-eligibility of those entrusted with functions of authority and of the holders of other public offices; it stipulates, at the same time, that one person may not hold more than one office. This means in practice that, as a rule, no person can be for two consecutive terms a member of the same chamber, assembly, executive council or of the council of the communal assembly. Likewise, no person can at the same time be a member of the Federal and the Republic Assembly, or member of two chambers of the same assembly.

All assemblies comply fully with the principle of the public character of their proceedings. It imposes on the assembly the obligation to inform the public about its work and to ensure, by its organization and methods of work, the most direct possible participation and influence of citizens and working organizations in the consideration of problems and in decision-making.

The functions and organization of executive and administrative bodies have been brought into conformity with this main function of the assembly, in its capacity of protagonist of the integral system of authority. The main task of these bodies is to supervise the implementation of the laws, social plans and other acts of the assemblies. These bodies are set up in all socio-political communities and are directly subordinated to the assembly which has formed them. The political-executive body of the Federal Assembly is the Federal Executive Council. The assemblies of republics and provinces also appoint executive councils as their political-executive organs, while communal assemblies set up appropriate boards. The affairs of state administration are conducted by secretariats and other organs, whose number and functions depend on the volume and nature of the affairs and on the type of socio-political community.

The President of the Republic occupies a specific place in this system. He represents the Socialist Federal Republic of Yugoslavia at home and abroad, he is the commander-in-chief of the armed forces and discharges the political-executive functions determined by the Constitution. The President of the Republic proposes to the Federal Assembly one of the members of the Assembly for appointment as president of the Federal Executive Council, who, in turn, proposes the election of the members of that Council. Further, the President of the Republic has the right to convene sessions of the Federal Executive Council on certain matters, in which case he presides over the meeting.

The Federal Assembly elects the President of the Republic for a term of four years; his re-election is subject to his not remaining in office for more than two consecutive terms. This limitation of tenure of office for the President of the Republic does not apply to Josip Broz Tito. During his absence, the functions of President are exercised by the Vice-President of the Republic, who is also elected by the Federal Assembly.

The functions of the judiciary are separated by law from legislative and political-executive functions. The functions of the judiciary are exercised within an integral judiciary system, which consists of courts of general jurisdiction (communal and district courts, supreme courts of the republics, Supreme Court of Yugoslavia) and of specialized courts (economic, military, etc.). Constitutional courts have also been established for the protection of the socio-economic and political relations determined by the Constitution and by other laws, of the unity of the legal order and of civil rights. Courts are independent in the exercise of their functions, basing their verdicts on the Constitution and other laws. Court proceedings are conducted by regular judges and by lay judges, who are voted into and out of office by the assembly of the given socio-political community. Court proceedings are public in principle.

In addition to courts, there are also organs of public prosecution in the capacity of autonomous organs entrusted with criminal prosecution and with the application of measures prescribed by law and of legal expedients to ensure the uniform enforcement of laws and to protect legality. Private legal practice is also well developed.

III. MAIN FEATURES OF THE STRUCTURE AND GROWTH OF THE NATIONAL ECONOMY

1. *Basic geographic, demographic and employment data*

The present territory of the Socialist Federal Republic of Yugoslavia covers an area of 255,804

square kilometres. At the time of the last census, carried out in 1961, the population of the country was 18,549,000, and the population density 72 inhabitants per square kilometre. It is estimated that in 1965 Yugoslavia had 19,525,000 inhabitants, the forecast for 1970 being 20,671,000 inhabitants and it is anticipated that in 1981 the population will rise to 23,007,000 inhabitants.

At the time of the 1921 census, Yugoslavia had 11,984,911 inhabitants; in 1948 their number had risen to 15,772,098, in spite of the great losses in human life (estimated at 1,700,000) suffered during the Second World War.

Between the two wars, the average annual rate of population increase amounted to 1.6 per cent. This rate increased substantially between the years 1946 and 1956, then dropped to 1.1 per cent after 1956. Yugoslavia was thus characterized, until very recently, by a rather high rate of population growth.

The distribution of the population according to republics and autonomous provinces is given in Table I.

Table I

Distribution of population by Republics, according to the three latest censuses⁽¹⁾ (in thousands)

Republic or Province	1948	1953	1961
Bosnia and Herzegovina	2,565	2,848	3,278
Montenegro	377	420	472
Croatia	3,757	3,919	4,160
Macedonia	1,153	1,304	1,406
Slovenia	1,392	1,466	1,591
Serbia	6,528	6,979	7,642
Autonomous Province of Vojvodina	(1,663)	(1,713)	(1,845)
Autonomous Province of Kosovo and Metohija	(728)	(808)	(964)
Total for country	15,772	16,936	18,549

1. Population figures relate to the National Territory at the time of each census. For 1961, the census refers to the enlarged Territory of Yugoslavia.

Males comprise approximately 65 per cent of the total active population, according to the two latest censuses (1953 and 1961). In 1961, 31.1 per cent of the population belonged to the group under 15 years of age, 62.6 per cent were persons able to

Table II

Number and distribution of employed persons in 1952 and 1964

	Number in thousands		Index (1952 - 100)	Distribution in %	
	1952	1964		1952	1964
<i>Economic activities</i>					
Industry and mining	562	1,319	234.7	32.4	36.6
Agric., forestry, fisheries	213	406	190.6	12.3	11.3
Construction	217	361	166.4	12.5	10.0
Transport	139	246	177.0	8.0	6.8
Trade and catering	161	337	209.3	9.3	9.3
Crafts	104	253	243.3	6.0	7.0
Municipal services	39	106	271.8	2.2	2.9
Sub-total	1,435	3,028	211.0	82.8	83.9
<i>Non-economic activities</i>					
Cultural and social	178	387	217.4	10.3	10.7
Public admin. & other	121	193	159.5	6.9	5.4
Sub-total	299	580	194.0	17.2	16.1
TOTAL	1,734	3,608	208.1	100	100

work, i.e. between 15 and 65 years of age, and 6.3 per cent were persons over 65 years. More detailed data on their distribution, including the distribution by sex, estimates for 1966 and forecasts for 1971 are given in Table 11, Annex III. According to forecasts for 1971, 64.4 per cent of the total population of Yugoslavia will then belong to the age group of persons able to work.

The trends in the percentage of rural population in relation to the total active population constitute a specific indicator of the changes that have taken place not only in the demographic but also in the economic structure of the country. During the first years after the First World War, about 1921, some 80 per cent of the active population worked in agriculture; on the eve of the Second World War 75 per cent of the active population still lived on agriculture.

After the war, the distribution of the population was radically changed: the percentage of the rural population decreased from 72.7 per cent in 1948 to 56.2 per cent in 1961. The total rural population, including dependants, was reduced from 10.6 million in 1948 to 9.2 million in 1961, i.e. their number dropped from 67.2 per cent of the total population in 1948 to 49.4 per cent in 1961.

In 1964, 3,608,000 persons were employed in economic and non-economic activities, in both the so-

cialist and the private sectors, (84 per cent in economic and 16 per cent in non-economic activities). Compared with 1952, the total number of employed persons has more than doubled, the rate of increase being the highest in industry and mining (from 562,000 to 1,319,000). The number and distribution of the active population and the changes that occurred between 1952 and 1964 are shown in Table II, above.

The rapid growth of the rate of employment which accompanied the industrialization of the country is also manifested in the increase of the percentage of the total population which is employed (from 5.9 per cent in 1939 to 10.2 in 1952 to 18.7 in 1964).

2. National income and investments

a) Volume and rate of growth of the national income

In 1965, the value of the national income⁽¹⁾ of Yugoslavia amounted to 73.47 thousand million

1. The national income (= net material product) does not include non-productive services. In order to compare with the national incomes of the countries which have adopted the methodology exposed in the UN document "A Standardized System of National Accounts", we would have to include these services. In our case, an increase of some 20 per cent would result.

(new) dinars, or 3,766 dinars per capita. Converted into dollars on the basis of the real purchasing parity of the dinar,¹ the national income, i.e. the net material product, was estimated in 1965 at 10.61² thousand million U.S. dollars or 544² U.S. dollars per capita.

Two periods can be clearly distinguished in the economic and social development of Yugoslavia: the period between the two wars and the post-war period of socialist economic and social development.

At the beginning of the first period (1923), the per capita national income amounted to approximately 192 U.S. dollars per capita (according to the parity of the purchasing power of the dinar in 1965). Between 1923 and 1939 the population increased at the annual rate of 1.5 per cent and the national income at the rate of 2.5 per cent, so that the per capita income grew by only 1 per cent per annum, amounting in 1939 to about 218 U.S. dollars (likewise on the basis of the parity of 1965).

Under such conditions, the economic structure was changing at a slow rate. The share of industry and crafts in the national income, which amounted to 20 per cent in 1923, was increased by 1939 to 25-26 per cent; this could not effect any substantial changes in an economy which continued to be predominantly agrarian in character, with an agriculture bearing all the marks of extensive economic activity with low productivity and redundant labour which could not be absorbed by the undeveloped industrial sector.

The new, socialist, social system was a decisive factor in promoting the economic and social growth of Yugoslavia after the Second World War. The new social structure was characterized by determined efforts to accelerate economic growth to the utmost and thus to create material conditions for the improvement of the living standards of the population in all their essential aspects.

During the 17 years between 1947 and 1964, the national income increased by more than a factor of 3 (index 326) in absolute terms and the per capita income by a factor of 2.6, the average annual rate of increase being 7.2 per cent and 5.9 per cent respectively. During the first nine years (1947-1956) the national income grew at a lower rate, 4.6 per cent for the total income or 3.2 per cent for the per capita income. This trend resulted mainly from the unfavourable foreign trade balance experienced by Yugoslavia during the period 1948-1952. This, combined with a substantial increase in defence expenditures, inevitably led to a slowing down of the economic expansion which affected first of all the standard of living of the population.

During the period 1956-1964, the national income rose at the annual rate of 10.2 per cent, or 9.1 per cent per capita. In addition to the results obtained in the preceding period, when a broad basis for the

accelerated industrialization of the country was created, these trends received after 1956 a strong impetus from the development of workers' management and from the intensified action of the market mechanism.

b) Structure of the national income

The preponderant share of industry in the formation of the national income constitutes one of the principal characteristics of the present economic structure of Yugoslavia. In 1964, 48 per cent of the national income was derived from industry. Such a structure is the result of the extremely dynamic changes that occurred in the economic development of Yugoslavia during the post-war years, as can be seen from the data presented in Table III.

Table III

Changes in the structure of the national income of Yugoslavia between 1947 and 1964 (at constant, 1960 prices)

	1947	1964	1964 Index (1947=100)
Total	100.0	100.0	326
Industry and mining	29.0	48.0	542
Agriculture and fisheries	37.0	20.0	178
Forestry	5.0	2.0	95
Construction	9.0	7.0	263
Transport	5.0	6.0	415
Trade and catering	9.0	12.0	446
Other	6.0	5.0	254

During this period, the income derived from industry was increased by a factor of 5.4 and the income from agriculture by 1.8. Thus the situation regarding the contribution of these two economic branches to the national income was completely changed. Other branches, such as transport, trade and catering and construction also expanded considerably.

c) Investments

A high rate of investment has been one of the striking features of the economic development of Yugoslavia and a major factor in the changes that took place in

1. See Annex I.2.

2. The exchange rate obtained by the SP method is here utilized. See Annex I.2.

the structure of the economy after 1947. The whole post-war development of the Yugoslav economy has been characterized by a constantly increasing rate of accumulation, as shown in Table IV.

Table IV

*Share of investments in the social product
(As % of total, at constant, 1962 prices)*

	Economic investments	Non-economic investments	Total
1947-1952	22.7	5.8	28.5
1953-1956	26.4	4.5	30.9
1957-1963	27.0	8.6	35.6

The breakdown of economic investments reflects the prominent importance attached to industry in the economic growth policy of Yugoslavia. In 1964, the total gross investments in the Yugoslav economy amounted to 13.43 thousand million (new) dinars or 2.4 thousand million U.S. dollars, for the socialist and the private sector together; industry absorbed 50.5 per cent of this total, transport 18.1 per cent, agriculture 16.1 per cent, trade and catering 8.6 per cent, construction 3.4 per cent, crafts 1.7 per cent, and forestry 1.6 per cent.

Investments in industry have been intensive throughout the post-war period (see Table V). This tendency was especially marked during the first decade after the war, between 1948 and 1956, when the foundations were being laid for an accelerated industrialization of the Yugoslav economy.

Table V

*Breakdown of economic investments during the period 1948-1964 (socialist and private sectors)
(As % of total, at constant, 1962 prices)*

	1948-1956	1957-1960	1961-1964
Total economic investments	100.0	100.0	100.0
Industry and mining	56.2	43.1	51.0
Agriculture and fisheries	15.9	23.6	17.3
Forestry	2.0	1.7	1.7
Construction	2.8	3.0	3.2
Transport	18.3	21.3	17.8
Trade and catering	3.6	5.8	7.3
Crafts	1.2	1.5	1.7

After 1956, a special effort was made in the branches with low rates of growth. This was particularly true of agriculture between 1957 and 1960, when its share of total investments was the highest.

3. Industry and mining

The industrialization policy was based on the fact that the country's natural resources were rich and diverse. There were 7.9 million hectares covered by forests, and the electric power potential of rivers amounted to about 13 million kW, a potential capacity of 65-70 thousand million kWh annually. Coal, although predominantly of a low calorific value, with estimated deposits of 21 thousand million tons, also constituted an important source of electric power as well as an abundant supply of raw materials for chemical industry. Among the mineral deposits, the most promising ones were non-ferrous metals - copper, lead and particularly bauxite. Together with the less abundant deposits of iron ores, and a variety of non-metals, an area of 14.9 million hectares was under cultivation, guaranteeing a rich supply of raw materials for the food processing industry. Altogether, the natural resources provided a solid basis on which to initiate a more rapid industrialization of the country.

During the first post years (1948-1956), when industrialization served as the main instrument in transforming the country's economic structure, emphasis was laid on developing electric power production, capacities for the primary processing of raw materials and the capital-goods industry.

This policy resulted in a vigorous expansion of the entire industrial production. Compared with the level of 1939, the physical volume of industrial production had by 1964 been increased by seven times. The average annual rate of growth of industrial production for the period 1947-1964 was 10.8 per cent. This rate, however, was not continuously maintained at the same level. At the time of centralistic state management, this rate was considerably lower, amounting to 6.5 per cent per annum. The transfer of decision-making powers in all matters concerning production and remuneration to the working communities themselves liberated the strong latent potential of the economy and accelerated the rate of growth of industrial production. Thus, for instance, the average annual rate of growth of the total industrial production was raised to 12.6 per cent during the years 1952-1961, one of the highest rates in the world.

So far, one of the major characteristics of industrialization in Yugoslavia has been its broad range. This policy gave rise to the production of a great number of goods that had not been made in the country before the war (equipment and machines, primarily capital goods but also durable consumer goods). Production was launched in entirely new

industrial branches, some of which gained in importance as the propulsive factors of industrial and general economic development. The growth indices of the physical volume of production in individual branches, shown in Table VI, give an idea of the rate at which the new capital goods industry expanded; this volume increased, by 25 times in the period 1939-1964. Among the new industrial branches, electro-industry and crude oil production take a prominent place.

Table VI

Growth indices of industrial production, according to basic groups of products

	1952 (1939=100)	1964 (1952=100)	1964 (1939=100)
Industry - total	164	417	714
Capital goods	588	435	2,500
Raw materials and semi-finished goods	156	400	625
Consumer goods	141	476	667

A few data about some basic commodities will illustrate the level of industrial production attained. For example, if we take the volume of production in 1964 and 1939, the figures for raw steel are 1,677,000 and 235,000 tons, electric power 14,189 and 1,173 million kWh, crude oil 1,799,000 and 1,000 tons, machines for industry and construction 81 and 5 thousand tons; 18.5 thousand lorries and tractors and 528 thousand wireless sets were produced in 1964, while in 1939 the production of such items was inexistent.

Nonetheless, in spite of this expansion of industrial production, the present level of industrial potential, expressed in terms of per capita steel production (87 kilogrammes in 1964), or of electric power production (736 kWh per capita) indicates that the production should continue to expand at a high rate.

The present structure of industrial production, measured by the volume of the social product derived from various branches of production, puts at the top of the list the production of capital equipment and durable consumer goods, which provided in 1963 one fourth of the social product derived from the national industry. The present trend is for this type of production and for chemical industry to increase their share in the social product. (Table VII)

In 1964, industry employed 1.32 million persons or 43.5 per cent of all persons employed in the economy, as compared with the 300,000 persons employed in industry before the war (1939). The number of industrial enterprises grew by over 400, with a tendency to the formation of larger units; thus, in

Table VII

Origin of the social product derived from industry in 1952 and 1963
(As % of total, at constant, 1962 prices)

	1952	1963
Electric power	15.0	14.6
Basic metals	8.8	8.6
Capital equipment and durable consumer goods	19.6	24.7
Chemical industry	4.0	7.0
Material for construction and non-metals	7.2	5.9
Processing of agricultural products	16.4	12.4
Timber processing	9.1	7.8
Textiles, leather and rubber	16.7	15.1
Other industry	3.2	3.9
Total, industry and mining	100.0	100.0

1952, 11 per cent of all industrial enterprises employed over 500 workers, and only 4.6 per cent employed over 1,000 workers. In 1964, on the other hand, 27 per cent of all industrial enterprises employed over 500 workers and 13.7 per cent over 1000 workers, comprising together 57 per cent of the total manpower employed in industry. However, the number of small industrial enterprises is still considered to be large, especially in view of the fact that they are not sufficiently specialized. For all these reasons, it may be said that the extremely dynamic development of industry in the past years was extensive by character and that this is partly the result of the insufficiently selective investment policies of socio-political communities.

The need is also felt to encourage integration and the establishment of larger production units, so as to accelerate in some branches the introduction of new techniques; this requires, in turn, the improvement of research and of its organization. At the present level of industrialization it is becoming increasingly manifest that there is a need for more up-to-date methods in the organization of work and in decision-making in economic enterprises. These are some of the main conditions for the further rapid growth of industrial production and its participation in the international division of labour.

4. Agriculture

Vast areas of land suitable for cultivation and favourable climatic and geographical conditions permit a broad and diversified range of agricultural products, and agriculture in Yugoslavia has extremely great potentialities.

The cultivable area covers 14.9 million hectares, or 58 per cent of the territory. Land under cultivation consisted in 1964 of 51 per cent of arable fields and gardens, 4.7 per cent of orchards and vineyards, 12.8 per cent of meadows, 31 per cent of pastures, and 0.5 per cent of other types of cultivable land.

The breakdown of area sown in 1964 is indicative of the present trends in crops production. During that year, the area under crops comprised 75.4 per cent of cereals, 5.6 per cent of industrial crops, 8.2 per cent of vegetables and 10.8 per cent of animal fodder. Livestock consisted in 1964 of 5.1 million head of cattle, 6.1 million pigs, 9.7 million sheep and 32.5 million head of poultry.

Agricultural production during the post-war years did not expand at an even pace. Until the end of 1957, agricultural production went through a period of stagnation, causing a considerable structural disproportion in the economic development of the country. A series of measures aimed at correcting this situation were taken from 1957 on. The use of up-to-date machines and chemicals considerably contributed to increasing the yields in farming. A few data will illustrate this trend: between 1958 and 1964 the number of tractors has more than doubled, the number of combines has trebled, and the amount of artificial fertilizers used has also doubled. Parallel to the efforts in furthering mechanization and the use of chemicals in agriculture, new sorts of high-yielding wheat and maize and of some industrial crops were introduced, and a systematic dissemination of highly productive cattle breeds adjusted to the local geographical and climatic conditions was undertaken. The results of these drives, which involved a considerable amount of research, were reflected in a growing acceptance of the new production methods.

In Tables VIII and IX, we present data on the total volume of agricultural production and on yields of main crops. The figures shown give an idea of the main trends and of the changes that occurred after 1957 as a result of a number of economic measures, including intensified investments in agriculture and subsidized prices of agricultural machines and fertilizers.

In 1964, only 13.5 per cent of cultivable land was in the socialist sector, although it provided substantially more products for the market than individual producers. Because individual holdings exploit most of the cultivable area modern means of cultivation need to be introduced, the agrarian policy since 1957 devoted particular attention to developing co-operation between individual producers and large socialist farms and agricultural co-operatives. Agricultural co-operatives, which have a long tradition in Yugoslav agriculture as voluntary economic associations of individual producers, were assigned

the important role of lending technical assistance and of introducing up-to-date methods of production on individual holdings. The differences between the yields obtained on individual and social holdings are mainly brought about by the differences in the extent to which modern means of cultivation have been employed, in the organization of work and in an appropriate concentration of land.

Table VIII

Growth indices of the physical volume of agricultural production
(pre-war average for the decade 1930-1939=100)

	Averages for the years			
	1947-51	1952-56	1957-61	1962-65
Total agricultural production	95.2	97.6	142.8	157.8
Crop farming	96.0	93.6	149.4	161.3
Fruit growing	105.0	104.6	125.6	121.5
Viticulture	112.2	97.4	118.2	147.0
Livestock	86.8	97.8	131.4	145.8

Table IX

Average yields of main crops
(quintals per hectare)

	1930-39	1947-51	1952-56	1957-61	1962-65
Wheat	11.4	12.0	10.6	16.2	18.4
Maize	16.4	16.2	12.8	21.4	23.9
Sugar beet	176.0	150.0	152.0	253.0	294.3
Tobacco	9.9	8.3	8.2	8.7	9.2
Potatoes	60.0	69.0	76.0	102.0	88.3

Table X

Average yields, 1962-1964
(in quintals per hectare)

	Social holdings	Individual holdings
Wheat	29	16
Maize	46	22
Sugar beet	331	227
Potatoes	128	88

These statistics on yields indicate that there are still large untapped reserves which can serve to raise the productivity of Yugoslav agriculture. The activation of these reserves and the increase of the rate of growth of agricultural production remains one of the major objectives in the economic development of the country.

5. Foreign trade

There is a close relationship in the Yugoslav economy between foreign trade and the general economic growth. Between 1952 and 1957, the social product and the physical volume of exports grew at approximately the same rate. Between 1957 and 1964, the physical volume of the export of goods and services increased at a somewhat higher rate than the social product as shown in Table XI.

Table XI

Growth indices of the social product and foreign trade, 1952-1964

	1952	1957	1964
Social product (at constant, 1960 prices)	100	165	294
Physical volume of:			
Imports	100	173	329
Exports	100	171	346

The value of the import of goods in 1964 was 1,323 million U.S. dollars, or 68.6 U.S. dollars per capita, and exports amounted to 893 million U.S. dollars, or 46.3 U.S. dollars per capita. The average annual deficit in the exchange of goods in the 1962-1964 period was 37.6 per cent of the value of the exported goods.

The growth of industry, which caused significant changes in the economic structure, resulted also in a considerable alteration in the structure of foreign trade, especially with regard to exports, as shown in Table XII.

The structure of exports throughout the post-war period has shown a strong tendency towards the increase in the percentage of industrial products and the reduction of agricultural products, with the result that, in 1964, industry supplied 80 per cent of the exports as compared with 53 per cent in 1939.

Another change in the structure of exports was that the amount of exported finished goods increased, and the amount of crude products diminished (see Table XIII). Thus, the position of the Yugoslav economy in world trade, which used to be predominantly that of an exporter of primary commodities

Table XII

Structure of the export and import of commodities

Products	1939	1952	1960	1964
<i>Export:</i>				
Industry and mining	53.0	58.5	75.7	79.3
Agriculture*	42.7	37.6	23.0	19.4
Forestry	4.3	3.9	1.3	1.3
Total exports	100.0	100.0	100.0	100.0
<i>Import:</i>				
Industry and mining	91.6	76.0	91.1	87.1
Agriculture	8.4	24.0	8.9	12.9
Total imports	100.0	100.0	100.0	100.0

* Including agricultural products processed in the country (2.4 per cent of the total exports in 1964)

Table XIII

Exports, by degree of processing

	1939	1952	1960	1964
Crude products	55	52	26	17
Semi-finished goods	39	41	39	39
Finished goods	6	7	35	44
Total	100	100	100	100

before the war, owing to an underdeveloped industrial sector, underwent an important qualitative change.

A series of economic measures, primarily various forms of subsidies, played an important role in this expansion of the export of industrial goods. However, it was felt more and more strongly that domestic production should be made capable of competing in the world market without special subsidies. This realization resulted in the measures effected by the economic reform of 1965

6. Personal consumption and social standards

Until 1959, the standard of living, as measured by the total real value of personal consumption and

investments in the social standards¹, grew at a slower rate than the national income. During the four years 1953-1956, national income measured at constant prices increased at an annual rate of 8.2 per cent, while the total real value of personal consumption and investments in the social standards grew at the rate of 5.3 per cent per annum. These trends are, above all, the result of the priority having been given to the construction of industrial capacities.

After 1956, the trends of the general economic growth and of the living standards as a whole were harmonized. During the period 1957-1961, in which the highest post-war rates of growth of industry, agriculture and social product were attained, the rates of growth of personal consumption and investments in the social standards were also at their highest. The real national income increased by 10.0 per cent annually during that period, real personal consumption by 9.3 per cent, and investments in the social standards by 17.8 per cent. The compound rate of growth of the standard of living (personal consumption + investments) was 9.9 per cent.

Between 1957 and 1964, real personal incomes of persons employed in working organizations in the socialist sector rose by 81 per cent, or 7.7 per cent per annum (nominal incomes increased by 205 per cent and the cost of living by 68 per cent).

Such an increase of real personal incomes brought about changes in the level and structure of personal consumption. In 1965, food constituted about 49 per cent of the personal consumption of the total population, and as early as 1963 it dropped to 41 per cent; during the same time, the percentage of spendings on durable consumer goods was increased from 6.7 to 11 per cent.

However, there existed some disproportions between production and consumer demand. Whereas industrial production was on the whole flexible in adjusting to the demands of the market, the slower development of agriculture resulted in less substantial changes in the composition of the diet of the population than would have been consistent with the increase of personal incomes. The development of crafts and services, was also inadequate, so that the prices of food and services, which were formed according to the conditions in the market, represented the main components in the increase of the cost of living.

Housing construction expanded especially after 1956. Between 1957 and 1964, a total of 341 million square metres of housing area was built, raising the annual increase of the housing area per 1,000 inhabitants from 110 square metres in 1956 to 327 square metres in 1964. However, owing to the disproportion between the volume and structure of housing construction in the socialist sector and the extremely strong demand in towns and industrial centres,

administrative control of allocations was retained longer in the housing sector than elsewhere.

Although substantial funds have been invested in education and health protection², the networks of institutions are still insufficiently developed. This deficiency is primarily due to a social policy which opened up broader possibilities to the population for obtaining general education and health protection.

IV. PLANNING AND FINANCING MECHANISMS

1. *System of planning*

During the past two decades the system of planning has undergone substantial changes, as have also the organization and financing of economic and social activities. The evolution of the planning system was imposed by the problems arising from the economic and social development.

During the first post-war years, the programme designed to introduce qualitative changes in the economic structure of the country was implemented by means of the state management of the economy and by centralized planning.

With the adoption, in 1950, of the law on workers' management, a process of change was initiated in the economic system and in social relations, placing them on a basis that differed considerably from that on which the centralistic planning and administrative system of the preceding period were founded.

The transfer of decision-making powers on matters such as the organization of production, the production and business policy of the enterprise, profitability and the reduction of costs to the working communities, lent socially owned economic enterprises that business and operational independence which constitutes an indispensable component of efficient management in commodity production.

The system of planning which evolved in the conditions of social self-management is characterized by the independence of enterprises in adopting production and other plans. By means of these plans, enterprises determine their business policies with respect to simple and expanded reproduction and selling. The plans also contain forecasts of the business

1. The methodology used for calculating national income in Yugoslavia includes only commodities and production services under the heading "personal consumption", leaving out expenditure on non-production services, i.e. housing rents, health services, culture and education, and other personal non-production services. Expenditures on social standards comprise investment outlays in various establishments housing, hospitals, health, cultural and educational institutions and the current expenditure on these services.
2. Approximately 4 per cent of the national income is spent on education, while the expenditure on health services amounts to almost 5 per cent.

results of the enterprise, expressed in terms of income and of its distribution among the personal incomes of the workers and the independent funds of the enterprise.

When drawing up their plans, working organizations base their decisions on the general policy pertaining to the development and the conditions of economic activities contained in the social plans of socio-political communities, which guide and co-ordinate the development of the economy and public services in accordance with the needs and conditions of a given region.

The essential function of social plans is to effect such distribution of the total social labour and such structural harmony in the development of economic and other activities as will yield the most favourable results for the entire social community. The important role of the market mechanism is to stimulate rational decision-making in individual working organizations and thus facilitate the elimination of the inefficient organizations. The transfer of increasingly greater rights in the field of the economy to working organizations and thus the growing role of the market and commodity-monetary laws in the allocation of the factors of production and in the marketing of products represented, in fact, an inevitable process in the loosening of state control over economic decision-making and in raising the efficiency of the entire economy. On the other hand, the forces of the market cannot be let to act without any control. Economic measures and social intervention are used to restrict the action of those spontaneous market forces which produce adverse effects.

The present social plans of the Federation, as opposed to the plans from the period when the economy was regulated by administrative measures, does not any longer set specific targets to be fulfilled by individual organizations. Instead, the Social Plan provides basic-objectives and proportions, which are determined on the basis of the optimum possibilities for the economic development of the country considered as an integral economic region, during the period covered by the Plan. These objectives are determined on the basis of analyses on the development trends, the need to introduce certain structural changes in the economy or in a particular branch, etc. Other objectives concern the improvement of the living standards of the population. The basic proportions set up by the Social Plan are expressed in the form of various structural indices in the capacity of quantitative indicators of the objectives and proportions of development, such as the rate of growth of the social product and national income, their distribution, the rate of growth of individual basic sectors of the economy (industry, agriculture, etc.), the growth of investments and their distribution according to economic activities,

basic changes in the structure of foreign trade and the balance of payments, the rate of increase of employment, the rate of growth of personal consumption and of the social standards, and regional development, particularly the accelerated growth of underdeveloped regions. These general structural indices are drawn up on the basis of more detailed elements, which are published in the documentation attached to the Social Plan.

The objectives set down by the social plans of the constituent republics are formulated in keeping with the guide-lines of the general economic policy determined by the Federal Social Plan, as well as on the basis of general economic measures valid for the whole country. These plans make provision for the specific requirements of the development of the economy and public services on the territories of the individual republics and of the need to achieve a more rapid growth of the underdeveloped regions within them.

The social plans of communes formulate in the most concrete terms the objectives of the development of the economy and of those public services which have the most direct bearing on the living and working conditions of the population, such as the organization of market supply, local transport and other municipal services, crafts, housing, education and culture, health services and social welfare, etc.

2. Distribution, financing and social guidance mechanisms

The co-ordination of the decisions taken independently by economic organizations and their integration into the general objectives of the plans are effected by means of economic measures, such as the regulations on the distribution of the income of enterprises, measures regulating long-term and short-term credits, price policy and the measures concerning foreign trade.

Although enterprises are independent in distributing their income, their financial obligations towards the community are defined by the law. For example, all enterprises have to pay interest on their capital and working assets, regardless of the extent to which they use these assets; this measure serves as an incentive for enterprises to utilize them rationally. The revenue derived from this interest is used by socio-political communities to finance large projects. In addition, a certain portion of the personal income fund of enterprises goes to the budgets of socio-political communities; these communities thus take an active interest in the economic development of their territory. Social insurance rates are also paid out of the personal incomes fund, this money being used to finance the health protection of workers and for pensions. The federal and

local turnover taxes represent one of the main sources of revenue for the budget of a given socio-political community. The economic reform has turned this tax exclusively into an instrument of the economic policy for the adjustment of supply and demand.

The economic reform, whose implementation started in the middle of 1965, introduced substantial changes in the system of the distribution of income, by reducing the contributions paid by enterprises to the community and by increasing the portion of the social product left under the exclusive control of enterprises. In 1962, enterprises in industry and mining had given to the community, in the form of various contributions, 55 per cent of their social product. In 1964, these contributions were reduced to some 49 per cent, and in 1965 to 39 per cent. Once the reform takes full effect, these contributions will be reduced to 30 per cent.

By retaining control over a greater amount of funds, working organizations became independent in deciding on the investments to be made. Two or more enterprises can also pool resources to finance investments of common interest, and they can also deposit their funds in business banks.

The Federation can also take other measures to regulate the distribution of the income of working organizations, for the purpose of ensuring that the basic proportions and objectives of economic development should be materialized in accordance with the Federal Social Plan.

The banking mechanism plays a particularly important role in concentrating the free funds of enterprises. Banks are conceived as business organizations which are concerned about expanding their credit potential and about using their funds in the most efficient possible manner, through short-term and long-term credits. In determining their business policy, they take into consideration the objectives and forecasts on the rate of development of individual economic branches and the economic policy defined in the social plans.

Socio-political communities, and above all the Federation and the republics, are able to use their own investment funds to influence the structural harmony in the development of economic branches and activities. For that purpose, social plans make special provision for funds with which the Federation or the republics will participate in the financing of large economic and other projects in instances when the banks and enterprises are unable to provide sufficient resources.

In 1964, changes were effected in the system of financing expanded reproduction, in order to rationalize the utilization of the available funds. Instead of paying compulsory contributions to the investment funds of the Federation, the republics and the communes, enterprises form credit funds in business banks. The decision on how these funds are

to be used is taken by the enterprises, their voting strength being in proportion to the size of their deposits. In this manner, foundations have been laid for a financing mechanism of expanded reproduction in which economic criteria play an increasingly decisive role in the utilization of banking funds.

The present banking system, which went through several stages of evolution, functions through three types of institutions: investment banks, which grant loans for investments in capital and durable working assets of enterprises; commercial banks, which give short-term loans and supply the economy with the needed amount of money; and savings banks whose function is to accumulate deposits and grant consumer credits. The National Bank has a special position and role, since it issues money and regulates the credit potential of business banks, thus ensuring stability in economic and monetary trends. The National Bank also grants credits to business banks to stimulate certain economic activities, in conformity with the credit policy adopted by the Federal Assembly and the Federal Executive Council.

The foreign exchange regime and the regulations concerning foreign trade are a further group of economic instruments through which the community materializes the objectives and targets of economic development adopted by the Social Plan of the Federation.

Import and export are free in principle. However, for certain groups of products, instruments of quantitative restrictions and regional guidance are used, such as export and import quotas, licences and approval. The National Bank has the exclusive right to purchase the foreign exchange earned by export, a portion being left at the free disposal of the relevant enterprises. The system has gradually evolved in the direction of more liberal conditions; the aim of these changes is to eliminate unnecessary administrative barriers and thus enable the influence of the world market to be felt by the domestic production, in order to strengthen its competitiveness and to ensure such efficient organization of production as will obtain favourable results in foreign trade.

Until 1965, a rather extensive system of export subsidies has been in force, mostly in the form of premiums and fiscal exemptions; together with customs tariffs, which had a predominantly fiscal function, these measures resulted in a substantial disparity between the rates of exchange of the dinar applied respectively to the export and import of goods and services. This inevitably conveyed mistaken ideas on the profitability of exports and on the economic justification of imports. With the economic reform, a unique rate of exchange was introduced (1 U.S. dollar = 12.5 (new) dinars), thus placing all the economic organizations in the same

position in relation to the foreign market. Customs tariffs also assumed their basic economic function of protecting certain sectors of production of the national economy, acting, at the same time, as an incentive to higher productivity and efficiency of the domestic producers.

As regards the domestic market, the principle of price formation according to supply and demand and its active role in the production orientation and the allocation of the factors of production by producers represents one of the main elements of the business independence of working organizations as well as of economic calculation. Nevertheless, the dynamic economic growth of Yugoslavia still causes unbalance between supply and demand in the case of some commodities, and the adverse effects of such

a situation cannot be adequately counteracted by financial instruments only. For that reason, exceptional State interventions in the sphere of prices have been required (ceiling prices, permissions to raise prices, guaranteed prices for agricultural products etc.). This State price control is enforced as a rule when there is an indication that the monopolistic position of a branch makes possible for enterprises to derive unjustifiably high incomes by raising prices, a situation which could lead to serious disturbances in the economy. In this manner, economic measures are used to prevent the market mechanism from affecting unfavourably the establishment of the basic proportions set down by the social plans.

1. DEFINITIONS OF SPECIAL TERMS AND CONCEPTS
2. METHOD OF CALCULATION OF THE PURCHASING POWER PARITY OF THE DINAR

1. DEFINITIONS OF SPECIAL TERMS AND CONCEPTS

Socio-political community - the community formed by the group of people residing in an area which constitutes a separate economic, political and territorial entity. The basic socio-political community in the Yugoslav social order is the municipality (commune); however, the term is also applied to other communities institutionalized on a larger scale, such as the District, the Province, the Republic or the Federation.

Socio-political organizations - groups of persons united by a common socio-political programme, aim or task. The Socialist Alliance of the Working People and the League of Communists are the two main socio-political organizations in Yugoslavia. There are other socio-political organizations, such as the Confederation of Yugoslav Trade Unions, the League of Youth, the Conference for the Social Activity of Women, etc. All of these organizations are members of the Socialist Alliance.

Social body - this term denotes all organs which have been elected or appointed to administer or discharge certain affairs in the name of a social community (commune, district, etc.). Such social bodies are for example assemblies of socio-political communities, executive councils, courts of justice, etc.

Social property - The form of ownership according to which means of production are owned by society. In the Yugoslav system, the means of production are managed directly by the working people, that is, by society as a whole, associated in working organizations or territorial communities, to be used by them. This form of ownership constitutes the foundation of the Yugoslav economic system and social order. It serves as the basis of the ramified system of self-management of the working people in the sphere of production and distribution of income, and of the planned guidance of economic and social development.

General acts of a working community - general acts (internal regulations) adopted by a working community in conformity with the Constitution and the laws, determining the relations prevailing in that working organization. The main general act is the statute of the working organization. It determines the internal organization, scope of competence and responsibility of the bodies of management; the status of working units and the rights of the working people in managing these units; labour and other internal relations; methods of running the organization; and other matters of importance for self-management in the working organization and for its activities. In addition to the statute, the general acts of a working organization comprise various by-laws, e.g. on the distribution of income, on the distribution of personal incomes, on the funds of the working organization, etc.

Working community - the community of persons who work in a working organization and exercise management over the social means of production that have been placed at their disposal and over the product of their labour. The regulations and statutes of working organizations determine in precise terms the conditions for becoming a member of a certain organization, as well as the rights and duties of every worker in his capacity of member of the working organization. *At the meetings of the working community* - the workers nominate candidates for their representative bodies and discharge other affairs provided for by the laws and the statute of the organization.

Social services -- the term denotes those activities which are indispensable and useful for society and which are not economic by nature. These activities comprise education, science and culture, public health, social welfare, social security, public administration, etc.

Social standards - the level of development of

housing, municipal services, education, culture, physical culture, health, social welfare and social security in a society. All these activities directly serve to meet various needs of the population and greatly influence its standard of living.

Personal income - the share of the worker in that portion of the revenue which is set apart by the working organization to which he belongs and is distributed among its members according to their work and contribution to the general business success. Every working organization adopts its own by-laws setting down the standards and criteria for this distribution. The size of the personal income depends on the business results of the working organization as a whole, on the contribution of an economic or working unit to those results and on the personal performance of the worker in his job.

Citizens who are engaged, by their personal work, in independent agricultural, handicraft, service and

similar activities derive a personal income which is equal to the net revenue from their activity.

Working organization - the term covers enterprises and other economic organizations whose activities are conducted in the field of the economy, as well as the institutions and other organizations whose activities are in the field of education, science, culture, health protection, social welfare, or of other social services. Every working organization is an independent and self-managed organization.

Working unit - organizational part of a working organization constituting a whole; its definition depends on the type of activity, on the technological field, and on its relation to the entire working organization. The working units of a working organization have certain rights of self-management which are exercised through the meetings of these units or through their bodies of self-management.

2. METHOD OF CALCULATION OF THE PURCHASING POWER PARITY OF THE DINAR^{1,2}

The purchasing power parities¹ of the dinar and the U.S. dollar obtained by methods based on calculations of the gross national product (GNP) and the social product (SP, Yugoslav definition) in Yugoslavia are given below, according to years:

Year	Purchasing power parity of the dinar (din./U.S. \$)	
	GNP method	SP method
1948	0.595	0.599
1953	2.92	3.00
1958	3.16	3.28
1961	3.94	4.19
1962	4.17	4.46
1963	4.43	4.79
1964	5.17	5.60
1965	6.38	6.93

Some estimates of the per capita national income (or social product) in Yugoslavia in 1953 were taken as the starting point in determining the ratio of the purchasing power parities of the dinar and the U.S. dollar. This per capita aggregate is estimated at approximately 200 U.S. dollars according to its purchasing power in the same year.

This figure is quoted by M.L. Watkins (International Studies Center of the Massachusetts Institute of Technology, according to P. Kindleberger, *Economic Development*, 1958, p. 6) and in the U.N. document of August 1960 [Memorandum D-4: *Patterns of Industrial Growth*, Statistical Annex Tab.A-2]. A Yugoslav estimate made in 1955 assesses the per capita income in 1953 at 197.4 U.S. dollars (*Deset godina nove Jugoslavije*, 1955, p. 156).

By using appropriate implicit price indices for the aggregate of the social product for the United States and Yugoslavia, it was found that the purchasing power rate, under these conditions, should amount in 1938 to approximately 38 old dinars per U.S. dollar, as compared with the average annual rate of exchange of 43.25 old dinars per U.S. dollar quoted in the *Statistical Abstract of the United States* for 1939 and 1940 [pp.288 and 291].

This confers probability to the estimate according to which the per capita social product in 1953 amounted to approximately 200 U.S. dollars according to the purchasing power in the same year.

1. Compiled by S. Stajić, senior scientific worker at the Yugoslav Institute for Economic Research, Beograd.
2. The dinar currency used throughout this publication is, unless otherwise indicated, the "new" dinar (= 100 "old" dinar). Abbreviation: din.
3. The exchange rate conversion factors used throughout are, unless otherwise indicated, the ones obtained by the GNP Method (left column in the table above), i.e. 6.38 din./\$ for 1965, etc.

By means of this estimate, and taking into consideration the internal changes in prices which occurred between 1953 and 1961, or 1962, in both countries (implicit price indices on the basis of the Yugoslav definition of the social product), it was calculated that the global purchasing power parity of the dinar and the dollar in 1961 amounted to 418.6 old dinars per U.S. dollar, and in 1962 to 445.6 old dinars per U.S. dollar.

In order to make a comparison on the basis of the Western definition of the gross national product (GNP, definition of the U.N. Statistical Office), supplementary calculations were made with regard to those activities which are not considered as productive under the Yugoslav definition.

The value of GNP computed in this manner lowered the purchasing power parity of the dinar and the U.S. dollar to 394.0 old dinars per U.S. dollar in 1961, and to 416.8 old dinars per U.S. dollar in 1962.

In a study project undertaken by the Yugoslav Institute for Economic Research of Beograd, a detailed comparison was carried out between the aggregate products (according to branches and groups of products) and the purchasing power of the French and Yugoslav currencies in 1962 and this was used as a check for the computed purchasing power parities of the dinar and the U.S. dollar.

The verification of the calculated purchasing power parities of the dinar and the U.S. dollar was carried out by means of the well-known computations of the purchasing power of the U.S. dollar and the currencies of some West European countries, which were done by Gilbert and Kravis for 1950 (Milton Gilbert and Irving B. Kravis, *An International Comparison of National Products and the Purchasing Power of Currencies*, Paris 1954).

Non-productive services were omitted in the calculations, so as to arrive at the appropriate purchasing power parities of the French franc and the U.S. dollar on the basis of the Yugoslav definition of the social product, in addition to the parities computed by the above-mentioned authors for the GNP aggregate.

By applying the implicit price indices for France and the United States from 1950 until 1962, the following corresponding parities for 1962 were obtained:

GNP Method 3.451 (NF/U.S. \$)

SP Method 3.676 (NF/U.S. \$)

If direct comparison is made between the results obtained by the calculation for France and the United States in relation to Yugoslavia, one obtains the following parities between the U.S. dollar and the French franc for 1962:

GNP Method 3.640 (NF/U.S. \$)

SP Method 3.556 (NF/U.S. \$)

Of course, direct comparison cannot yield completely satisfactory results. Nevertheless, the difference of 5.47% more for the parity of the dollar and the franc on the basis of the GNP method and of 3.37% less on the basis of the SP method in relation to the figures obtained with the aid of the Gilbert Kravis calculations indicates that the results of the calculations of the purchasing power parities of the dinar and the dollar, and of the dinar and the franc, are not far from being accurate.

The series for the purchasing power parities of the dinar and the U.S. dollar between 1947 and 1965, as well as the corresponding series of per capita GNP and SP for Yugoslavia have been computed by applying implicit price indices on the basis of these aggregates, and by extrapolation by means of the parity indices obtained from this comparison.

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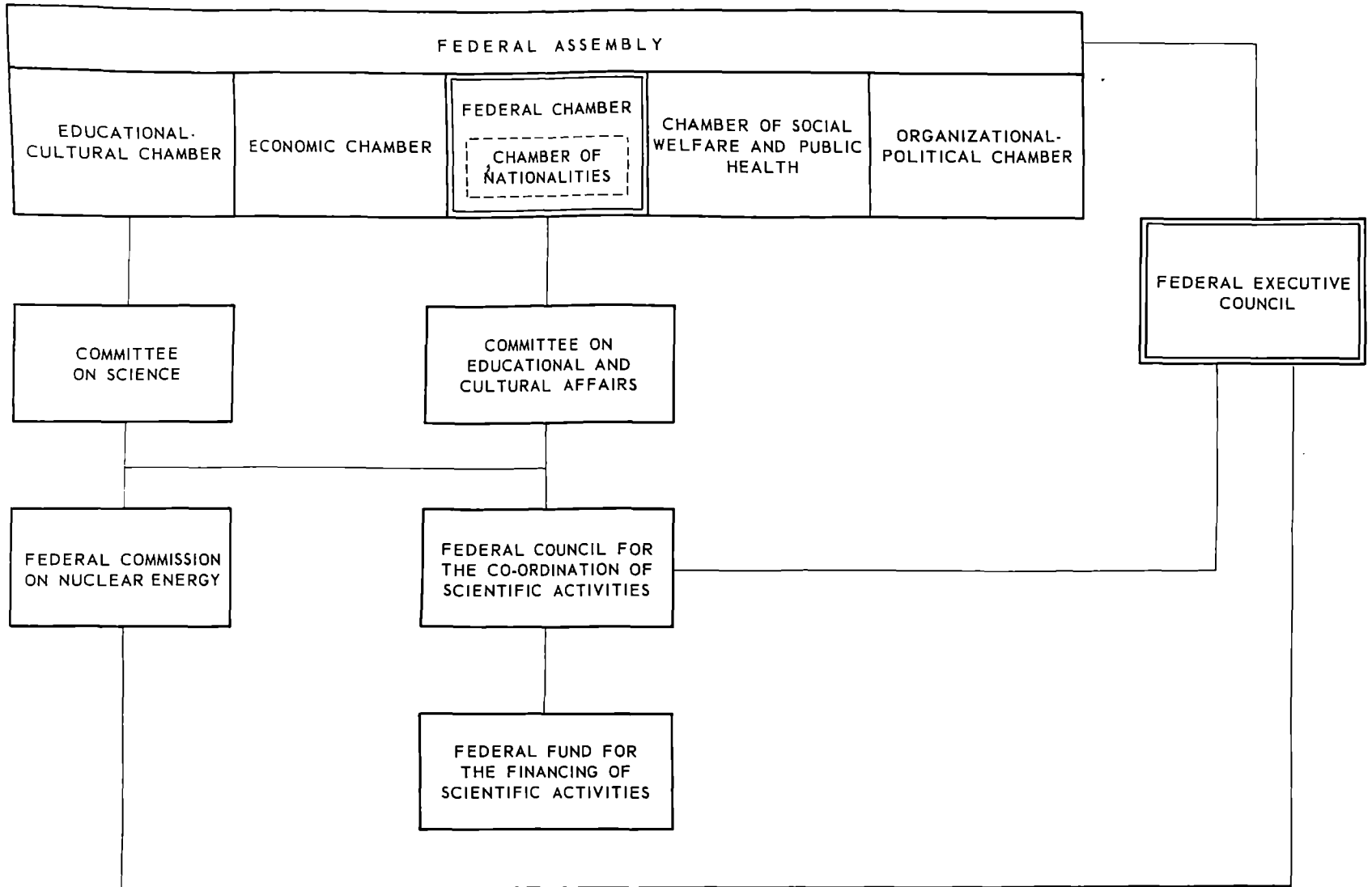
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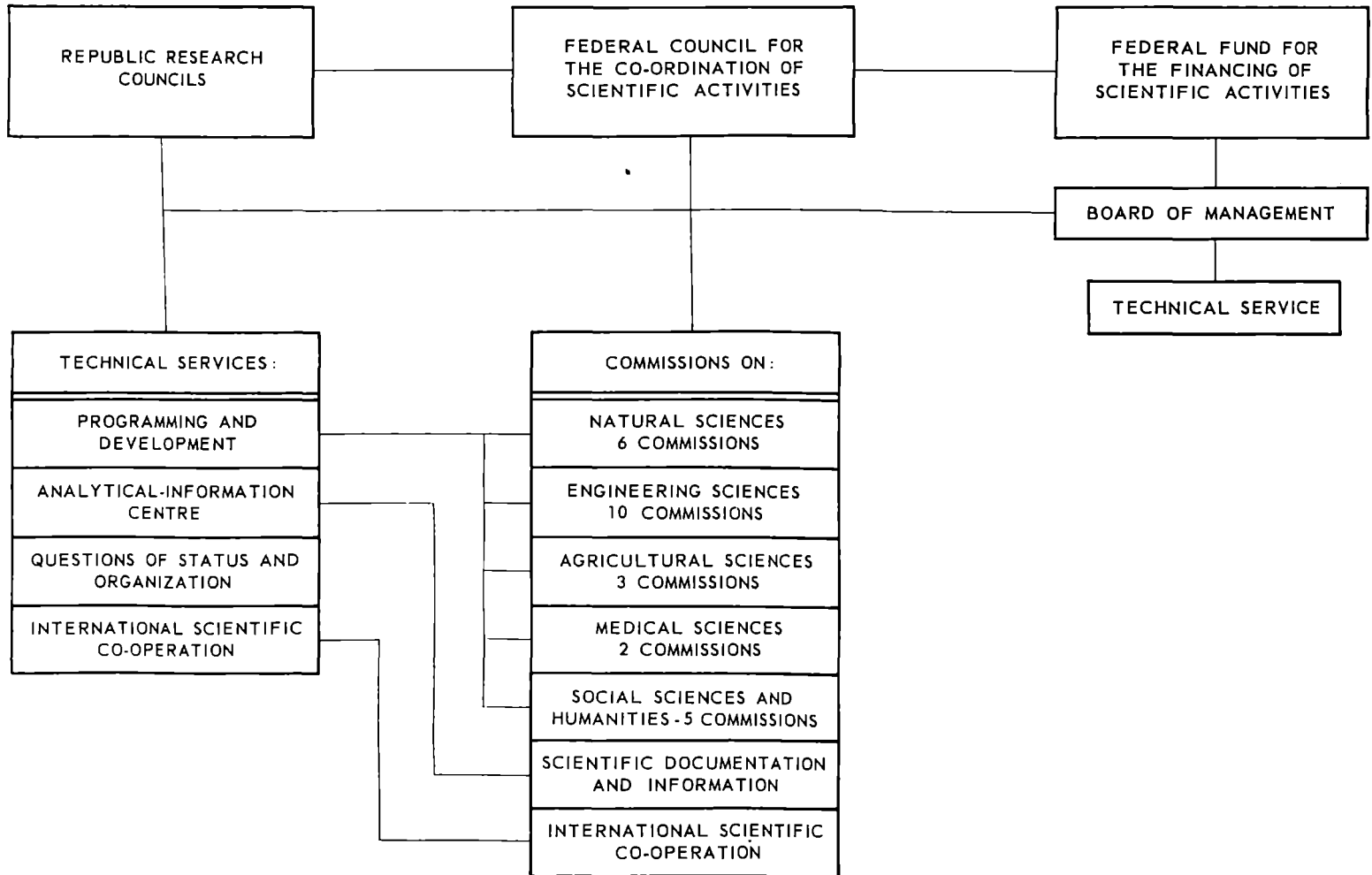
ORGANIZATIONAL CHARTS

1. Federal Council for the Co-ordination of Scientific Activities (1,2)
2. Scientific institutes (3)
3. General mechanism for the planning of economic and social development (4)

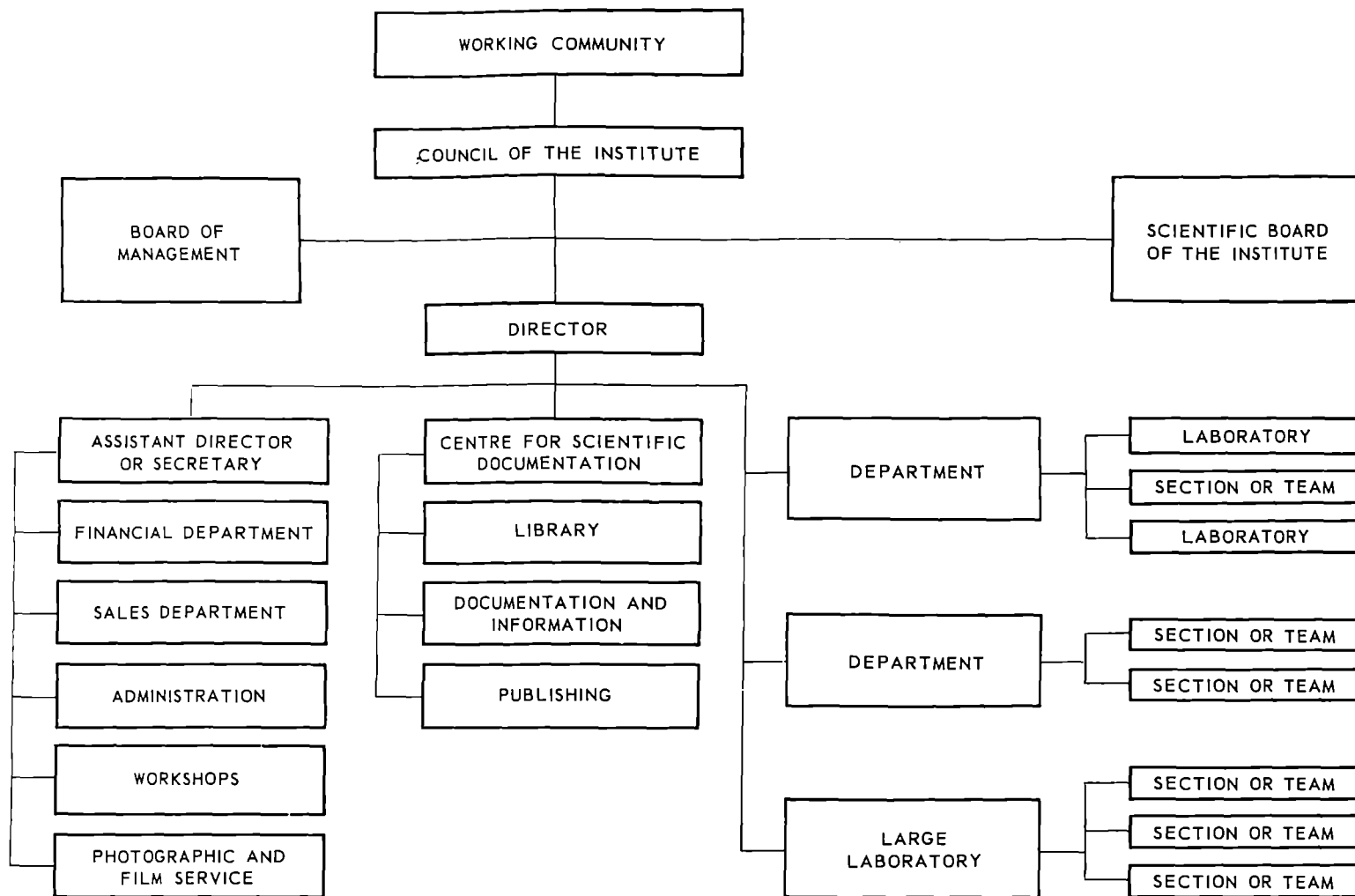
1. POSITION OF THE FEDERAL COUNCIL FOR THE CO-ORDINATION OF SCIENTIFIC ACTIVITIES IN THE POLITICAL ORGANIZATION OF THE FEDERATION



2. FEDERAL COUNCIL FOR THE CO-ORDINATION OF SCIENTIFIC ACTIVITIES



3. ORGANIZATION OF A WELL-DEVELOPED INSTITUTE





STATISTICAL TABLES

1. Educational and manpower statistics
in science: Tables 1 to 10
2. Demographic statistics: Table 11
3. Economic statistics: Tables 12 to 14

Table 1

DEVELOPMENT OF SECONDARY SCHOOLS IN YUGOSLAVIA

	1938/39	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65
NUMBER OF SCHOOLS							
Schools for skilled workers	766	713	710	692	642	629	644
Other vocational schools	4	54	49	43	41	40	32
Technical and similar schools	53	298	374	490	513	516	536
Teacher training schools	37	79	91	108	111	99	90
Art schools	5	42	42	47	48	48	47
Schools of general education - gymnasia -	205	219	229	275	300	337	370
Total :	1 070	1 405	1 495	1 655	1 655	1 669	1 719
NUMBER OF STUDENTS							
Schools for skilled workers	69 737	131 384	139 305	140 353	138 713	153 128	182 452
Other vocational schools	135	3 544	3 391	3 110	3 391	3 269	3 044
Technical and similar schools	10 689	89 967	108 023	130 465	153 339	171 586	190 071
Teacher training schools	4 268	25 755	27 950	30 335	31 912	28 716	28 942
Art schools	603	4 191	4 195	4 408	4 643	4 990	5 088
Schools of general education - gymnasia -	125 098	78 750	79 676	94 651	116 171	141 738	161 630
Total :	210 530	333 591	362 540	403 322	448 169	503 427	571 227
SCHOOL OUTPUT							
Schools for skilled workers	...	35 790	41 769	40 743	39 008	42 082	43 600
Other vocational schools	...	1 560	1 529	1 460	1 223	1 324	1 201
Technical and similar schools	...	14 655	19 909	21 330	23 214	28 608	33 880
Teacher training schools	...	3 807	4 397	5 351	4 713	4 535	4 524
Art schools	...	614	613	642	659	671	698
Schools of general education - gymnasia -	...	17 330	28 364	32 537	28 456	24 723	24 959
Total :	...	73 756	96 581	102 063	97 273	101 943	108 862
TEACHING STAFF							
Schools for skilled workers	1 679	5 240	5 837	3 960	3 314	3 481	3 697
Other vocational schools	23	738	627	572	512	400	249
Technical and similar schools	665	4 380	5 514	5 735	6 416	6 545	6 983
Teacher training schools	483	1 455	1 579	1 607	1 646	1 354	1 299
Art schools	136	1 182	1 185	1 213	1 180	1 074	1 194
Schools of general education - gymnasia -	5 607	4 873	5 139	5 512	6 249	7 404	8 215
School centres in enterprises				2 789	3 649	4 355	5 129
Total :	8 593	17 868	19 881	21 388	22 966	24 613	26 766

Source : Statistical Yearbook, 1966.

Table 2

**GEOGRAPHICAL DISTRIBUTION OF FACULTIES, ADVANCED SCHOOLS, ACADEMIES
OF ARTS AND HIGHER SCHOOLS DURING THE 1965/66 SCHOOL YEAR**

Republics		Engineering Sciences	Medical Sciences	Agricultural Sciences	Social Sciences and Humanities	Natural Sciences	Total
SR Bosnia and Herzegovina	a	9	1	3	7	1	21
	b	2		2	9	-	13
SR Montenegro	a	1	-	-	1	-	2
	b	1	-	-	1	-	2
SR Croatia	a	11	4	4	16	1	36
	b	17	3	3	26	-	49
SR Macedonia	a	3	1	1	3	1	9
	b	1	-	2	5	-	8
SR Slovenia	a	3	1	1	9	1	15
	b	5	2	1	7	-	15
SR Serbia	a	12	5	4	21	1	43
	b	20	2	3	28	-	53
AP Vojvodina	a	2	1	1	4	-	8
	b	4	-	-	6	-	10
AP Kosovo and Metohija	a	1	-	-	2	-	3
	b	2	-	1	4	-	7
Total for SFR Yugoslavia	a	39	12	13	57	5	126
	b	46	7	11	76	-	140

a) Faculties, advanced schools and academies of arts

b) Higher schools

Data obtained from the Federal Institute of Statistics.

Table 3

STUDENTS ENROLMENT IN HIGHER EDUCATION, ACCORDING TO TYPE OF ESTABLISHMENT AND TYPE OF ATTENDANCE

Type of establishment		1938/39	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66
Faculties, advanced schools and academies of arts	Regular	-	71 961	79 581	85 389	85 065	81 818	81 114	90 261
	Part-time	-	13 539	28 800	31 723	27 245	25 396	26 312	26 012
	Total	16 719	85 500	108 381	117 112	112 310	107 214	107 426	116 273
Faculties	Regular	-	69 489	76 462	81 321	80 764	76 292	75 653	84 891
	Part-time	-	13 438	28 413	30 684	25 461	22 764	22 978	22 438
	Total	16 491	82 927	104 875	112 005	106 225	99 056	98 631	107 329
Advanced schools	Regular	-	1 079	1 710	2 456	2 546	3 585	3 552	3 460
	Part-time	-	82	378	1 005	1 722	2 592	3 263	3 470
	Total	-	1 161	2 088	3 461	4 268	6 177	6 815	6 930
Academies of arts	Regular	-	1 393	1 409	1 612	1 755	1 941	1 909	1 910
	Part-time	-	19	9	34	62	40	71	104
	Total	228	1 412	1 418	1 646	1 817	1 981	1 980	2 014
Higher schools	Regular	-	12 032	15 179	17 872	21 374	24 808	25 845	31 563
	Part-time	-	7 254	17 014	23 026	26 408	28 573	37 228	37 087
	Total	259	19 286	32 193	40 898	47 782	53 381	63 073	68 650
Total :	Regular	-	83 993	94 760	103 261	106 439	106 626	106 959	121 824
	Part-time	-	20 793	45 814	54 749	53 653	53 969	63 540	63 099
	Total	16 978	104 786	140 574	158 010	160 092	160 595	170 499	184 923

Source: Statistical Yearbooks for 1964, 1965 and 1966.

Table 4

STUDENTS ENROLMENT IN HIGHER EDUCATION, BY TYPE OF ESTABLISHMENT AND BY SEX

Type of establishment	Sex	1938/39	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66
Faculties, advanced schools and academies of arts	male	12 911	60 716	77 168	82 714	79 002	74 757	74 057	78 410
	female	3 808	24 784	31 213	34 398	33 308	32 457	33 369	37 863
	total	16 719	85 500	108 381	117 112	112 304	107 214	107 426	116 273
Faculties	male	12 769	58 729	74 314	78 533	74 235	68 373	67 294	71 590
	female	3 722	24 198	30 561	33 472	31 990	30 683	31 337	35 739
	total	16 491	82 927	104 875	112 005	106 225	99 056	98 631	107 329
Advanced schools	male	-	1 084	1 968	3 159	3 623	5 150	5 497	5 591
	female	-	77	120	302	645	1 027	1 318	1 539
	total	-	1 161	2 088	3 461	4 268	6 177	6 815	6 930
Academies of arts	male	142	903	886	1 022	1 144	1 234	1 266	1 229
	female	86	509	532	624	673	747	714	785
	total	228	1 412	1 418	1 646	1 817	1 981	1 980	2 014
Higher schools	male	111	12 432	22 706	28 762	33 383	37 028	42 889	44 502
	female	148	6 854	9 487	12 136	14 399	16 353	20 184	24 148
	total	259	19 286	32 193	40 898	47 782	53 381	63 073	68 650
Total :	male	13 022	73 148	99 874	111 476	112 385	111 785	116 946	122 912
	female	3 956	31 638	40 700	46 534	47 707	48 810	53 553	62 011
	total	16 978	104 786	140 574	158 010	160 092	160 595	170 499	184 923

Source : Statistical Yearbooks for 1964, 1965 and 1966.

Table 5
STUDENTS ENROLMENT IN HIGHER EDUCATION (EXCLUDING HIGHER SCHOOLS),
BY SCIENTIFIC DISCIPLINES

Scientific discipline	1938/39	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66
NATURAL SCIENCES		3 169	4 616	4 857	6 081	7 681	7 955	9 171
% of women		50.2	60.2	40.3	39.5	38.3	38.5	39.4
% of total		3.7	4.3	4.1	5.4	7.2	7.4	7.9
ENGINEERING SCIENCES	2 671	19 436	27 407	29 869	29 685	28 296	28 457	31 957
% of women	8.0	14.5	17.0	15.6	15.4	15.8	16.3	17.9
% of total	16.0	22.7	25.3	25.5	26.6	26.6	26.4	27.5
MEDICAL SCIENCES	2 096	11 040	12 624	13 690	13 992	13 501	13 365	13 923
% of women	23.6	35.6	38.9	41.1	43.4	44.5	46.2	48.1
% of total	12.5	12.9	11.6	11.7	12.5	12.6	12.4	12.0
AGRICULTURAL SCIENCES	1 874	7 955	10 969	9 961	8 921	8 199	7 481	7 642
% of women	10.1	10.9	11.4	12.5	13.4	13.7	13.1	15.5
% of total	11.2	9.3	10.1	8.5	8.0	7.6	7.0	6.6
SOCIAL SCIENCES AND HUMANITIES	10 078	43 900	52 765	58 735	52 949	49 537	50 168	53 580
% of women	28.9	36.6	33.4	35.6	35.4	36.1	36.9	38.5
% of total	60.3	51.4	48.7	50.2	47.5	46.2	46.7	46.0
TOTAL :	16 719	85 500	108 381	117 112	111 628 *	107 214	107 426	116 273
% of women	22.8	30.0	28.8	29.4	29.5	30.3	31.0	32.6

... Number unknown. Students in natural sciences in the 1938/39 academic year studied at the faculties of arts, which covered also humanities and some social sciences.

Source : Annual Statistical Bulletins no. 255, 339 and Statistical Yearbook 1966.

* This number does not include first level students in one natural sciences faculty (663) and one chemical-technology faculty for petrol (13).

Table 6

NUMBER OF GRADUATES IN HIGHER EDUCATION, BY SCIENTIFIC DISCIPLINES

Scientific discipline	1939	1960	1961	1962	1963	1964	1965
NATURAL SCIENCES	... ¹	920	698	702	707	626	598
% of women	-	43.9	49.2	51.9	50.9	41.9	43.0
% of total	-	9.0	5.9	5.4	5.1	4.7	2.2
ENGINEERING SCIENCES	379	1 959	2 633	2 960	3 459	3 329	3 355
% of women	5.0	12.9	14.0	14.4	16.5	17.0	18.0
% of total	15.1	19.1	22.3	22.9	25.2	25.0	25.8
MEDICAL SCIENCES	184	1 649	1 695	1 725	2 049	1 763	1 808
% of women	25.5	36.9	33.3	29.5	33.8	37.7	40.0
% of total	7.4	16.1	14.3	13.3	14.9	13.3	13.9
AGRICULTURAL SCIENCES	327	1 158	1 441	1 526	1 495	1 431	1 276
% of women	6.4	6.3	8.9	10.7	12.3	12.2	12.5
% of total	13.1	11.3	12.2	11.8	10.9	10.8	9.8
SOCIAL SCIENCES AND HUMANITIES	1 612	4 562	5 361	6 010	6 003	6 151	5 973
% of women	34.2	36.2	34.0	43.7	54.0	54.7	32.2
% of total	64.4	44.5	45.3	46.6	43.9	46.2	48.3
TOTAL :	2 502	10 248	11 828	12 923	13 713	13 300	13 010
% of women	19.1	31.6	27.3	31.6	36.8	37.8	28.2

1 Number unknown

Source : Statistical Yearbooks 1940 and 1966 and Statistical Bulletins no. 255, 339, 364 and 397.

Table 7
NUMBER OF GRADUATES IN HIGHER EDUCATION, BY SCIENTIFIC
DISCIPLINES AND PROFESSIONS

Scientific discipline-profession	1939	1960	1961	1962	1963	1964	1965
NATURAL SCIENCES		920	698	702	707	626	598
ENGINEERING SCIENCES	379	1 959	2 633	2 960	3 459	3 329	3 355
Architecture		377	472	494	624	458	425
Construction		324	423	444	536	523	485
Machine-building		436	541	589	635	667	712
Electrical engineering		336	441	461	499	492	554
Geology		30	27	37	54	81	95
Technological chemistry		312	488	492	606	637	659
Food technology		13	43	54	73	98	119
Shipbuilding		9	9	11	16	11	12
Mining		122	121	181	239	199	210
Advanced engineering schools		-	68	197	177	163	84
MEDICAL SCIENCES	184	1 649	1 695	1 725	2 049	1 763	1 808
Medicine	184	1 184	1 290	1 338	1 598	1 266	1 210
Dentistry	-	237	249	238	285	336	428
Pharmacy	-	228	156	149	166	161	170
AGRICULTURAL SCIENCES	327	1 158	1 441	1 526	1 495	1 431	1 276
Agriculture		553	817	982	909	859	727
Forestry	222	265	327	335	353	361	351
Veterinary medicine	105	340	297	209	222	176	157
Advanced schools of agriculture	-	-	-	-	11	35	41
SOCIAL SCIENCES AND HUMANITIES	1 612	4 562	5 361	6 010	6 003	6 151	5 973
Social sciences and humanities	468	1 937	1 943	1 810	1 759	1 671	1 398
Economics	13	1 053	1 481	1 595	1 672	1 851	2 126
Law	1 102	1 298	1 393	1 902	1 841	1 750	1 522
Academies of arts	29	231	237	240	300	298	270
Advanced schools	-	43	307	463	431	581	657
TOTAL :	2 502	10 248	11 828	12 923	13 713	13 300	13 010
Faculties	2 473	9 974	11 216	12 023	12 794	12 223	11 958
Academies of arts	29	231	237	240	300	298	270
Advanced schools	-	43	375	660	619	779	782

Source : Statistical Yearbook 1966

Table 8

NUMBER OF STUDENTS IN THE FIRST YEAR OF HIGHER EDUCATION*,
BY SCIENTIFIC DISCIPLINES

Scientific discipline	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66
NATURAL SCIENCES	2 327	2 582	2 572	3 596	4 077	3 806	4 499
% of women	35.1	32.6	39.5	40.8	36.8	38.2	41.4
% of total	6.5	4.9	4.7	7.3	8.8	7.8	8.3
ENGINEERING SCIENCES	6 262	13 728	14 430	13 251	12 366	13 616	15 173
% of women	16.5	13.7	15.2	15.2	14.4	15.4	19.3
% of total	17.6	26.1	26.1	27.0	26.7	27.8	27.9
MEDICAL SCIENCES	2 507	3 872	4 364	4 340	3 807	3 660	4 454
% of women	45.5	47.2	47.3	46.2	46.3	48.6	51.3
% of total	7.0	7.4	7.9	8.8	8.2	7.5	8.2
AGRICULTURAL SCIENCES	3 037	5 345	4 165	3 297	3 174	3 124	3 552
% of women	12.0	10.7	12.2	13.0	15.5	14.0	18.5
% of total	8.5	10.2	7.5	6.7	6.9	6.4	6.5
SOCIAL SCIENCES AND HUMANITIES	21 481	27 046	29 745	24 578	22 835	24 688	26 635
% of women	34.4	37.8	36.6	36.5	38.2	39.4	42.5
% of total	60.4	51.4	53.8	50.2	49.4	50.5	49.1
TOTAL :	35 614	52 573	55 276	49 062	46 259	48 894	54 313
% of women	30.2	29.2	30.2	30.3	30.8	31.7	35.1

* The table covers regular and part-time students.

Source : Statistical Bulletins no.255, 339, 364, 397; for the 1965/66 academic year the data were obtained from the Federal Institute of Statistics.

Table 9 TEACHING STAFF IN FACULTIES, ADVANCED SCHOOLS AND ACADEMIES OF ARTS

Academic year	1938/39	1959/60	1960/61	1961/62	1962/63	1963/64	1964/65	1965/66
Full-time staff		2 018	2 367	2 949	3 366	3 641	3 869	4 079
Full-time auxiliary staff	...	2 955	3 330	3 651	3 915	4 101	4 181	4 337
Total :	...	4 973	5 697	6 600	7 281	7 742	8 050	8 416
Part-time staff		853	979	1 304	1 604	1 889	2 045	1 914
Part-time auxiliary staff		1 082	1 538	1 655	1 607	1 788	1 832	1 546
Total :	...	1 935	2 517	2 959	3 211	3 677	3 877	3 460
Grand total	1 207	6 908	8 214	9 559	10 492	11 419	11 927	11 876
Index number (1959/1960 = 100)	17.5	100	118.9	138.3	151.9	163.8	172.6	171.9

Source : Statistical Yearbooks 1940, 1961-1966.

Table 10

NUMBER OF DOCTORATES, BY SCIENTIFIC DISCIPLINES

	1960	1961	1962	1963	1964	1965
NATURAL SCIENCES	66	68	75	79	114	259
% of total	29.1	29.3	28.4	29.4	22.2	20.2
ENGINEERING SCIENCES	25	16	15	34	46	84
% of total	11.0	6.9	5.7	12.6	9.0	6.5
MEDICAL SCIENCES	27	26	35	34	68	115
% of total	11.9	11.2	13.3	12.6	13.4	9.0
AGRICULTURAL SCIENCES	44	52	49	52	142	280
% of total	19.4	22.4	18.6	19.3	27.7	21.8
SOCIAL SCIENCES AND HUMANITIES	65	70	90	70	143	546
% of total	28.6	30.2	33.0	26.1	27.8	42.5
Total :	227	232	264	269	513	1 284

Table 11

FORECAST OF POPULATION DISTRIBUTION IN YUGOSLAVIA BY SEX AND AGE GROUPS
(in thousands)

Age Group (Years)	1961			1966			1971			1976		
	T	M	F	T	M	F	T	M	F	T	M	F
0 - 4	1 932	984	947	1 933	996	937	2 009	1 037	972	1 977	1 021	956
5 - 9	2 008	1 028	980	1 892	964	928	1 893	975	917	1 984	1 024	960
10 - 14	1 841	938	903	2 001	1 024	976	1 885	960	925	1 885	971	914
15 - 19	1 378	692	686	1 833	933	900	1 992	1 019	972	1 876	955	921
20 - 24	1 565	786	779	1 370	687	682	1 822	928	894	1 979	1 013	966
25 - 29	1 634	820	814	1 552	779	773	1 359	682	677	1 807	920	887
30 - 34	1 572	774	798	1 618	812	806	1 537	771	766	1 345	675	670
35 - 39	1 273	579	693	1 554	764	789	1 598	801	797	1 518	761	757
40 - 44	783	355	428	1 254	570	684	1 530	752	778	1 574	788	786
45 - 49	888	413	475	766	347	420	1 227	556	671	1 497	734	763
50 - 54	1 009	488	521	860	397	462	742	334	408	1 188	535	653
55 - 59	859	412	447	956	458	498	815	373	442	704	313	390
60 - 64	700	321	379	788	372	416	877	414	464	748	337	411
65 and over	1 166	475	691	1 382	577	805	1 618	696	922	1 860	814	1 046

Note : The 1961 data refer to the 5% sample of the population covered by the 1961 census.

Source : Dr Dušan Breznik, "Population Forecasts in Yugoslavia Until 1981"
Stanovništvo, Jan-March 1963, p.66.

Table 12

FOREIGN TRADE,
BY CLASSES OF PRODUCTS, IN 1964.

Classes ¹ of products	Exports (%)	Imports (%)
0. Food and live animals	24.1	12.6
1. Beverages and tobacco	5.6	0.2
2. Crude materials, inedible, except fuels	12.9	15.8
3. Mineral fuels and lubricants	1.4	5.0
4. Animal and vegetable oils and fats	0.1	1.1
5. Chemicals	4.2	10.4
6. Manuf. goods, classified by materials	22.9	21.0
7. Machinery and transport equipment	17.0	30.1
8. Miscellaneous manuf. art.	11.7	3.9
9. Unclassified goods and special transactions	0.1	0.0
Total	100	100

1. According to the Standard International Trade Classification.

Table 13

GROSS INVESTMENT IN THE ECONOMY AS A WHOLE,
BY SECTORS OF ACTIVITY ¹

Sector of activity	1960	1961	1962	1963	1964
1. Agriculture, forestry, fisheries	16.21	12.53	12.07	11.87	11.43
2. Mines	31.70	33.06	32.70	33.05	33.72
3. Manufacturing industry (with handicraft)					
4. Construction	1.79	2.02	1.81	1.88	2.28
5. Transport and Communications	14.08	12.63	11.08	9.66	11.73
6. Commerce (with catering)	4.13	3.83	3.90	4.75	5.58
7. Public administration ² and defence	3.26	3.61	3.49	4.06	3.60
8. Other ³	28.83	32.32	34.95	34.73	31.66
9. Total	100	100	100	100	100
10. TOTAL in millions of dinars (at 1962 prices)	12,073	13,384	14,322	15,640	17,388
11. TOTAL in millions of U.S. dollars ⁴	2,709	3,003	3,214	3,510	3,902

1. Including both the social and private sectors of the economy.

2. Including some services from sector no. 8.

3. Includes : housing, public utilities, cultural and health activities.

4. An exchange rate of 4.456 dinars (U.S. \$, obtained from the SP method for 1962 (see Annex I.2 above) is utilized here.

Source : Investicije 1947-1963 (Investments), Beograd, Jul. 1965.

Data for 1964 are preliminary estimates.

Table 14

INDEX NUMBERS (1960 = 100) OF THE NATIONAL PRODUCTION ¹ AT CURRENT PRICES
IN THE YEARS 1960-1964; BREAKDOWN BY CLASSES ² OF PRODUCTS AND INDUSTRIES.

A : index number - B : percentage of total

Products & industries	1960		1961		1962		1963		1964	
	A	B	A	B	A	B	A	B	A	B
1. Coal mining	100	4.8	113.4	4.7	117.3	4.5	140.4	4.5	178.6	4.3
2. Iron ore mining	100	0.6	105.2	0.6	129.9	0.7	141.4	0.6	136.9	0.4
3. Crude petroleum and natural gas	100	1.7	130.9	1.9	144.9	2.0	162.7	1.8	118.9	1.0
4. Food and beverages	100	5.9	131.4	6.7	135.3	6.4	153.1	6.0	185.2	5.5
5. Tobacco	100	3.9	111.1	3.8	141.4	4.5	158.4	4.2	210.6	4.2
6. Textiles	100	12.8	99.4	11.1	111.3	11.4	136.4	11.7	186.2	12.0
7. Wood and cork products and furniture	100	6.7	117.1	6.8	110.9	5.9	132.1	5.9	191.7	6.4
8. Paper and paper products	100	2.1	130.3	2.4	142.2	2.4	168.5	2.4	206.8	2.2
9. Leather & leather products	100	3.1	78.8	2.1	82.8	2.0	107.6	2.2	163.9	2.5
10. Rubber products	100	0.8	260.6	1.9	290.8	1.9	368.1	2.0	485.5	2.0
11. Chemicals & Chemical products	100	5.7	114.9	5.7	129.2	5.9	181.3	6.9	227.9	6.5
12. Petroleum products	100	2.4	119.4	2.5	144.9	2.8	163.2	2.7	289.3	3.5
13. Non-metallic mineral products	100	4.7	125.3	5.1	117.4	4.4	144.9	4.5	181.0	4.3
14. Iron & steel metallurgy	100	5.2	100.4	4.6	98.4	4.1	108.7	3.8	147.1	3.9
15. Non-ferrous metallurgy	100	5.9	91.4	4.7	99.2	4.7	125.2	5.0	155.6	4.6
16. Metal products	100	8.1	118.7	8.4	93.4	6.1	113.6	6.2	168.5	6.9
17. Machinery except electrical machinery	100	4.8	119.2	5.0	130.2	5.0	151.3	4.8	177.2	4.3
18. Electrical machinery apparatus & appliances	100	5.4	109.8	5.2	119.1	5.2	155.2	5.7	225.2	6.2
19. Transport equipment	100	6.6	102.1	5.9	152.5	8.1	185.5	8.2	254.1	8.4
20. Others ³	100	8.8	138.9	10.9	167.2	12.0	184.6	10.9	246.7	10.9
Total	100	100	114.4	100	124.3	100	149.2	100.	198.7	100

1. Social product (national income plus amortization. Yugoslav concept, see footnotes on pp. 67, 73).

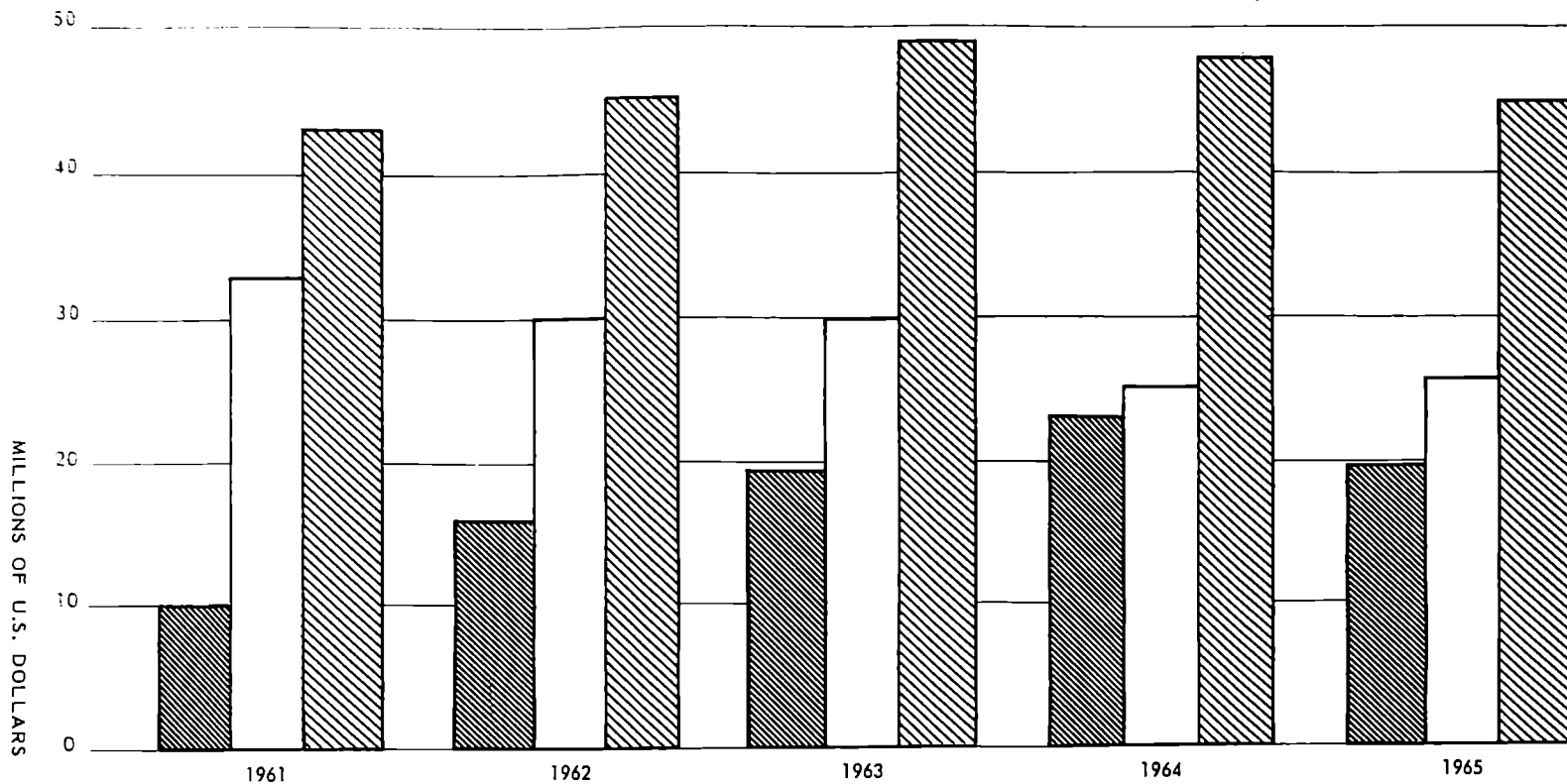
2. The classes retained here follow the lines of the International Standard Industrial Classification of All Economic Activities - ISIC

3. Electric power, Non-metallic mining, Prospecting, Graphic industry, Picture industry, etc...




Source : Industrijska Preduzeća (Industrial enterprises), Statistical Bulletins no 283, 333 and 382;
Industrija (Industries), Statistical Bulletin no. 236.

1. Expenditures (1-3)
2. Staff and students (4-8)
3. National income (9)
4. Population distribution (10)

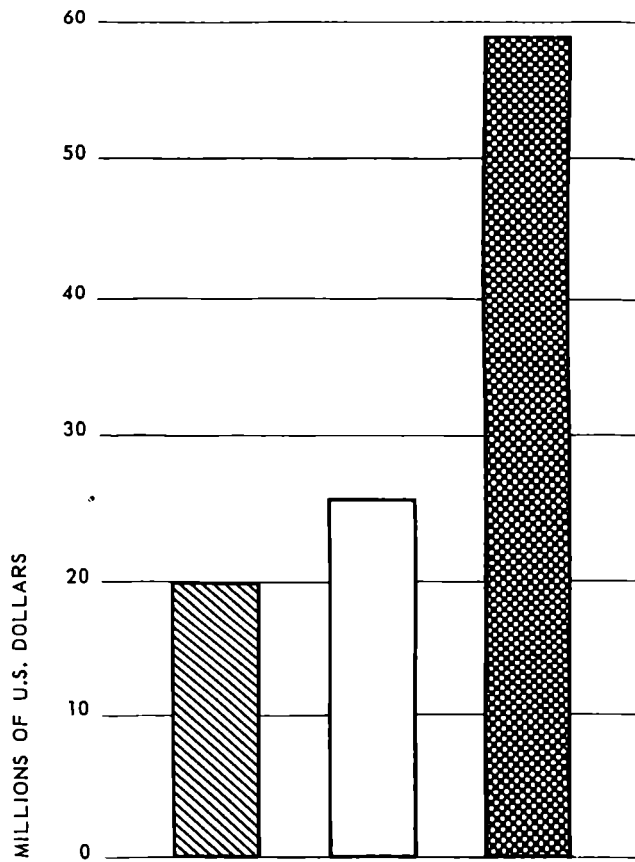
1. PUBLIC EXPENDITURE ON SCIENTIFIC AND TECHNICAL RESEARCH ACCORDING TO ORIGIN OF FUNDS



LEGEND

-  TOTAL PUBLIC EXPENDITURE
-  BUDGETS OF SOCIO-POLITICAL COMMUNITIES
-  FUNDS FOR THE FINANCING OF SCIENTIFIC ACTIVITIES

2. NATIONAL EXPENDITURE ON SCIENTIFIC AND TECHNICAL RESEARCH IN 1965, ACCORDING TO ORIGIN OF FUNDS



LEGEND



ECONOMIC AND OTHER WORKING ORGANIZATIONS

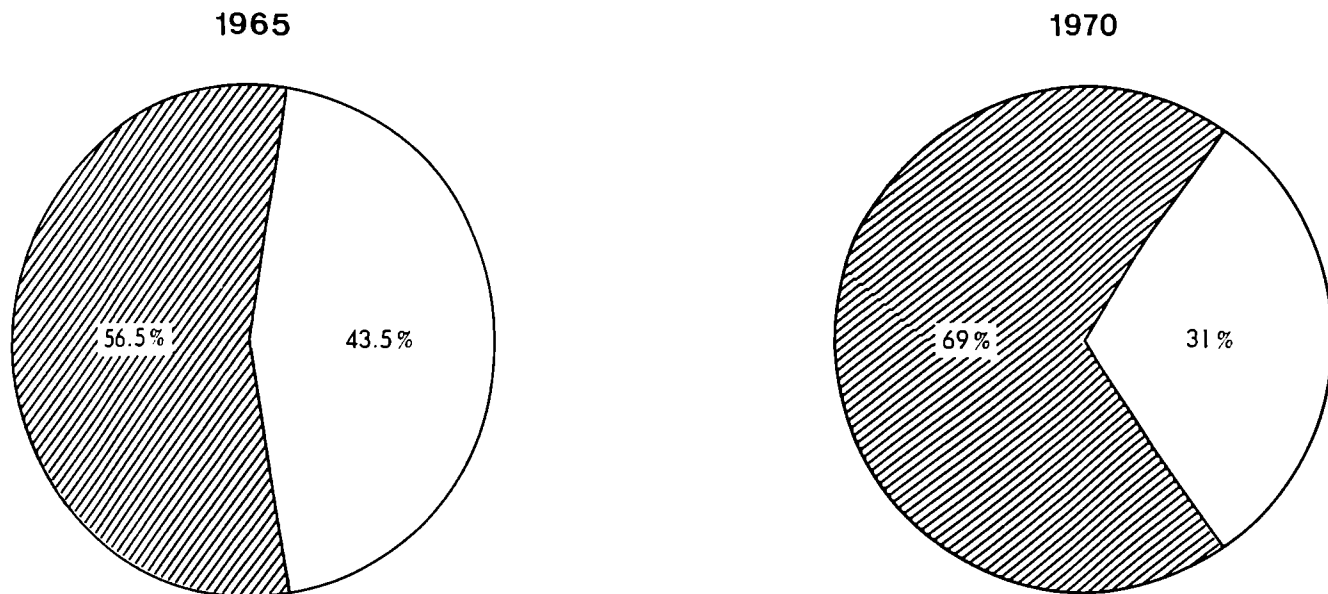


BUDGETS OF SOCIO-POLITICAL COMMUNITIES



FUNDS FOR THE FINANCING OF SCIENTIFIC ACTIVITIES

3. NATIONAL EXPENDITURE ON SCIENTIFIC AND TECHNICAL RESEARCH IN 1965 (ACTUAL) AND 1970 (PLANNED),
ACCORDING TO ORIGIN OF FUNDS



LEGEND

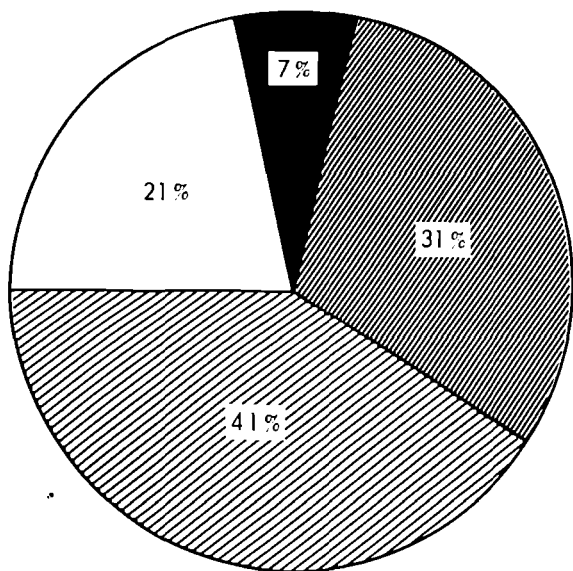


ECONOMIC AND OTHER WORKING ORGANIZATIONS







SOCIAL FUNDS (BUDGETS OF SOCIO-POLITICAL COMMUNITIES
AND FUNDS FOR THE FINANCING OF SCIENTIFIC ACTIVITIES)

4. BREAKDOWN OF PERSONNEL IN SCIENTIFIC INSTITUTIONS
(AT THE END OF 1964)

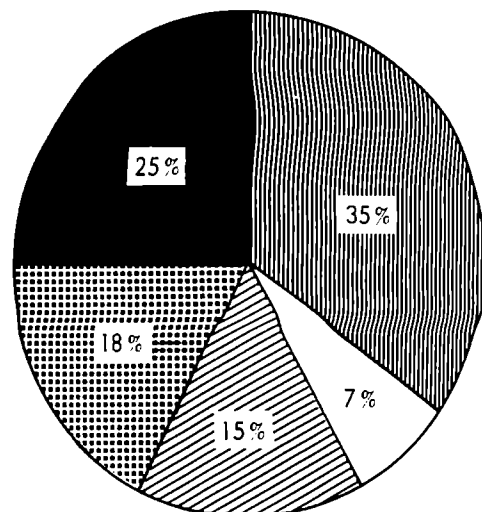


LEGEND

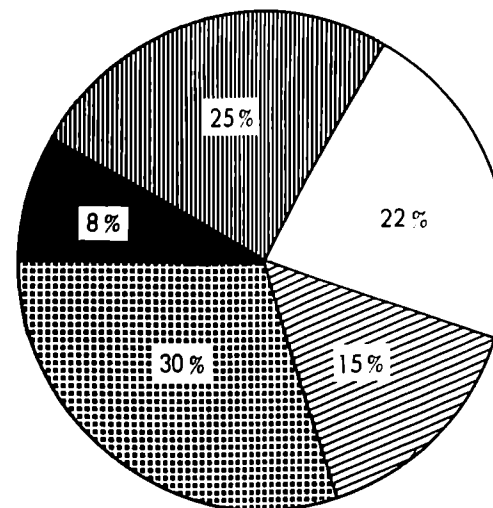
-  RESEARCH STAFF
-  TECHNICAL STAFF WITH UNIVERSITY EDUCATION
-  TECHNICAL STAFF WITH SECONDARY EDUCATION
-  OTHERS (WORKERS, ADMINISTRATION, AUXILIARY PERSONNEL)

5. RESEARCH STAFF, ACCORDING TO BRANCHES OF SCIENTIFIC ACTIVITY
(AT THE END OF 1965)

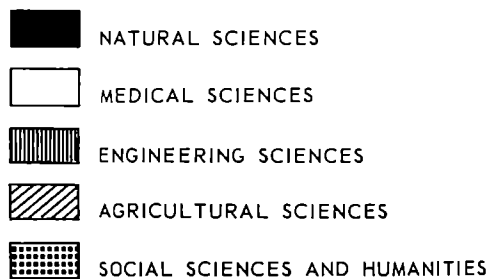
SCIENTIFIC INSTITUTIONS



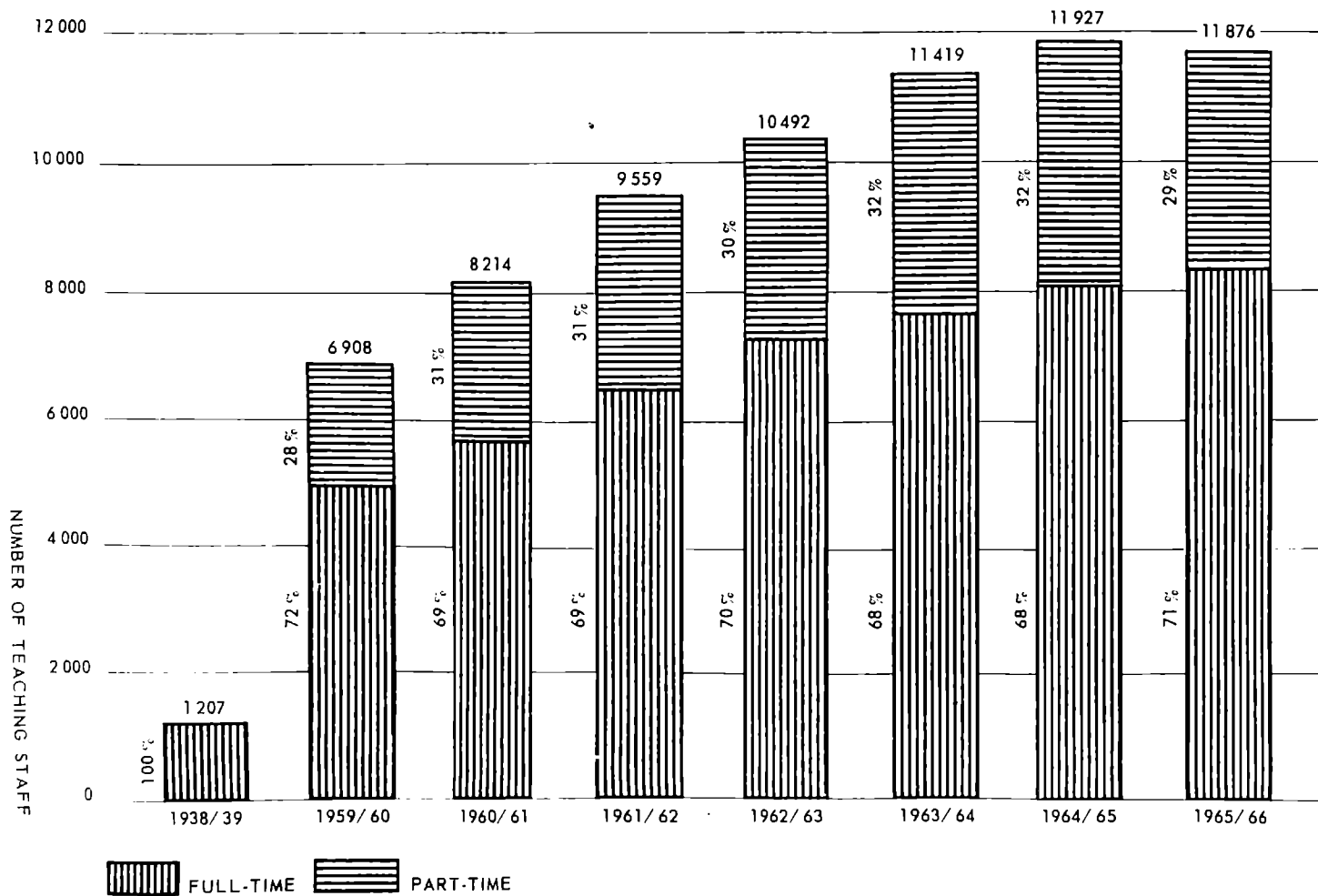
UNIVERSITIES AND ACADEMIES OF SCIENCES
(PERMANENT STAFF AND ASSISTANTS)



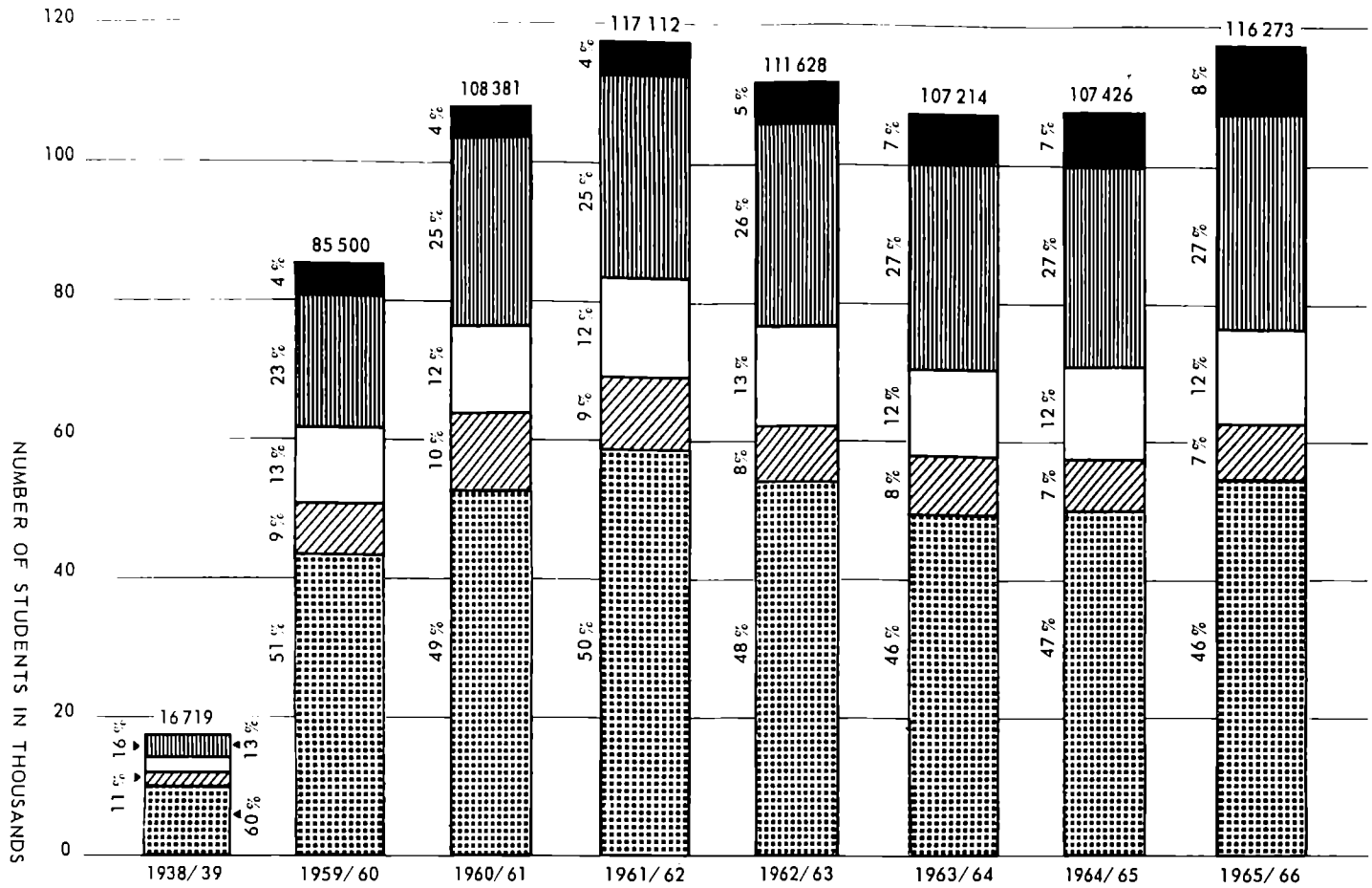
LEGEND



6. TEACHING STAFF IN FACULTIES, ADVANCED SCHOOLS AND ACADEMIES OF ARTS



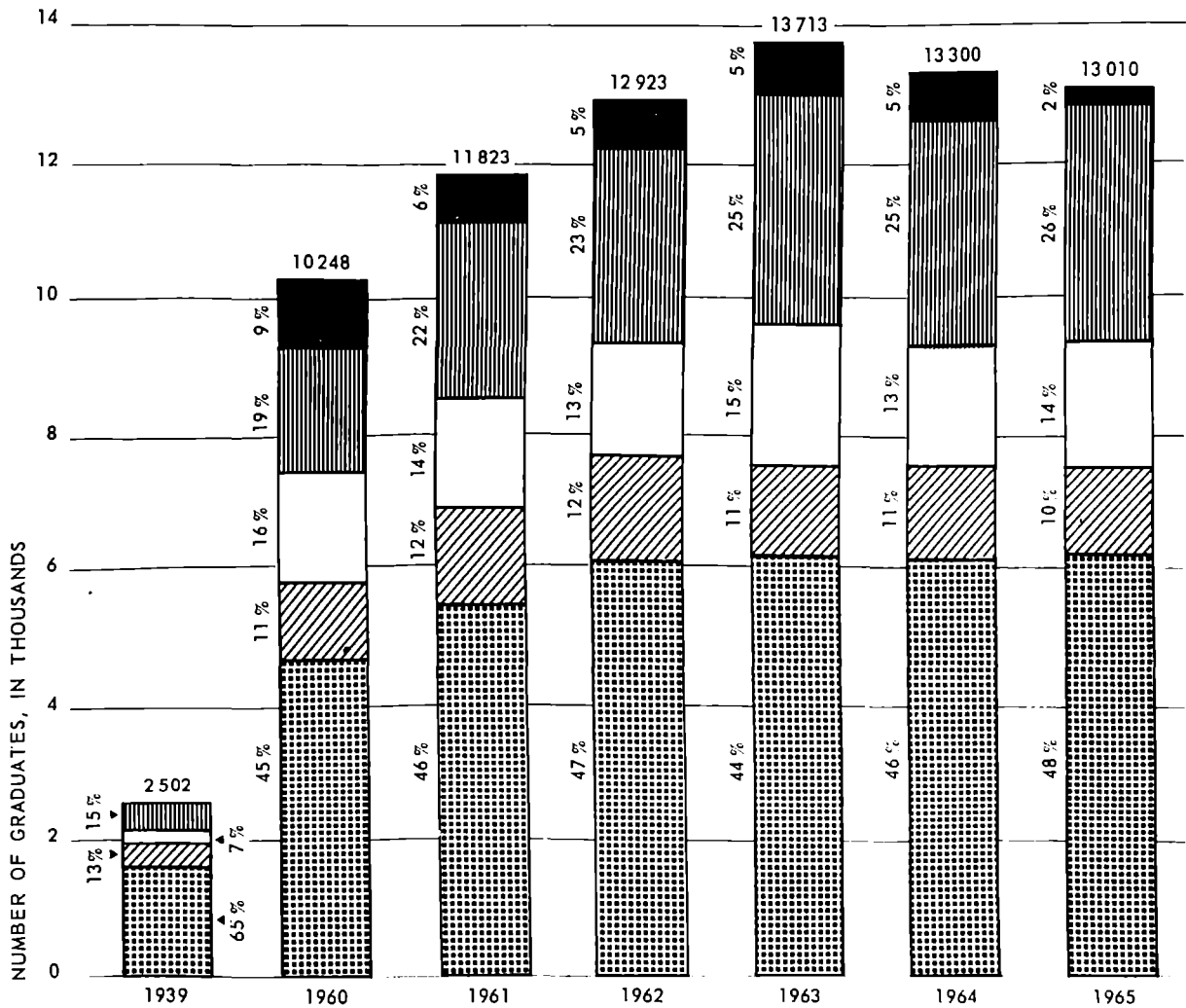
7. STUDENTS ENROLMENT IN HIGHER EDUCATION, BY SCIENTIFIC DISCIPLINES



LEGEND

- NATURAL SCIENCES
- MEDICAL SCIENCES
- AGRICULTURAL SCIENCES
- ENGINEERING SCIENCES
- SOCIAL SCIENCES AND HUMANITIES

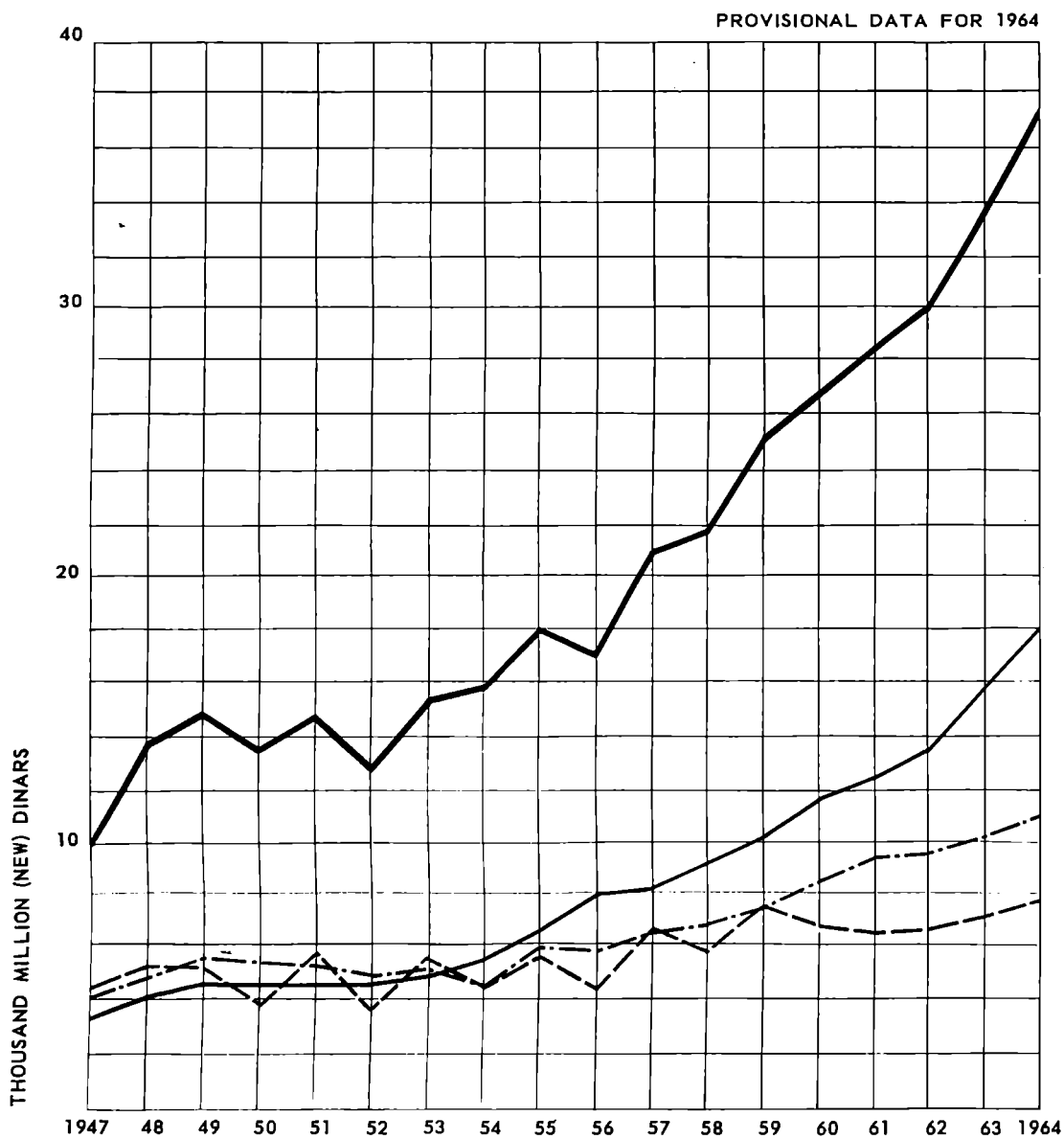
8. NUMBER OF GRADUATES IN HIGHER EDUCATION, BY SCIENTIFIC DISCIPLINES



LEGEND

- NATURAL SCIENCES
- ENGINEERING SCIENCES
- MEDICAL SCIENCES
- AGRICULTURAL SCIENCES
- SOCIAL SCIENCES AND HUMANITIES

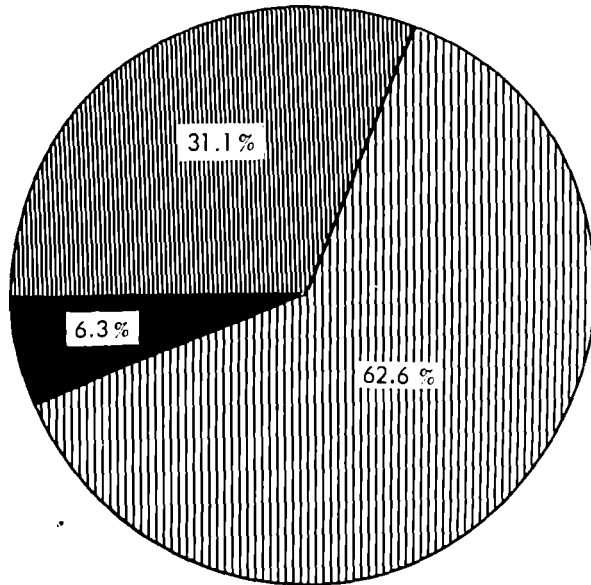
9. NATIONAL INCOME OF SFRY (AT CONSTANT, 1960 PRICES)






LEGEND

- TOTAL FOR THE ECONOMY
- INDUSTRY
- AGRICULTURE
- - - - OTHER (FORESTRY, CONSTRUCTION, TRANSPORT, TRADE, CATERING, HANDICRAFTS)

10. POPULATION OF YUGOSLAVIA IN 1961, BY AGE GROUPS



LEGEND

-  0-15 YEARS
-  15-65 YEARS
-  OVER 65 YEARS

1. LIST OF PROFESSIONAL TITLES
GRANTED IN YUGOSLAVIA2. NAMES OF THE MAIN NATIONAL
RESEARCH INSTITUTIONS1. LIST OF PROFESSIONAL TITLES GRANTED IN YUGOSLAVIA
to graduates of faculties, advanced schools and higher schools.

	First-level studies and higher schools	Second-level studies
1. At the departments of faculties of philology, philosophy and mathematics or engineering (groups: mathematics, physics and chemistry) or at the department of biology of biotechnical faculties and at the appropriate advanced schools and higher schools for teachers.	Teacher (name of discipline) e.g. teacher of physics, mathematics, history, etc.	Professor (name of discipline) e.g. professor of physics, mathematics, history, etc.
2. At faculties of law or at the departments of law at faculties of law and economics, and at appropriate advanced and higher schools	lawyer	graduated lawyer
3. At faculties of economics or at the departments of economics at faculties of law and economics, and at appropriate advanced and higher schools	economist	graduated economist
4. At medical faculties or at the departments of general medicine of medical faculties, and at higher schools of dentistry	higher medical technician, higher medical nurse	physician
5. At faculties of dentistry or at the departments of dentistry of medical faculties, and at higher schools of dentistry	higher dentist	dentist- physician
6. At faculties of pharmacy	higher pharmaceutical technician	graduated pharmacist
7. At agricultural faculties or at the departments of agriculture of biotechnical faculties or faculties of agriculture and forestry and at advanced and higher agricultural schools	agricultural engineer (name of speciality) e.g. crop farming, vegetable farming etc.	graduated agricultural engineer (name of speciality)

8. At faculties of forestry or at the departments of forestry of biotechnical faculties or faculties of agriculture and forestry	engineer of forestry (name of speciality)	graduated engineer of forestry (name of speciality)
9. At faculties of veterinary medicine or at the veterinary departments of biotechnical faculties	veterinary surgeon	graduated veterinary surgeon
10. At faculties of machine-building, construction, architecture or other engineering faculties, or at the departments of machine-building, construction, architecture and other departments of engineering faculties, and at advanced and higher schools of engineering	machine engineer, construction engineer etc. (name of speciality)	graduated machine engineer, graduated construction engineer, etc. (name of speciality)
11. At faculties of transport and at appropriate higher schools	transport engineer (name of speciality)	graduated transport engineer (name of speciality)

2. NAMES OF THE MAIN NATIONAL RESEARCH INSTITUTIONS

I. COUNCILS AND OTHER BODIES

FEDERAL COUNCIL FOR THE CO-ORDINATION OF SCIENTIFIC ACTIVITIES NOVI BEOGRAD, zgrada SIVA, Zapadno krilo, Bulevar Lenjina 2

COUNCIL FOR THE CO-ORDINATION OF SCIENTIFIC RESEARCH OF SR SERBIA, BEOGRAD, Čika Ljubina 8

RESEARCH COUNCIL OF SR CROATIA, Zagreb, Amruševa 4

ASSOCIATION OF RESEARCH ORGANIZATIONS OF SR SLOVENIA LJUBLJANA, Župančičeva 3

SECRETARIAT FOR EDUCATION AND CULTURE OF SR SLOVENIA LJUBLJANA, Župančičeva 3

RESEARCH COUNCIL OF SR BOSNIA AND HERZEGOVINA SARAJEVO, Vase Miskina 18

SECRETARIAT FOR EDUCATION, SCIENCE AND CULTURE OF SR MACEDONIA SKOPJE, Maksima Gorkog 28

ASSOCIATION OF RESEARCH ORGANIZATIONS OF SR MACEDONIA SKOPJE, Maksima Gorkog 28

COUNCIL FOR THE CO-ORDINATION OF SCIENTIFIC ACTIVITIES OF SR MONTENEGRO, TITOGRAD, Lenjinov bulevar 4

ASSOCIATION OF YUGOSLAV UNIVERSITIES, BEOGRAD, Palmotičeva 22

COUNCIL FOR THE CO-ORDINATION OF SCIENTIFIC ACTIVITIES OF AP VOJVODINA, NOVI SAD, zgrada Pokrajinskog Izvršnog veća

SECRETARIAT FOR EDUCATION AND CULTURE - RESEARCH COUNCIL OF THE AUTONOMOUS PROVINCE OF KOSOVO AND METOHIJA, PRISTINA

FEDERAL COMMISSION ON NUCLEAR ENERGY, BEOGRAD, Kosančićev venac 29

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