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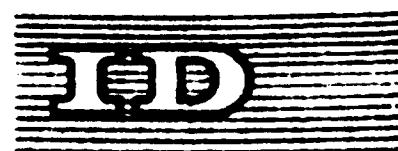
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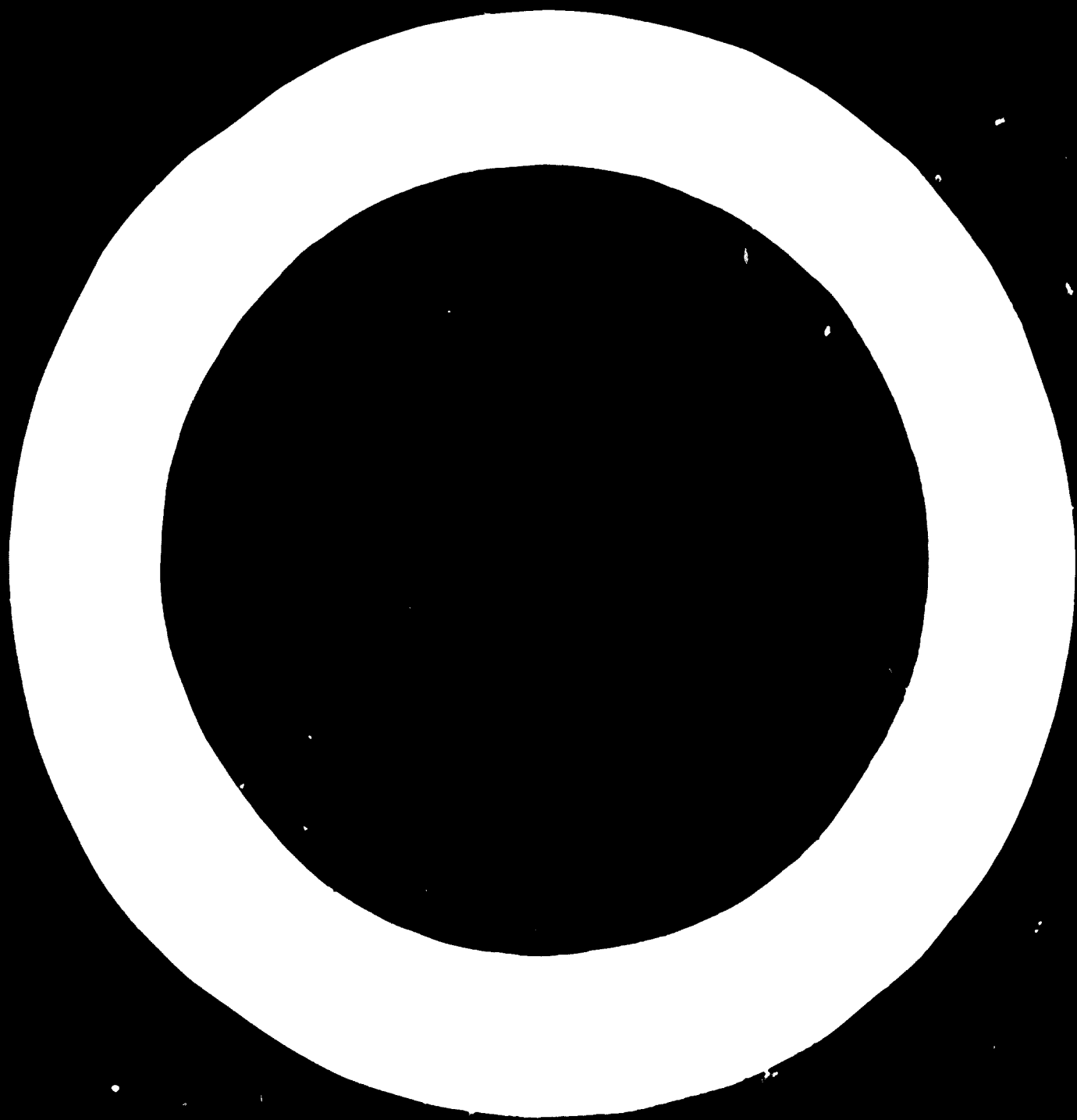
**ORGANIZATION OF INDUSTRIAL RESEARCH IN UZBEKISTAN -
AN IMPORTANT STAGE IN INDUSTRIALIZATION**

by

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The views and opinions expressed in this paper are those of the author and do not imply any opinion on the part of the United Nations Secretariat

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.



ORGANIZATION OF INDUSTRIAL RESEARCH IN UZBEKISTAN -
AN IMPORTANT STAGE IN INDUSTRIALIZATION

The economy of the Union of Soviet Socialist Republics, which comprises 15 fully franchised republics, is making good progress in its development -- a process which is characterised not only by quantitative changes but also by important qualitative changes. The new features in economy include the development of new types of natural resources, the creation of new and highly efficient materials, machines and production processes and methods of control and adjustment. This is a highly complicated process and it amounts to the concept of scientific-technical progress. One of its distinctive features is the fact that the level of industry, its power resources, the assortment of goods and requirements to these goods necessitate the study and utilization for the national economy of hitherto un known forms of energy, synthetic materials with set parameters, etc..

It stands to reason that organization of such production is preceded by research aimed at improving existing production units and developing new ones.

The system and sequence of research preceding and providing the development of whole branches of industry and industry as an entity differ. The distinctions depend on the prevailing social and economic factors. The rationale of any existing system of industrial research is best judged by the development index of industry, its quantitative and qualitative growth.

Pre-revolutionary Turkestan (as Central Asia was then called) was a backward colony of tsarist Russia. The 1917 Revolution established the Soviet power in the region and in 1924 the Uzbek Soviet Socialist Republic was proclaimed as a result of the national demarcation of the territory.

Uzbekistan's industry at that time comprised semi-handicraft enterprises for the initial processing of raw cotton and their gross output in 1924 amounted to the sum of 110.3 million roubles. Compare this with

industrial goods put out by the republic in 1968 — a ninety-fold increase.

The plants and factories of Soviet Uzbekistan produce sophisticated farm machinery, excavators, electric transformers, textile machinery, steel, cinema projecting equipment, electronic instruments, mineral fertilizer, paints, compressor units, cement, textiles, rubber articles, chemical equipment, etc.

Contrary to pessimistic forecasts by pre-revolutionary specialists Uzbekistan has rich natural resources. Today the republic produces coal, oil, gas, copper, lead, gold and various rare elements.

Striking changes have also taken place in agriculture. Today the Uzbek Republic is a leading producer of cotton and accounts for 70 % of the country's cotton output. Prior to the 1917 Revolution the farmers of Uzbekistan had 135,000 wooden ploughs and 1,000 metal horse-driven ploughs. In 1969 the farm machinery plants of the Uzbek Republic put out almost 100,000 units of agricultural machinery (cotton harvesters, tractors, tractor driven seeders, cultivators and

other implements) which ensure efficient performance of collective and state farms. The socialist system of agriculture in Uzbekistan is responsible for the increase in cotton output from 521,500 tons in 1913 to 4.1 million tons in 1968 and the increase in yields from 1.2 to 2.5 tons of cotton per hectare on the average.

All these results have been made possible thanks to the correct organization of research and the ultimate purpose of this paper is to bring to your attention the experience accumulated by Soviet Uzbekistan in this aspect.

In 1918 V.I. Lenin came out with a plan for research activities where he outlined the basic principles for the organization of scientific studies which would be subordinated to national interests and conducted on a country-wide scale. Lenin recommended that the Academy of Sciences, which was becoming a leading research centre, be instructed to develop a master plan for the reorganization of industry and the economic development of Russia. The plan was to meet the following requirements :

a) It was to ensure the rational distribution of industry in Russia in terms of bringing it closer to sources of raw material and cutting down losses during the transition stage after initial processing to all following working stages;

b) It was to ensure the creation of a rational and up-to-date industry and concentrate production at large industrial enterprises ;

c) It was to make the Soviet Republic self-sufficient in major raw materials and industrial goods.

All this meant that the national minorities which were

subjected to colonial exploitation in tsarist Russia were to be given the right to equal development of their national culture and economy. Great importance was attached to the development of the peoples of Central Asia as an advance post of socialism in the East.

The main problem in developing the culture and economy of Uzbekistan was that of providing national cadres in all fields of science. The situation was aggravated by the fact that less than 2 per cent of the population could read and write and in the rural areas the ratio was even lower. This vast territory did not have a single higher educational establishment. There were only 175 schools with a total attendance of 17,500 children. Despite the adverse conditions of the Civil War the Soviet Government undertook a gigantic programme for the elimination of illiteracy. In 1920 V. Lenin signed a Decree on the establishment of University in Tashkent. This marked the beginning of a planned development of scientific personnel and research in the republics of Central Asia.

The implementation by the Soviet state of a nationalities policy, which was worked out by Lenin, resulted in the complete elimination of the political, cultural and economic backwardness of the Uzbek people. Here are a few figures to illustrate Uzbekistan's progress in the field of science. Before the 1917 Revolution there were 289 scientific establishments with a staff of 11,500 throughout the whole of Russia. The peripheral provinces did not have a single research centre. Today, the Uzbek Republic alone has 184 research establishments and institutions of higher learning.

with a total staff of some 24,000 research workers.

The development of research institutions of Uzbekistan and the nature of their studies stem from the basic principles of Soviet science and its attitude to national tasks of economic development.

Research conducted at the establishments of the Uzbek Republic is of a multiple nature -- it is aimed first and foremost at the solution of integrated tasks connected with the development and distribution of productive forces in the region and also encompasses studies aimed at solving practical tasks which face the individual branches of the national economy.

The Academy of Sciences of Uzbekistan has a special Council on Productive Forces which studies the productive forces of the republic, their development and rational distribution. The Council summarises data provided by research, designing and other establishments operating in the field of productive forces, co-ordinates its activities with over 250 establishments and draws up long-range plans for the development and distribution of industry. These plans are presented for examination to the State Planning Commission and after approval by the latter they are included into the state plan for national economy development. The efficiency of this system of research and planning is testified by the fact that the plans worked out by the Council on Productive Forces for the development of such large economic regions in Uzbekistan as Ferghana valley, the Angren-Almalik industrial zone, the Kara-Kalpak Autonomous Republic have been fully realized and constitute a model of planned

socialist organization of the economy and culture of large regions.

The following is a brief description of the organization of branch research and its influence on the economy of the Uzbek Republic.

As mentioned earlier in this paper Uzbekistan has at the present moment 184 research establishments and higher educational institutions. Besides, there are many designing institutes and bureaus and also large research laboratories directly at the industrial enterprises. The state distributes research and educational establishments according to the same principle as industry. Here in Uzbekistan the research centres are distributed all over the territory of the republic -- in the regional centres, cities and large district centres. In the field of agriculture the research establishments cover all natural and climatic zones -- the deserts, foothills, semi-deserts, etc.

IN terms of organization the research institutes, universities and educational institutes constitute subdivisions of the Uzbek Academy of Sciences, the Ministry for Higher and Secondary Special Education of Uzbekistan and a number of other ministries of the republic. At present there are the following establishments in Uzbekistan -- research and designing centres dealing with agricultural and irrigation machinery, mining, power production, chemistry, building materials textile, etc., that is almost all the branches of industry existing in the republic. The higher educational establishments open special laboratories for applied research and they are financed by those industrial enterprises which

expect to use the results of these studies.

Research work in Uzbekistan was started with studies in the field of cotton growing and the search for natural, vegetable, mineral, power and other resources. This stands to reason because Uzbekistan has always been the country's leading supplier of cotton and there can be no industrial development without an adequate raw materials and power basis.

The USSR Cotton Research Institute, opened in Tashkent in the twenties, conducted extensive work in developing high-yield varieties of cotton and in improving methods of cultivation. The Institute played an important role in bringing Uzbekistan's cotton output to the 4 million mark which in turn had a decisive influence on the development in the republic of the cotton ginning, oil extraction, textile, farm machinery and other branches of industry. The increase in cotton production in the republic demanded, on the one hand, modern farm machinery, fertilizer and electric power and, on the other, the construction of industrial enterprises for processing raw cotton. Here are a few facts to illustrate the influence of scientific research on the development of the farm machine industry.

The Central Station for Mechanization and Farming Methods of cotton was opened in Uzbekistan in 1931. In 1954 it became the Central Asian Research Institute of Mechanization and Electrification of Agriculture (CARIMEA) and deals with the technology and systems of machines used for the cultivation and harvesting of cotton and other crops. The research workers of this institute develop new types of

and parametres of working tools and technological processes for the cultivation and harvesting of cotton, rice, wheat, maize, fibre crops, etc. CARIMEA also co-ordinates the work of mechanization departments at all agricultural research institutes in Central Asia. During the last few years this institute has developed 52 major recommendations on the basis of which experimental models have been developed and many other taken up for quantity production. The elaboration of recommendations and their realization at CARIMEA is the subject of a special paper by its director M. Ganiev.

Extensive research in the field of farm machinery is also conducted by the Institute of Mechanics and Seismic Structures of the Uzbek Academy of Sciences, which has a special department for this purpose. Besides working on theoretical principles this department also develops new models of machines (particularly machines connected with cotton harvesting).

Industrial level research is conducted at a special designing bureau for cotton-growing machinery and the designing departments at all the farm machinery plants of the region. These designing departments work on improving existing models and develop new designs. For instance, the "Uzbekistan" all-purpose tractor produced at the Tashkent Tractor Works is a modification of the "Vladimirets" tractor and has been adapted for effective performance in the soil and climatical conditions prevailing in the Uzbek Republic. The HVS-2,8 cotton harvester designed in Uzbekistan is considered to be one of the best models of its kind in the world. The designers and mechanics who helped to

work out performance instructions and achieved record harvesting capacity were awarded the Lenin Prize.

The Tashkent, Uzbek and Chirchik Farm Machinery Plants, the Tashkent Tractor Plant and several other enterprises in the republic manufacture tractors, cotton harvesters, cotton drills, sprayers and dusters, cotton cultivators, strippers, mowers, etc.. The production of these machines was preceded by research and it is still continued.

It must be pointed out that the Academy of Sciences and a number of higher educational establishments in Uzbekistan opened special consultation centres at the farm machinery and other industrial enterprises of the republic with the aim of helping their engineers perform independent research and win degrees. This, of course, stimulates research activities directly at the plants and strengthens creative ties between the scientists and engineers. Several hundred engineers have already won degrees or are preparing to do so.

Cotton production in Uzbekistan which has reached an annual level of over 4 million tons of unginned cotton at a per-hectare yield of 0.88 tons of fibre on the average (in the United State it is 0.51 tons, in the United Arab Republic — 0.6 tons and in Turkey — 0.53 tons of fibre to the hectare) necessitated the development not only of the farm machine-building industry, but also the electric power industry, irrigation, chemistry, etc. — all branches which are connected with the processing of cotton and its products.

The industrial development of any country is unthinkable without a comprehensive study of its natural resources, without their assessment and rational utilization.

The all-round industrial and agricultural development of Uzbekistan on the basis of its potential resources and the principle of processing raw material on the spot has been the result of integrated research aimed at the study and assessment of natural resources and compiling a scientifically substantiated plan for the development of economy.

At different periods this research in the field of geology was conducted by the Geological Committee, Tashkent State University, the Central Asian Institute of Geology. A Geology Research Institute was set up for this purpose at the Uzbek Academy of Sciences.

In 1933 the USSR Academy of Sciences organized the Tajik-Pamirs expedition whose programme covered the territory of the whole of Central Asia. By 1936 this expedition with the co-operation of regional geological boards and various higher educational establishments provided summarized data on the geology and ore deposits of Uzbekistan. The studies of the natural resources of Uzbekistan were continued in the forties and as result numerous deposits of copper, molybdenum, lead, zinc, tungsten, arsenic, fluorite were discovered in the republic and worked.

The post-war period was marked by the further development of geological studies and the growth of geological science. Geological maps were drawn up for all the ore-bearing regions and geologists also found numerous deposits of metals, rare elements, non-ore chemical raw materials, building materials, etc.

Traces of gas and oil were known in Uzbekistan since ancient time and in the thirties geological studies were

started with the aim of tracing regularities in the distribution of these deposits. A special Institute of Geology of Oil and Gas was organized for this purpose and its staff substantiated forecasts of rich gas-bearing regions in Bukhara and the Ust-Yurt plateau in the Karakalpak Autonomous Republic. Geologic prospecting on the spot confirmed these predictions. The unique gas deposits at Bukhara now supply natural gas to the whole of Uzbekistan, the Urals and the central regions of Russia. Uzbekistan's annual output of gas is equal to 30,744 million cu.m. The development of the gas industry in the republic is the result of well-organized research. Right now research for the industrial development and operation of the gas fields and pipe lines is concentrated at the Central Asian Gas Research Institute in Tashkent.

Everything said about research in the field of natural gas applies to the non-ferrous metals industry in the republic and also to the coal industry. It is thanks to large-scale research that Uzbekistan has become a leading producer of gold, copper, tungsten in the Soviet Union. There is also a special non-ferrous metals research institute which helps the industry develop efficient systems of production.

The importance of water in arid zones is common knowledge. Every new source of water in the region is of considerable value for the national economy. There is an Institute of Hydrogeology and Engineering Geology in Tashkent which studies ground water reserves in Uzbekistan and problems of their utilization in agriculture, industry and the communal services. This institute has already mapped

several sub-surface water basins, which includes thermal waters. The latter are being utilized in the republic on an increasing scale.

The Uzbek Republic produces 5,000 times more electric power than the territory did in 1913. In 1964 total power output in Uzbekistan was 15,777 million kW/hrs and this year it is expected to reach 17,200 million kW/hrs. Such an increase in electric power production is the result of extensive research aimed at estimating the water and fuel power resources of Uzbekistan. In the conditions prevailing in our republic the priority task was to introduce the integrated utilization of the water resources — for irrigation and power production. This produced numerous scientific and engineering problems: the rational combination of agricultural and hydropower requirements in water utilization; the scientific principles for compiling fuel and power balances; designing and construction of hydropower and thermal power electric stations; transmission, distribution and transformation of electric power; the creation of a unified power grid of Central Asia; rational operation of power units and automatic controls of united power grids; modernization of existing and construction of new transformer units, electrical drive units, machines and apparatuses; rationalization of operation regimes; improvement of engineering and economic indices; automation of electrical installations; etc..

This wide range of problems is being studied at the Uzbek Research Institute of Power and Automation, the Tashkent Polytechnic, the Central Asian Research Institute of

Irrigation, the Institute of Economics, the Cotton Industry Central Research Institute, the Central Asian Branch of the USSR Hydro-Project Institute and other designing centres. The scientists and engineers also studied the long-term development of the power industry and drew up schemes for the development of power transmission lines for a united Central Asian power grid. These schemes encompassed scientifically substantiated projects of major hydropower units with integrated utilization of water resources and the utilization of the Ferghana-type water intake dam which are being widely used in many parts of Central Asia.

In the field of thermal power and thermal engineering extensive research has been conducted concerning problems of the fuel balance, the characteristics of solid and liquid fuels and their rational utilization, heating of industrial enterprises, cities and rural areas, heat transmission, the study and improvement of the heat and power characteristics of technological equipment, the transfer of industrial installations to natural gas, the development and introduction of highly-efficient burners, etc.

The Central Asian Branch of the USSR Thermal Power Project Institute has conducted extensive research in the course of designing thermal power stations. The Uzbek Research Institute of Power and Automation and the Tashkent Polytechnic have performed comprehensive studies of the optimal regimen and stability of power systems, increased loads of generators and establishment of optimal regimens.

Comprehensive analyses have been undertaken of the system of frequency controls of electrical drives with

automatic governing from valve frequency transformers incorporating controlled power semi-conductors which hold a promise for industry and transport. New and original designs have been worked out for the adjustment of power transformers in operation, the use of magnetic dielectrics in electrical machines has been studied with the aim of raising their efficiency.

Considerable studies have been done in the field of automation and remote controls in production processes. Uzbek scientists and engineers worked out schemes and instruments which made it possible to place a whole cascade of hydropower stations on automatic and remote controls in 1951. In the following years this work was successfully continued by research teams at the Ministry of Power and Electrification of Uzbekistan in co-operation with a number of scientific establishments. The Uzbek Institute of Power and Automation has worked out a simplified scheme of automation which has been introduced at many rural power stations of the republic.

The Institute of Power and Automation and the Institute of Irrigation have developed numerous instruments and devices for automatic and remote controls of irrigation systems, methods of controlling water seepage in irrigation systems, new methods of irrigation based on engineering installations and the use of new materials, systems of ground water drainage, systems of pumps, etc.. This, in its turn, resulted in the creation of irrigation machine-building plants, instruments building plants and building materials enterprises, etc..

In such a short paper as this it is hardly possible to illustrate the organization of research, the relations between research and industrial establishments and their mutual influence in all fields of industry since the Uzbek Republic today has plants and factories of some 100 different branches of industry, all of them created after the 1917 Revolution. However we feel it necessary to dwell at some length on the role of chemical research in the development of the chemical industry of Uzbekistan

The Uzbek Republic is the third largest producer of chemical fertilizer in the Soviet Union and has such large enterprises as the Chirchik Chemical Works, the Samarkand and Kokand Superphosphates Plants. A big fertilizer plant recently went into operation in Almalyk and there is a large chemical works in Navoi. There are several hydroli- sia plants in various parts of Uzbekistan, etc..

Chemical research in Uzbekistan was started in the twenties at Tashkent State University. Later. The following years saw the opening of an Institute of Chemistry, an Institute of Chemistry of Vegetable Substances of the Uzbek Academy of Sciences, an Institute of Chemistry and Technology of Cotton Cellulose and an Institute of Chemistry of Oil. Extensive chemical research has been conducted at Tashkent and Samarkand Universities and the Tashkent Polytechnic.

The timely organization of chemical research directed at the utilization of local raw materials resources for the chemical industry brought about good results. For instance the production of nitrogenous fertilizer and ammoniated superphosphates is based on technology worked

out by the Institute of Chemistry. The Tashkent Pharmaceutical Plant produces many medical preparations from local raw material which have been developed by the Institute of Chemistry of Vegetable Substances. Technological processes at the hydrolisis plants of Uzbekistan are based on recommendations worked out by the Institute of Chemistry and the Institute of Technology of Cotton Cellulose.

It goes without saying that electronic computers play an important role in establishing optimal processes in industrial management. The electronic computer centre of the Uzbek Academy of Sciences was reorganized into the Cybernetics Institute in 1967. It maintains contacts with over 100 production units and renders them practical assistance in organizing production. The Cybernetics Institute is a centre for developing methods of using electronic computers in various branches of the national economy, trains specialists and helps other computer centres in their work.

As mentioned earlier there are several research establishments in Uzbekistan which are subordinated to Union organizations. These centres render considerable assistance to the industry of the Uzbek Republic. The scientists of the other Soviet republics and particularly Russian scientists have been helping Uzbekistan from the first days of Soviet power in training national specialists, in outlining our tasks and organizing research.

The state provides generous financial support to the organization and development of research. In particular the annual budget of the Uzbek Academy of Sciences amounts to 25 million roubles. New premises are constantly build for

research centres and they are being furnished with the most up-to-date equipment.

To wind up this paper we may arrive at the following summary :

The development of all branches of industry in the Uzbek Republic has been preceded and accompanied by fundamental and applied research at general and branch research establishments, at designing centres and chairs of higher educational establishments.

The organization of research in the republic was preceded by the organization of higher educational establishments for training specialists and research workers for all branches of the national economy.

Plans for research activities are adopted on the basis of requirements for accelerated technical progress. Research is financed either directly from the state budget or from special funds of industrial enterprises.

The development of any branch of industry is based on research aimed at the study of available raw materials, power and other resources and their distribution.

The training of specialists and researchers and the organization of research activities is conducted in close co-operation with research centres and leading scientists in the country.

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