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PROBLEMS OF DISTRIBUTION OF INDUSTRY IN THE UNION OF SOVIET SOCIALIST REPUBLICS (THEORY AND PRACTICE)[1/]

by

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1/ The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO.

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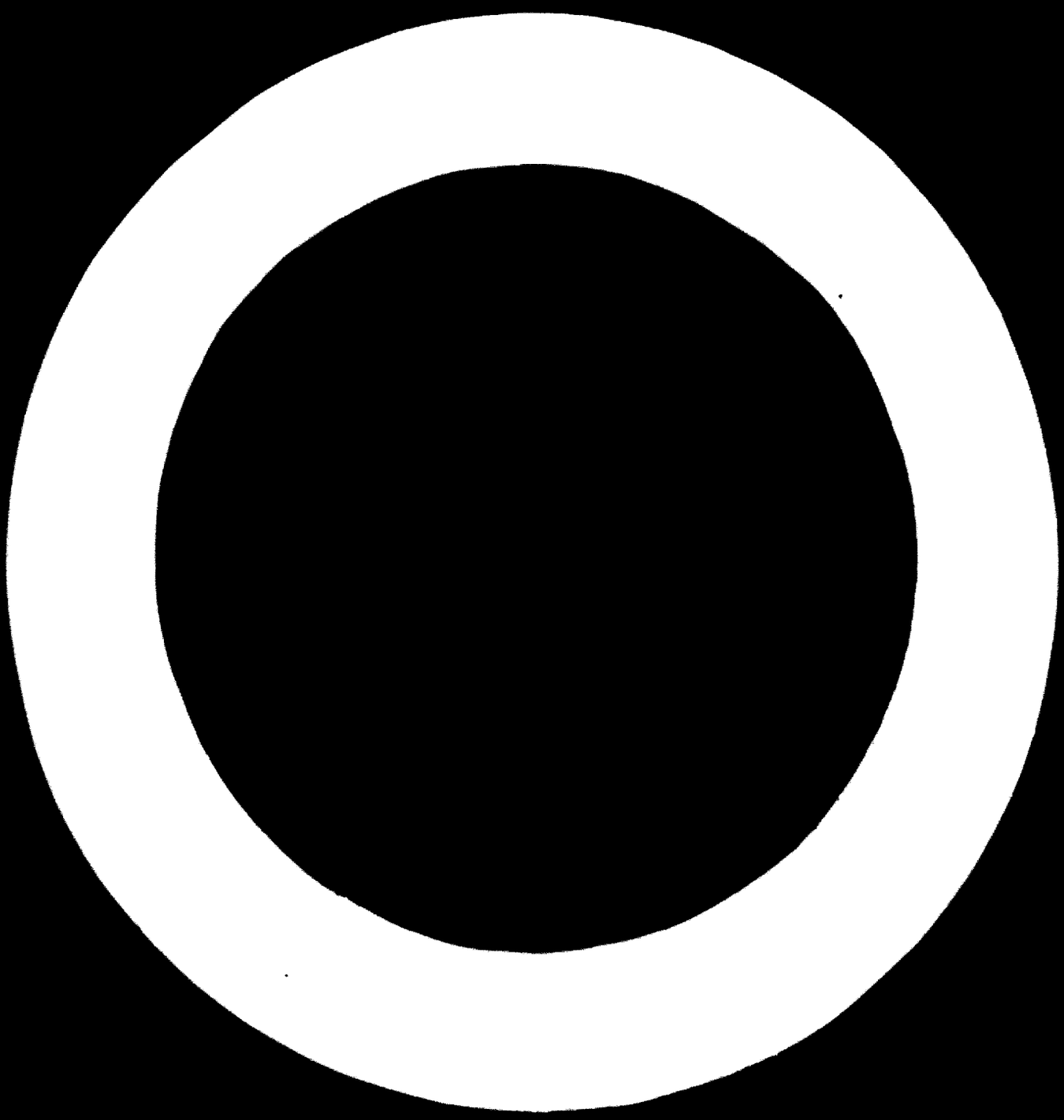

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I. DISTRIBUTION OF PRODUCTIVE FORCES IN THE GENERAL SYSTEM OF PLANNING

1. In the Union of Soviet Socialist Republics great importance has always been attached to the problem of the rational distribution of industry. One of the main trends of Soviet economics is to find a solution to these problems based on the findings of science.

2. The national distribution of the forces of production makes it possible to cut down production costs, to speed up the rate of growth of the national economy, and to determine the proper economic balance among the various regions of the country. At the same time the question of the distribution of industry has a great bearing on a number of social and ethnographic problems involving the differences in living standards, in urban development, the social structure of the population in the nationalities making up the population in various parts of the country.

3. From the first years of its existence, the Government of the USSR has pursued a policy aimed at the rapid development of the former national suburbs of prerevolutionary Russia by developing both their traditional branches of industry and agriculture and new industries. The rapid agricultural and industrial development of the national republics has radically changed their economic and cultural look and raised living standards. Already in the prewar years the national republics of the USSR had been turned from backward, mainly agricultural republics, into prosperous industrial and agricultural ones.

4. By 1939 basic industrial production of the republics of Central Asia had grown 19.5 times as compared to 1928, in Kazakh SSR - 22.9 times, in Byelorussian SSR - 12.6 times while the average growth rate in the country for the same period had been 7.8 times. By 1940 the volume of production of the gross output of the large-scale industry had increased 324 times in Tajik SSR, as compared to 1913, 193 times in Kirghiz SSR, 26.9 times in Georgian SSR, 23 times in Armenian SSR while the average growth rate in the Soviet Union had been 11.7 times.

5. The rapid industrial development of the Union republics laid a firm foundation for the rise in living standards. For example, the volume of the retail trade turnover per head had increased in 1940, as compared to 1928, 15.3 times in Kazakh SSR, 15.6 times in Transcaucasian republics, 16.2 times in the republics of Central Asia. During the Second World War and especially in the postwar years, the national republics of the Soviet Union continued to develop rapidly, untapping vast natural resources and setting up extracting and processing industries.

6. Industrial development is first of all connected with the volume of capital investments. In this respect it would be of interest to examine the growth of capital investments especially in terms of their share per head of population. In the USSR as a whole, the volume of capital investments per head was 240.5 per cent in 1962 as compared to 1952, in the Byelorussian SSR - 375.3 per cent, in the Kazakh SSR - 392 per cent, in the Uzbek SSR - 278.3 per cent, in the Lithuanian SSR - 501.2 per cent etc. The growth of the volume of industrial production for the same period had reached 279 per cent in the USSR, 336 per cent in the Byelorussian SSR, 315 per cent in the Kazakh SSR, 464 in the Lithuanian SSR, 321 in the Latvian SSR.

7. The industrial development of the national republics of the Soviet Union was due to the tremendous efforts exerted by the Soviet State and resulted in important gains in various social and economic endeavours.

8. Under the conditions of modern society one should not consider the problem of locating an enterprise as an isolated fact, for extremely important social and economic consequences of the possible distribution must be taken into account. Also, it is impossible to solve economic problems without thoroughly analysing a whole complex of regional factors. The planning of the distribution of productive forces in general and industry in particular, is part of the larger problem of regional planning, which is primarily concerned with raising the level of well-being of the population of this or that region. The level of well-being is indicated by the extent to which the various needs of the people are met, the needs which in volume and structure are dependent on the level of economic development as well as on social, historic, national, and other conditions of the given region.

9. Thus, in dealing with the problem of the distribution of productive forces one should take into account the following:

a) The most rational distribution of production activity over the country's territory from the point of view of the economic efficiency of the whole country.

b) Provision for a certain level of well-being of the people in the different regions of the country.

10. Thus, the criterion of effective distribution of productive forces in the present conditions of the Soviet Union can be defined as the maintenance of a given volume of production for the country as a whole at minimum cost and the given levels of well-being of the people in different regions during the last year of the planned period. It is obvious that minimum cost is not an end in itself, as savings effected by finding more rational ways of achieving the above-mentioned aims can be used for increasing the growth rate of the country's economy and for raising living standards.

11. Theoretically it is possible to approach the problem of planning in such a way that its solution would presuppose the simultaneous determination of all the main parameters of the development and distribution of production activity including every single enterprise. In this case the criterion of efficiency would be the achieving in the end the maximum of personal consumption by the people all over the country, provided a number of conditions of nation-wide importance are observed.

12. However, this approach is only of theoretical interest. For practical purposes it is necessary to solve these complex problems one by one.

13. Thus, two major lines of development stand out: (a) the determination of rates of growth and proportions of the development of the country's economy as a whole and of the rational structure of the branches of the economy; (b) the complex of questions related to regional planning. In other words, the reconstruction of existing enterprises and the construction of new plants, agricultural enterprises, new transportation lines, towns etc. is a function of the volume of capital investments in every given period. In its turn capital investments are highly dependent on the national income and the rate of economic growth.

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14. It is quite obvious that these two lines of development are interdependent, but it is also obvious that the rates of growth and the proportions of development of the whole country's economy are to be determined first. Then comes the multi-stage process of planning the distribution of the determined parameters of production and non-production activity for every region of the country taking into account the existing differences in the factors affecting the distribution and the above-mentioned aims of regional planning.

15. Thus, one may regard the process of determining "branch" and territorial proportions of the plan as iterative. Since it is extremely difficult to work out plans, one should not think that the number of iterations can be large enough.

16. Before dealing at length with the methods of planning territorial proportions of production, which, in fact, is the main theme of this report, it is necessary to determine how "branch" proportions are arrived at for the planned period. Theoretically it is possible to determine optimal "branch" proportions on the basis of a corresponding dynamic model of interindustry balance. However, since it is too complicated to make such a model at present, only rather simplified models having a high degree of aggregation of industries are made. These models are valuable for analysing and forecasting future processes of the development of the country's economy but not for making recommendations to be incorporated in the state plan.

17. A long-term plan for the development of the country's economy is based on the detailed plans for the separate branches of industry. These plans are unified by the centrally-planned targets, which take into account the trends of technical progress and ensure a better structure of production. However, first and foremost the plans themselves must be brought into balance.

18. Detailed plans for the development of the country's economy usually are made for a five-year period. As experience shows, when planning the distribution of productive forces, it is necessary to plan for a 10-15 year period at least and for a still longer period when determining lines and parameters for the utilization of natural resources. It is obvious that plans for that length of time cannot be as detailed as five-year plans. That is why they look more like long-term economic forecasts.

19. On the basis of these long-term forecasts, detailed five-year plans for the distribution of productive forces are made. These plans are part of the overall state five-year plans for the development of the country's economy.

20. The Council for Studying Productive Forces affiliated with the USSR State Planning Committee is responsible for drafting these long-term forecasts. Work on the general plan for the development and distribution of productive forces of the USSR for the period 1971-1980 is now under way. In this work hundreds of research and designing institutes of various branches of industry, the economic institutes of the Academies of Sciences of the Union republics, departments and branches of the USSR Academy of Sciences in the regions of the RSFSR, planning committees of the economic regions of the RSFSR and the Ukrainian SSR are engaged.

21. The work on the "general plan" has not yet been completed, but the methodological principles on which it is based, and the experience of the joing research of hundreds of scientific institutions may be of considerable interest to the participants of this seminar.

Collection of "initial data for making up the general plan"

22. A brief description of the general system of organisation and main principles of elaborating the general plan for the development and distribution of productive forces of the USSR for the period 1971-1980 is given below.

(a) Determination of the possible rates of growth and proportions of development of the branches of the economy and of a number of general economic parameters showing the country's main targets for the planned period.

(b) Defining the lines of development of the branches and sub-branches of industry, agriculture, transport and non-production sphere for the whole country.

(c) Determination of economically expedient versions of development of the economy of the Union republics and separate economic regions containing quantitative estimation of the main parameters of production and non-production activity.

23. The first round of this research was carried out by the Council for Studying Productive Forces in conjunction with the central economic institutes of the country. The results of the research were made available to all those engaged in making up the "general plan" as guiding points to be defined more accurately in the process of thorough investigation carried on by all concerned with this programme.

Elaboration of the parts of the "general plan" according to the branches of the economy and regions

24. On the basis of the "initial data" numerous research and designing institutes of the ministries and the USSR Academy of Sciences elaborated several versions of the "plan for the development and distribution" of various branches of the economy. Apart from that a plan for the utilisation of water resources was also made.

25. A great number of the economic institutes of the republics and institutes of the branches of industry worked out their own versions of the general plan making use of "initial data" and "plans for the development and distribution of branches of the economy".

Preparation of a summarised general plan

26. The scope of work carried on by the Council for studying productive forces is extensive. The Council must make a summary of the initial data after a thorough consideration of these materials in scientific and technical conferences in the Union republics and in the ministries of the branches of industry with a view to defining, in the first place, rational proportions of the long-term territorial economic development of the country.

27. The above-described system of organising work to make up the "general plan" reflects certain methodological concepts concerning the relations between national and regional planning, "branch" and regional approach to the distribution of productive forces, the role of science and research in the general organization of scientific planning of the country's economy.

28. Experience has shown that the "branch" approach to the distribution of single enterprises is insufficient. For example, from the point of view of the economy of a branch of industry it might be efficient to locate power-and-water-consuming enterprises in the European regions of the USSR. However, from the point of view of the economy of a region the opposite might be the case. The abundance of cheap fuel, power, and water resources in the eastern regions of the USSR makes it expedient to locate power-consuming enterprises there. That is why further on we shall deal with the methods of "branch" and regional planning of the distribution of industry.

29. The study and planning of the distribution of industry is well-elaborated and produces detailed results including the location of single enterprises and their specialisation. In analysing the distribution of branches of industry, the application of economic mathematical methods and particularly the methods of linear programming has proved its value.

30. In the USSR and abroad many books dealing with the laws of the distribution of branches of industry have been published. On the basis of studies made of the technological coefficients of consumption of raw materials, the fuel and power per unit of produce, and of determining the weight ratio between end products and certain elements of the costs, one finds that the producers of end products are attracted to the sources of raw material, fuel and centres of population.

31. Thorough studies have been made of numerous factors, including changes in production costs depending on the degree of specialization, increases in transportation costs following the growth of production etc. In these calculations, the drive to cut down to a minimum the costs of production and transportation yet meeting the demand all over the country has been taken as the criterion of efficiency.

32. It should be noted that the number of versions of the development of existing and construction of new enterprises in various parts of the country turns out to be so large that as a rule, it is impossible to make a comparative study of their efficiency manually. Nevertheless, economists and engineers who are well grounded in this subject often find a solution which is rather similar to the one made by the computer.

33. In the USSR computer programming is widely used just for solving the problems of optimal development and distribution of the branches of industry. At present there is a great deal of experience in finding optimal models of development and distribution for the following industries: chemical, fuel, cement, forest, pulp and paper, machine building and others. Some success has also been achieved in developing corresponding models for agriculture.

34. The achievement of the optimal development and distribution of a branch of industry ensures considerable improvement of the plan as compared to the versions made without using mathematical programming. Capital investments and current expenditures on production and transport would go down approximately 15-20 per cent.

35. It is quite obvious that each industry is connected in numerous ways with many other industries, and this or that version of its development and distribution influences the other industries directly or indirectly. Thus it is imperative that the optimized industry should be taken out of a more general complex of which it is a constituent part. At the same time branches of the country's economy with which it has developed the most ties should be similarly treated.

36. The optimal version of the development and distribution of an industry or a few industries (the optimized system) includes developing or modernizing existing enterprises and building new ones, determining the volume and range of manufacture and marketed goods and technology to be used, and the transportation and utilization of produce, including foreign trade. All these factors enable the system to achieve for a given period the maximum value, which means obtaining maximum results with the smallest possible expenditure of labour and material means.

37. The optimal version for the development of the system is chosen from among the versions that meet the restrictions imposed on the system. These restrictions include the following parameters: the original state of the system, available resources (raw materials, power, labour, capital investment), demand for goods including the possibility of interchange, ties existing among the elements of the system, and conditions for transportation of raw materials and end products.

38. In defining restrictions one must consider the rates of consumption of raw materials, fuel, power, labour, the equipment used and anticipated advances in technology.

39. The results of calculations made by computers do not signify the completion of the plan for the development and distribution of an industry. In the next stage experts in this industry as well as economist-mathematicians carry out a thorough examination of the results.

40. To make certain that the results are correct, the optimal plan is tried for stability by varying wording, initial economic information, and restrictions of the problem. Elements of the system incorporated in all versions of the plan are sought out. It is recommended that these elements be developed in the first place. The elements of the system that have not been incorporated in all the versions of the plan are submitted to further analysis.

41. Thus, though the "branch" approach to the distribution of industry is elaborated enough and ensures rather accurate results within the set of chosen restrictions, it is not possible to obtain the restrictions themselves by the "branch" analysis alone. An interindustry regional approach is needed for this purpose. The following example will make this idea clear.

42. Let us assume that the calculations for the development and distribution of the light industry show that a considerable number of the enterprises of this industry should be located in Siberia. It is also known that labour available in Siberia is limited and that it is most effectively used there in coal, oil and gas industries, power-consuming enterprises of the non-ferrous metal industry, the chemical industry, logging operations, and wood processing. Drawing some labour into the light industry may result in reducing the volume of production in these highly efficient industries. Bringing in additional labour from other regions will create major additional expenditures that will exceed the economic efficiency gained in the light industry. On the other hand, in some Siberian towns there is female labour available. The necessity of getting women employed may require the construction of enterprises of the light industry. It is by a thorough regional, interregional, and interindustry analysis that the amount of labour for the development of light industry in Siberia should be determined. This figure will serve as a restriction while solving the corresponding problem of the industry.

43. Such thinking may be applied to prove the expediency of using the cheap fuel and power resources of Siberia or the water resources of the European part of the country for this or that industry, or of using effectively the existing infrastructure of towns when locating enterprises etc.

44. The social and economic consequences of distribution of industry in some areas are not taken into consideration with this "branch" approach, as, for example, the possibility of creating disproportions between the spheres of application of male and female labour, extreme growth of certain towns, air and water pollution etc. So the solutions to the problem of the development and distribution of industry arrived at on this principle require considerable regional correcting even if use has been made of mathematical programming.

45. As experience has shown, it is expedient to use optimal models for extracting and processing industries to a varying degree.

46. For extracting industries or industries producing a limited range of heavy goods mathematical programming is most effective. This is accounted for by the specific conditions of production in these industries. The location of enterprises of these industries is usually associated with large deposits of minerals or forest resources, but the facilities for transportation are also of great importance. The demand for the produce of these industries in various regions can often be defined with great accuracy. Thus the solution to the problems of the development and distribution of the fuel industry as a whole and its branches (on the basis of the optimal fuel-power balance), of cement, forest and some other industries was arrived at with the help of linear models. These models were used when drawing up plans for the development of the economy of the USSR.

47. In processing industries such factors as skilled labour, research facilities and scientific personnel, infrastructure, urban development, and the creation of industrial centres, are of great importance. Difficulties arise because of a rather wide range of goods manufactured by these industries. These factors are often hard to take into account in the models of the development and distribution of processing industries. That is why these models must be thoroughly analysed especially from the regional viewpoint.

48. The third group is made up of industries which produce goods to be consumed entirely within a major economic region. These include the production of various kinds of foodstuffs and building materials. It is also possible to solve the problem of their optimal distribution within a region by mathematical programming, and the results received are of great practical value.

49. Thus, it would seem best to start studying and planning the distribution of industry by making a thorough economic and technical analysis of the distribution of enterprises of branches of industry. The results may have to be corrected on the basis of a regional analysis, which often reveals the need for most substantial changes in the plans of the development and distribution of processing industries.

50. The theory and practice of the rational distribution of productive forces in the Soviet Union is based on the necessity for establishing economically effective production in the different territories of the states. The territory of a region, macrozone, as a rule, has its own specific economic, demographic, and other conditions. The task is to get optimal solutions for the economic development of a certain territory (region, macrozone) corresponding to its particular conditions and to its economic potential for the development of productive forces. On the other hand, each region, macrozone, is an intrinsic part of the entire country as a result of multilateral, interregional economic ties. A quantitative growth of enterprises and output of production in the whole country and in the regions affects the qualitative changes in the territorial proportions of economic development.

51. One of the most important lines of research in the Soviet Union is to establish economically effective proportions for the development of the territory of the European part of the USSR (about one quarter of the territory) and the eastern part of the USSR. The main problems with respect to the European part of the USSR are the following:

(a) To provide the economy of the European regions with fuel and power at minimum cost by making maximum use of existing power resources and obtaining large supplies of power from the eastern regions.

(b) To change gradually the structure of industrial production with a view to increasing the share of the processing industry.

(c) To develop a system of towns ensuring economic ties between large, medium, and small towns.

52. The main problems with respect to the eastern regions are the following:

(a) To enhance gradually but drastically the role of the eastern regions in the development of the country's economy.

(b) To get such a structure of industrial production which, on the one hand, makes the best use of the natural and economic conditions of the eastern regions and, on the other hand, ensures the optimal technical and economic results of the development of specialized branches of industry (especially power-consuming, non-ferrous metal and chemical industries).

(c) To tap new territories having large deposits of various minerals and natural resources.

53. In order of importance the above-mentioned territorial proportions of the economic development of the European and the eastern regions of the USSR takes first place. The territories of the Union republics come next.

54. The territorial planning of the development of the productive forces of the Union republics is done by the state planning committees of the republics. The territorial planning and the planning of the development of branches of industry take into account both the interests of the Union republics and the interest of the Soviet Union as a whole. For study purposes the Union republics are grouped together according to their natural conditions and prospects for economic development. (Baltic republics, republics of Central Asia, Transcaucasian republics.) The problems of economic development of the Union republics are often very similar. For instance, the high industrial density existing in the territory of Estonia, Latvia, and Lithuania has led to high employment of the population, and this already determines future possibilities for locating industry there. On the other hand, a rather considerable growth of population in the Transcaucasian republics and the republics of Central Asia makes it necessary to increase the share of the processing industry in the general structure of economic production.

55. In third place come the large economic regions of those Union republics that have vast territories. For instance, in the RSFSR there are 10 regions: Central, Central-Black earth, Volga-Vyatsk, North-Western, North-Caucasian, Povolzhski (land along the Volga river), Ural, West-Siberian, East-Siberian, and Far Eastern. The Ukraine has three economic regions. Apart from these there are district, regional, and city planning bodies responsible for the economic development of certain areas.

56. Territorial economic proportions determine the interindustry (vertical) and interregional (horizontal) economic ties, depending on the specialized economy of the zones, Union republics, economic regions, and districts. The division of the country into economic regions is an important factor of territorial planning because it thereby is possible to select economically similar territories, to supply a great deal of information, and to set up statistical accountancy per each taxonomic unit. This information constitutes the basis, the main tool for an efficient and profound technical and economic analysis of the optimal development of the economy of each region, taking into consideration the targets for the country's development.

57. In analyzing the territorial proportions of economic development, the group location of industrial enterprises (industrial centers) and the basic principles for economic development of new territories are of principal significance.

58. An industrial centre comprises a group of interconnected industrial enterprises located within a comparatively small territory. The concentration of industry in some points (towns) and in urban agglomerations reflects the tendency to increase the economic efficiency of production by creating a unified infrastructure (transport, power, water communications, residential districts, social services etc.). On this basis large petro-chemical complexes having a diversified group of chemical production, or iron and steel works with coke-chemical production, large machine building complexes and others can be set up.

59. The problems of determining the optimal economic structure of industrial centres are rather complicated. Principally, this structure should be determined on the basis of the plans for the development and distribution of branches of industry over the country's territory and the plans for the rational economic development of each economic region of the country.

60. The general guiding principle for determing the structure of an industrial centre is to limit the range of possible industrial enterprises to those which it is expedient to develop in the given economic region. This allows a sharp reduction in the range of enterprises to chose from, and the imposed restriction is based on the heirarchical arrangement of the system for solving the problems of territorial planning (structure of the country's economy - of the Union republics - of the industrial centres.

61. After determining the structure of an industrial centre, a specific problem remains with respect to the group distribution of industrial enterprises within this given centre. In the USSR there are dozens of specialized territorial-designing institutes affiliated to the USSR State Committee for Construction which have already designed many an industrial centre.

62. The efficiency of group distribution of enterprises is due to the reduction in current expenditures and capital investments made possible by the territorial concentration of industry and more effective use of the infrastructure and auxiliary and servicing establishments. The following are the most important specific factors accounting for this reduction:

(a) A unified system of transport and storage facilities for all the enterprises.

(b) A unified system of heating, sewerage and water-supply.

(c) Interlocking of enterprises, buildings and installations.

(d) A single system uniting repair shops, tool rooms, stock, container-manufacturing and other auxiliary shops that cater to the needs of a group of technologically similar enterprises.

(e) Narrowing the industrial territory.

(f) Unified construction facilities.

(g) A unified system of housing and municipal services.

63. The amount of savings in current expenditures and capital investments depends on the kind of enterprises making up the group. It is important to select enterprises that can be made to co-operate on the auxiliary production level as well as on the basic production level.

64. A study of the data on planning the group distribution showed that the group distribution of enterprises effects up to a 15 per cent reduction of capital investments and from a 10-20 per cent reduction of current expenditures as compared to the corresponding figures of an isolated distribution of enterprises.

65. However, the above-mentioned factors are not the only advantages gained from the group distribution of enterprises. Of great and ever-increasing importance is the creation of conditions that will advance progress in technology, management and efficiency of production, and attract skilled labour and engineers and scientists.

66. Furthermore, planning of group distribution permits a firm policy concerning the growth of urban agglomerations in order to avoid their overgrowth and the unfavourable consequences stemming from it.

67. The analysis of the group distribution of enterprises should be coupled with an elaboration of the general concept for the development of urban and rural settlements in the given region. This point often may be the most important one in deciding on localities where new industrial centres are to be developed and the existing ones extended. This point does not apply to industrial centres directly engaged in the extraction and primary processing of mineral resources.

68. In the USSR the problems of developing territories with a high concentration of natural resources have always attracted much attention. For the past 50 years new powerful industrial complexes have been developed that determine the character and lines of industrialization of the Soviet Union. Such complexes include the Ural-Kuzbas and Khibini, oil producing regions along the Volga and the Ural rivers, Norilsk, Gasly and Mangyshlak, the Angara-Yenisei industrial complex. The Pechora and Kursk magnetic anomaly and many other regions have united into a wide system of industrial centres of the country. New industrial zones have appeared in the republics of Central Asia and Kazakhstan, in the Ukraine and the Transcaucasian republics, in the Baltic republics and Byelorussia.

69. The Soviet Union has grown economically mainly because of the intensified economic development of new regions with a high concentration of natural resources. This characteristic feature of the Soviet Union's industrial development has determined the creation of the country's modern raw material and power potential ensuring high growth rates of the economy of the USSR. Each five-year plan has served as the basis for the economic development of ever new regions.

70. The wide scope and the short duration of time during which this planned development of new territories has taken place have no precedent in history.

71. At present the Soviet Union has entered a new stage of all-round economic development of the territories possessing large deposits of minerals and natural resources. In the European area, in the centre of the country, a large centre producing iron ore is being developed on the basis of the Kursk magnetic anomaly. A new oil-producing region is appearing in Byelorussia. In the north-western area the Timano-Pechora region, possessing large oil, coal and gas deposits as well as timber resources, is being formed.

72. However, it is in the east that the scope for the development of new regions with a high concentration of natural resources is especially great. In the southern regions of Siberia, which can boast of natural and climatic conditions being quite suitable for habitation, two large territorial-industrial complexes, the Sayan and Low-Angara complexes, are being developed.

73. The Sayan region, which lies south of the Krasnoyarsk area, possesses large and economic hydropower resources, coal deposits in the Minusinsk basin, large deposits of various minerals and raw materials (manganese, molybdenum, titanium-magnetite ores, natrium chloride, limestone, phosphorites, nephelines and others) as well as timber resources and arable land.

74. A combination of favourable natural conditions and resources, available labour, and a comparatively well-developed network of transportation permits the development of a new industrial-agricultural complex in the Sayan region. The generation of power would form the basis of this development. Construction of the Sayano-Shushenskaya hydro power station with the capacity of 6.3 mln kwt is under way.

75. At present the composition of the Sayan economic complex has been defined in general. This has been done by the Council for Studying Productive Forces in conjunction with other research, designing and planning organizations.

76. In addition to the Sayano-Shushenskaya and Mainskaya hydro-power stations, some coal-fired thermal stations will be built here to make use of the Minusinsk coal basin. Large-scale production of non-ferrous metals and alloys, ferro-alloys and high-grade steel, phosphorus, chlorine and their compounds, artificial and synthetic fibres that will consume much power is foreseen. The share of machine-building and auxiliary and servicing industries in the total complex will be adequately large. In fact, the development of the Sayan complex has already started. It will probably take ten to fifteen years to put these plans into practice.

77. The Low-Angara region comprises the territory along the Low-Angara river and the land in the middle part of the Yenisei river. It is over 300,000 km^2 in area. A great complex of power-consuming industries can be developed, since large-scale hydro and thermal power stations can be built here. Also, aluminium,

lead and zinc-producing plants, steel mills producing ferroalloys, and enterprises of the chemical industry can be set up.

78. It will take 20-25 years and large capital investments (about 15 milliard roubles) to develop the Low-Angara economic complex. It will also be necessary to bring here about 600,000-800,000 people.

79. The northern portions of Siberia and of the Far East constitute a vast territory with severe climatic conditions. It is sparsely populated and has no means of transportation that functions all year round. However two basic large regions have now been defined in the north. Their development will radically change the economic life of the zone. They are the west-Siberian and Transbaikal-Yakutski/Aldan-Chulman-Udokan.

80. The west-Siberian economic complex is located within the boundaries of the west-Siberian plain, the area of which is about 2 million km^2. Large oil and gas deposits are to be found here as well as large forest and other resources. The total territory of gas and oil fields is over 1.5 million km^2. The estimated oil deposits are said to be over dozens of milliards of tons, the gas deposits - 16.5 trillion m^3. The output of oil in western Siberia will reach 20-25 million tons and of gas 16-20 milliard m^3 in 1970. In ten to fifteen years the output of oil can reach 150-200 million tons and of gas - 160-180 milliard m^3. It is proved by calculations that it is highly economic to develop the gas industry in the conditions of the far north.

81. The total area under forest is 135 million hectares, with timber resources of 7.6 milliard m^3. Coal and aluminium ore deposits have also been found here as well as thermal waters containing iodine and bromine.

82. The foundation of the economy of this region has been laid in the past few years. A system of transportation is being built. Construction of a number of oil and gas pipelines has been completed. Plans are in full swing to construct a system of large gas pipelines starting from the extreme north of the Tyumen district and extending to the European regions of the country. New towns have been built such as Urai (population: 18,500), Nefteyuganak (population: 8000), Gornopravdinsk, Megion, southern Balyk and others.

83. The abundance of hydrocarbon raw materials makes it possible to set up a diversified chemical complex in the southern zone of Siberia, from Omsk to Irkutsk.

84. The multiforest zone of Siberia is becoming an important centre for the chemical-mechanical processing of wood and the production of high-grade wood products in large quantities.

85. The Transbaikal-Yakutski region. Large deposits of minerals and other natural resources found in southern Yakutia and in north of the Transbaikal make it possible to solve new major economic problems and this will greatly affect the future industrial development of the far east.

86. Mineral resources discovered in this region include: a large coal field (40,000 million tons, mostly coking coal) in southern Yakutia; the Aldan iron ore deposits (the Taeshni deposit alone contains 1.3 milliard tons of good-quality ore); the Udokan copper deposits (some of the best in the USSR); the Leno-Viluisk gas-bearing area (estimated deposits - 12.8 trillion m^3); thick beds of rock salt in the basin of the Lena, Olekma, and Chara rivers. With these resources one can set up a large centre of the iron and steel industry in the far east and a new major centre of the non-ferrous metal industry in the Transbaikal area. The generation of power in the far east and the Transbaikal area is possible because of the gas and coal deposits and hydro-power resources.

87. The zone of Central Asia and Kazakhstan is passing through a stage of intensive economic development. Among the new regions of special interest are the South-Tajiksi and Mangyshlak complexes.

88. The south-Tajikski complex is based on the use of large hydro power resources. Hydro power resources of south Tajikistan that are technically possible to utilise can produce about 100 milliard kWt hours per year. There are also considerable deposits of gas, lime, rock salt and dolomite in this region.

89. Power-consuming industries will be developed in this complex. The Yavanski electro-chemical combine, the Vakhshski nitric fertiliser-producing plant, and the Regarski aluminium-producing plant are now being built here. Rather favourable soil and climatic conditions and available power will make it possible to develop electrified agriculture based on mechanised irrigation.

90. The Mangyshlak industrial complex occupies the Mangyshlak peninsula and is just in its birth throes. The estimated oil deposits in this region are well over milliards of tons. There are also deposits of coal, copper, and other minerals. A deposit of chemical raw materials (chlorides, sodium sulfate, magnesium, potassium and others) is situated nearby in the Bay of Kara-Bogaz-Gol. That is why the Mangyshlak region should be regarded not only as the country's new oil-producing centre but also as a major base for the chemical industry.

91. The Council for Studying Productive Forces has always paid special attention to the problem of developing new regions with a high concentration of valuable natural resources and has accumulated a great deal of experience in this field.

92. To solve the complicated problems of simultaneously setting up a number of large industrial complexes mainly on barren land, preparatory scientific and technical research in economic development is of paramount importance. In this connexion the following points need to be considered:

(a) A thorough study of the territories to be developed.

(b) Analysis of the major technical problems. Experience has shown that the "middle-sized" equipment and machinery that performs well in the middle zone of the country is not suitable for regions where the climate is severe. The same is true for the technology of construction of industrial and transport facilities as well as of housing. Mechanization and automation of production, which leads to a reduction in labour, is particularly effective in the northern regions and in the desert land of the south. The economic development of new territories requires new technical ideas.

(c) Research on sociological problems to find ways to create favourable living conditions in the new regions.

(d) Elaboration of a single scientifically-grounded plan for the development of industrial complexes. The plan for such development of the new territory is the result of a scientific study of the region and comparing possible versions of the most economic development of the whole complex.

93. On the basis of technical and economic research the model for the optimal interindustry balance is made. This provides for the interrelated development of the branches of the economy and of production and non-production spheres. Experimental work in applying economic and mathematical methods is under way.

II. THE FACTORS AFFECTING THE DISTRIBUTION OF ENTERPRISES AND THE ESTIMATION OF THEIR ROLE IN REGIONAL PLANNING

94. In general one should classify as factors affecting the distribution of enterprises or groups of enterprise the following: settlement of population and manpower, location of natural resources within the territory, infrastructure (especially transport facilities), and the existing economic conditions and technical progress in the economy of the country. All these factors simultaneously affect the distribution of enterprises and the lines of efficient economic development of economic regions in many ways and very often in opposite directions. The problem of determining the optimal territorial proportions of development can be regarded as that of finding the most efficient combination of the factors affecting the distribution of industry. The experience gained in planning and research in the field of the distribution of productive forces allows one to make a comparative estimation of these factors.

Population and manpower

95. Population and manpower are the most important factors in the distribution of industry. On the other hand, the distribution of industry is one of the principal means for controlling the territorial settlement of people and the employment rate in every region.

96. The study and planning of such settlement is closely connected with the urbanization process that is developing rapidly in the advanced countries. In the Soviet Union for the past 25 years alone (1940-1965) the urban population has almost doubled (1940 - 63.1 million, 1966 - 124.8 million people). The towns are, of course, the principal centres for the distribution of industry.

97. In this connexion a new and complex problem of planning has arisen. It is to create a network, controlled by plan, of the very large, large, medium, and small towns in which new towns could be included. To a certain extent a network of towns is indicative of the total territorial distribution of industrial centres and their development.

98. Such a network would provide for the restriction in growth of the largest towns, for the development of new industrial centres in the medium-size towns and for employing on a greater scale the population of the small towns.

99. In the USSR great importance is attached to the problems of resettling population, since the country is facing the task of developing the enormous resources of its eastern regions. The migration rate, especially to Siberia and the far east is increasing considerably. Material incentives have been introduced to attract people to settle in the new territories.

100. When estimating manpower one should take into consideration not the mere quantity but the age, sex and professional qualifications as well. The factor of the employment rate affects the rational distribution of industry in two respects. First, it is economically expedient to locate a certain group of enterprises in the regions where manpower is concentrated. This group includes enterprises requiring relatively small consumption of raw materials, fuel and power per worker per year with the share of the end product per worker also relatively small, but the product itself being of great value.

101. Calculations have shown that the costs of transporting raw materials to the production facilities and manufactured goods to the customer, even though the distances may be rather long, turn out to be lower than the costs of transporting the labour force necessary to start the production of this kind of goods and the costs of creating good living and working conditions in the undeveloped regions. Labour-consuming industries include some machine-building industries (instrument-manufacturing, electro-technical, radio-technical and other industries) the light industry, plastic goods manufacturing, chemical-pharmaceutical and others.

102. Second, it is necessary to have a combination of various types of plants distributed in the regions to provide both male and female employment. Experience has shown that in mining centres it is expedient to locate among other enterprises plants that employ female labour. In centres of the textile industry it is necessary to locate plants that employ male labour. For sociological reasons this is very significant.

103. In estimating the factor of manpower utilisation, the territorial differentiation of labour according to profession and trade, professional skill and experience, and the available training facilities assume ever greater importance. Owing to technical progress and the introduction of advanced techniques, engineers and technicians must be more highly qualified than formerly.

A new factor affecting the distribution of modern plants is the ever increasing ties between research and industry. In every large economic region new research centres are springing up, and the number of scientists engaged is going up rapidly. The planned distribution of many plants is beginning to depend on the degree of the development of research facilities in the region.

Natural resources

104. The location of natural resources exerts a decisive influence on the distribution of industry. Land, mineral, water and forest resources determine the lines of development of productive forces in every macrozone and economic region and the creation of new industrial centres.

105. Land resources, even in the USSR, with its vast territory, should be utilised with maximum efficiency for agriculture, industry, transportation and for laying out national parks and promoting tourism. In the USSR the land under cultivation occupies 27.3 per cent of the territory, forest - 34.4 per cent, and the remaining territory is tundra, marshland, and brushwood. The possibilities for considerably increasing the land under cultivation are limited by the cold climate in the north, the waterless deserts in the south and the mountain ranges in Siberia and in a number of southern regions. Thus it is necessary to make minimum or no use of agricultural lands for industrial, transport and other needs. The damage inflicted on agriculture in this case is to be calculated as expenditure for the construction of enterprises in the planning of the distribution of enterprises. It is also necessary to locate industrial and transport facilities mainly in the regions where it is possible to utilize lands of little or no use for agriculture. These restrictions are, of course, of local character and refer, mainly, to the zones of well-developed agriculture.

106. Forest resources occupy vast territories. Territorial planning envisages, on the one hand, large-scale chemical and mechanical wood processing, on the other hand, the preservation of large forest tracts as water-protecting zones.

107. It should be noted that from the scientifical and practical point of view land-forest-water supplies constitute a single interrelated and interacting complex of natural resources. The sound organization of the country's economy requires planning the economy as a whole, taking into consideration the availability of natural resources in each economic region. Recommendations for

regions are drawn up on the basis of the rational utilization of land resources by agriculture, forestry, industry and towns, with provision of drinking water for all the consumers.

108. Water resources, in view of the rate of the present development of industry, agriculture and towns assume the utmost importance as a factor affecting the economy as a whole and especially the distribution of water-consuming industries (synthetic materials, chemical wood processing and others). Some territories of the European part of the USSR, Kazakhstan and the republics of Central Asia cannot be recommended for the location of water-consuming enterprises. On the other hand, the water factor can be classified as a factor depending on the country's financial resources. Water can, in fact, be supplied to any dry region. Large hydrotechnical installations make it possible to provide deserts with considerable water resources (large canals, pipelines, man-made lakes, utilization of deep ground water). However, in these conditions water resources become rather expensive and should be used by only the most efficient customers. In future, the desalting of sea-water by nuclear power will provide great amounts of fresh water.

109. In advanced countries the pollution of rivers by industrial wastes is increasing at a dangerous rate. In the USSR there are two ways of tackling this problem: (a) the construction on a compulsory basis of full-scale installations for cleaning industrial waste waters; (b) the reduction of water consumption by industry and, consequently, the reduction to a minimum of industrial waste waters.

110. From the viewpoint of a single enterprise, this increases capital investments and may somewhat raise production costs. However, the state, acting in the interests of the whole society should be willing to assume these additional expenditures, which will be repaid by the preservation of fish resources, the increase in clean water resources, and better recreation facilities for the people. The preservation of nature has become now as never before a matter of great importance.

111. Mineral resources (oil, gas, coal, iron ores, non-ferrous metals, chemical raw materials, building materials, etc.) constitute the basis for the country's industrial development. The location of mineral resources is determined by the

geological structure of this or that territory and by the extent to which some deposits have been explored.

112. Large-scale mining enterprises are characteristic of the present stage of industrial development. This makes it possible to use the most advanced equipment for mining and dressing and to reduce considerably the production costs per unit.

113. In calculating the economic value of this or that territory it is extremely important to know how large the potential mineral resources are. It is necessary to know the extent of the explored and estimated deposits before setting up a mining enterprise. Geological exploration involves complex research and costs a great deal. That is why when estimating the cost of minerals to be extracted, capital investments for geological exploration (geophysical investigation, drilling operations etc.) must be included in the total costs. Statistics have shown that in the case of large deposits of valuable minerals even considerable capital investments for their development in new regions are economically justified. For instance, the cost of supplying gas from arctic regions of the Tyumen district to the regions where it is consumed is rather low.

114. Of special significance for determining the effective territorial proportions for economic development is the distribution of fuel and power resources. The fuel and power balance for the country and for each economic region constitutes also the basis for determining the distribution of industry in various territories.

115. In the USSR a complex economic and mathematical model of the country's fuel and power balance has been developed in which the output of various kinds of fuels has been fixed (including their interchangeability) as well as transportation routes. The minimizing function comprised the costs of the output of all kinds of fuels, of transporting fuel and transmitting power and the consumption of fuel and power by customers. It was possible to solve this problem because of the high level of economic research in this field and because the total demand for fuel by each region can be accurately determined by analysing the plans for its development. It is difficult to determine this for

other resources because their consumption by each region of the country is not so general. The results of research have in some cases considerably changed our understanding of the cost of fuel and power in various regions of the country.

116. It should be mentioned that before determining the optimal fuel and power balance in the USSR economic calculations of the versions of the distribution were made on the basis not of individual expenditures for certain deposits, but of the so-called "closing costs".

117. Here is an example. Let us assume that in one region there are a few open-bed coal operations with low costs that supply enough coal to meet a certain part of the present needs. There are also mines where coal is extracted at higher costs. Further increase in coal consumption in this region will lead to increased output of coal in the mines because open-bed operations have limited possibilities.

118. In these conditions if one plans to locate new coal-consuming enterprises in this region it is necessary to include the cost of mining coal from the pit in calculating the cost of fuel for these enterprises, even if they were to consume coal from the open-bed facilities. That is what "closing costs" are. When calculating the cost of other kinds of fuel or raw materials one should strive to determine the "closing costs".

The stage of economic development

119. The stage of economic development of the territory is among the most important factors of the distribution of industry. Its significance can be compared to that of the factor of population and manpower. In fact, these factors are closely connected.

120. An advanced stage of economic development of a territory makes possible a reduction in capital investments and current expenditures when setting up enterprises of the processing industry, and it opens up possibilities for improving the quality of goods and producing new kinds of goods.

121. In general the advantages of the economically developed territories are the following: developed infrastructure, skilled labour, scientific and technical personnel, ample opportunity for enterprises to combine efforts and otherwise co-operate.

122. In modern conditions the factor of the economic development of the territory often happens to be more important than the traditional factors of the distribution (raw materials, fuel, power, markets), which affect it through changes in the transportation costs.

123. In fact, the significance of the factor of the stage of economic development of the territory is spreading from extracting industries to processing industries. It assumes especially great importance in the newest industries that depend on the latest achievements of scientific and technical progress.

The transport factor

124. This factor determines territorial ties in the development of all sides of the country's economy. The technical progress in all means of transport leads to a gradual reduction of transportation costs. Parallel with the traditional means of transport a network of pipelines for transporting oil, oil products and gas is increasing quite rapidly and becoming more and more important. This is also true for long distance power transmission lines. These means of transport are radically changing the freight traffic especially of fuel and raw materials in mass.

125. The distribution of enterprises and the purposeful interlocking of the economy of the regions is closely connected with the whole transport system of the country. The economic development of practically all regions of the USSR, with its vast territory, requires a planned structure of the whole system of transportation and the furthering of those means of transport that are most expedient. Railway lines for transporting coal from Siberia to the European regions are being extended. Major pipelines have been built to transport gas from the regions of Central Asia to the Urals and the central part. Construction of the pipeline "Northern lights" extending westward from Ukhta to Leningrad is under way. A line to transmit power from Ekibastuz to the central part is to be built. It is characteristic of the modern system of transportation that it is possible to transport fuel and to transmit power on a large scale at long distances (2,000-3,000 km).

126. One can get an idea of the average share of transportation costs in the production costs of various industries in the USSR from the following statistics:

	per cent
Cement industry	35-40
Iron and steel industry	20-25
Production of building materials	20-40
Sulfuric acid production	20-35
Sodium carbonate production	20-30
Hydrolising industry	17-20
Pulp and paper industry	15-20
Low content phosphorus fertiliser production	15-30
High content phosphorus fertiliser production	5-10
Meat-packing industry	5-18
Machine building	0.7-3.5
Machine tool construction	1-2
Tool-manufacturing	0.5-2.5
Leather and tanning industry	0.75-1.25
Textile industry	0.08-1.0
Knitted goods manufacturing	0.1-0.3

127. Thus for fuel and raw-material consuming industries transportation costs are rather substantial. The share of transportation costs of the majority of the processing industries is small, as a rule, and these expenditures are of little importance.

128. Technical progress in industry and in the means of transportation exerts a considerable influence on the distribution of industry and the economic development of the new territories. The following examples may be given.

129. Generation of cheaper power by atomic stations leads to an increased share of nuclear fuel in the country's fuel and power balance. Location of atomic stations in the regions suffering from a fuel shortage will provide for an efficient supply of power for the economy of the region and reduce the expensive, long-distance transportation of fuel.

130. The construction of pipelines using large-diameter pipes (2-2.5 m) results in an increase in volume of the transported gas and a reduction in capital investments and the share of metal consumption. In this way the difficult problem of providing customers with gas from far-off regions can be solved.

131. The development of economically efficient processes of desalting sea-water makes it possible to utilise surface natural resources in desert regions and to set up industrial enterprises in dry regions.

132. The construction of machinery and equipment specially designed for "northern" or "southern" conditions ensures a sharp increase in productivity in the economic development of low-temperature regions (the arctic regions of the north) and deserts and semi-deserts.

133. The advancement of technology greatly affects the factors of the distribution of industry. Formerly factories producing synthetic rubber (butadiene rubber) from alcohol were located in agricultural regions, since alcohol produced from grain or potatoes was used. The utilization of synthetic alcohol and then of the butane-propane fraction of oil-processing plants led to the location of many synthetic rubber factories near petrochemical plants.

134. This means that it is always necessary to take into consideration the factor of technical progress in territorial planning and especially for a long-term economic development. New technology often determines the lines on which the economic development of the territory should proceed.

III. METHODS FOR REGIONAL PLANNING OF INDUSTRY

135. In the process of elaborating the "Plans for the development and distribution of productive forces in the Union republics and economic regions", the Council for Studying Productive Forces has worked out the basic methodological principles of regional analysis. According to these principles the first step in drafting a plan is to make a thorough economic analysis of the economy of each Union republic and each economic region and its development for the past period (analysis of the original economic base). On the basis of this analysis the future economic development of the economy is determined.

136. Natural resources, including minerals and raw materials, biological resources, land and water resources, are then estimated. With respect to mineral and raw material resources and some biological resources, it is necessary to determine not only the quantities available but also the economic efficiency of their utilization (specific production costs and capital investments).

137. Natural resources are analysed according to various taxonomic units within the region. Water and land resources are analysed mainly from the viewpoint of their availability and the need for them in the regional balance. Territories with a scant water supply and territories possessing highly efficient agricultural lands where it was not expedient to build enterprises are marked.

138. The analysis of social and economic conditions in the region will determine the utilization of manpower and its distribution between urban and rural areas and among various industries and offices.

139. Then the trends in urban development are studied as well as the changes in the structure of industry and the efficiency of the distribution of industry in towns of different sizes.

140. A thorough examination is made of the existing infrastructure in various types of towns and in rural areas (the availability of all types of communications, the heat and water supply, the sewerage system, housing, selling and catering businesses, medical and scientific establishments, cultural, educational and recreation facilities, nurseries and kindergartens etc.)

141. The effect of economic conditions on the costs of construction in various parts of the region is estimated, and corresponding coefficients are determined as well as the size and the location of the bases of the building industry.

142. On a par with the analysis of the important regional factors, special attention is paid to the study of the existing technical and economic problems in branches of industry, agriculture, transport and their effect on the distribution of industry. The principle of examining the innerregional differences is adhered to through all the stages of the analysis.

143. On the basis of the analysis of the natural and economic factors for the development of the region and its place in the territorial division of labour, concepts for the development and distribution of productive forces in each Union republic and each economic region are formed that serve as a tool for determining their further economic development. Concepts are advanced concerning the growth rates of the economy and its parts, its structure, the development of the system of settling the population, the innerregional distribution of productive forces. They also include the main problems to be solved during the planned period.

Determination of the rates and proportions of economic development of each Union republic and each economic region

144. The rates and proportions of economic development are determined by taking into consideration the country's targets for the planned period as well as the results of the analysis of the original economy of the region and concepts for its development. The attainment of the planned volume of production for the whole country and the advancement of living standards in the region with minimum capital investments and current expenditures (production and transportation) on all kinds of produce was taken as a criterion of efficiency.

145. Because this kind of criterion was taken decisions, based on minimum costs in a given industry may have to be corrected. Thus, the plans for each industry based on the criterion of minimum costs in the given industry differ in various degrees from the optimal ones from the viewpoint of the economy as a whole. The plans for the extracting industries as has been already mentioned, differ only to a very small degree.

146. For the processing industries it is necessary to take into account the restrictions on the effectiveness of all resources, for instance, fuel and power and especially immovable and semi-immovable multi-purpose resources (land, water, manpower, capital investments, some kinds of raw material) which can be used not only in this given industry but in many others.

147. For the purpose of bringing the solutions for each branch of industry (mainly processing industries) closer to the optimal ones, use is made of their analysis and correction in regional plans in three ways. First, since in the optimal plan at present there is neither an estimation of resources nor "closing costs" (except the estimation of fuel), it is necessary to divide at least qualitatively all the resources of each region into effective and non-effective categories in the order of preference with respect to their utilization in the manufacture of goods in this region.

148. The comparative efficiency of the manufacture of a certain product in the republic (region) is determined on the basis of the cost of effective or non-effective kinds of resources per worker engaged in the manufacture of this product.

In the same way the comparative efficiency of the production of goods in this republic (region) is determined, each point corresponding to the planned growth rate for the period. Such an approach allows one to make certain corrections in the plans for the development and distribution of each branch of industry using the data on resources that approximate "closing costs".

149. The second way of correcting the plans for each branch of industry is also connected with the limitation of immovable multi-purpose resources in each republic (region), which, as a rule, is not taken into proper consideration in the plans for each branch of industry.

150. The task here is to examine the proposals for the distribution of industries in this republic (region) from the viewpoint of the availability of manpower, land and water resources, fuel and power balance, and balance of some kinds of raw materials, the bases of the building industry, as well as from the viewpoint of meeting a number of local requirements, such as sanitation, protection of nature, keeping a certain balance in male and female employment, and the total employment rate etc.

151. The third way of possible substantial correction of plans for each branch of industry is to analyse their effect on a number of major social and economic questions such as checking the growth of large urban agglomerations and developing the economy of medium-size and small cities, raising living standards in the slowly developing territories within the republic (region), and equalising successively the standard of living throughout the country.

152. Thus, the regional and interregional analysis, on the one hand, makes it possible to enhance the economic efficiency of the distribution of industry by a more thorough examination of all the costs and by bringing all the proposals for the development of the economy of the republics (regions) into balance; on the other hand, it presupposes the solution of a number of social and economic problems for which only quantitative methods are being sought.

153. A general principle for drawing up plans for each republic and each region is to formulate in a preliminary way (on the basis of the concepts for the development of the region and the country's targets for the planned period) a summary of the solutions. Detailed calculations are then made that correct in their turn the results received at the first stage of the analysis. In this way

it is possible to bring the solutions offered in the plans for the republics and regions into balance.

154. The formulation of summarized results is based, in the first place, on the methods for determining long-term targets that aim at correcting tendencies existing in the past period with a view to enhancing the efficiency of the economy of the region. The same is true, though in a lesser degree, in working out the parameters for the development of each branch of industry. Forecasts of a more general nature are specified on the basis of subsequent detailed calculations.

155. A qualitative analysis of existing tendencies from the point of view of their conforming to the concepts for the economic development of the region and a sound estimation of the capability of realising the desired changes within a certain time-limit make it possible to determine the practical tasks of the distribution of industry in regional planning.

156. The determination of summarized economic and technical-economic solutions is made by studying the tendencies of the development and using balance methods. It is necessary to determine the long-term increase in population, the patterns of migration, the total amount of the population, the amount of manpower and the employment rate. Other points to be considered are the growth rate and the volume of gross output, the amount of labour employed in industry, agriculture, transport and construction, and the increasing number of people employed in the non-production sphere. One must also consider the need for construction of housing, the availability of medical care for children, of service industries, and of cultural and educational facilities etc.

Calculation of the volume of capital investments into branches of the national economy and non-production sphere

157. The volume of capital investments is determined by calculating the coefficients of capital consumption for the past period taking into account the structural changes and technical progress in the planned period.

158. After elaborating the forecasts of the summarised solutions, it is necessary to draw up approximate balances, especially, for immovable resources (manpower, water, land). The balances drawn up at the first stage of the analysis and, above all, the balance of manpower, should be used to correct the forecasts of the summarised solutions and, in their turn, they should be corrected at later stages of the analysis.

159. It is necessary to draw up the following balances: (1) the balance of manpower, water, fuel and power, and the most important kinds of raw materials and products; (2) the balance of production, consumption, and experts and imports for basic industrial and agricultural produce.

160. When calculating the volume of consumption of fuel, power, metal and some kinds of raw materials the method of correlative analysis with the employment of correction factors in connexion with the planned changes in the structure of economy can be used.

Programmes for the development and distribution of the branches of industry

161. The planned structure of industry and the distribution of industries within the region is determined on the basis of the estimation of the comparative efficiency of the development of the branches of industry in the region. The volume of the total output (of each branch of industry) is determined as well as the volume of capital investments, the increase in labour productivity, the employment figures, the main production targets in terms of units, an approximate ratio of reconstruction and construction work to be done. The proposals for the development and distribution of industries should meet a number of the local and regional social and economic requirements. The plans for the republics and regions also contain programmes for the development and distribution of agriculture and transport.

162. In these plans much attention is paid to the interregional distribution of productive forces. The main problems are the following:

(a) Division of the region into sub-regions according to similar conditions for economic development.

(b) The formation of a general system for urban settlement having in mind the economic, cultural and governmental functions of towns.

(c) The selection of towns to be the first to have new enterprises built there, and the determination of the growth of such industries in these towns.

(d) Development of catering establishments and municipal services, and construction of housing in towns of various types and rural areas.

(e) Formation of industrial centres and new developing regions.

163. In the section of the plan concerning the innerregional distribution, parameters for the development of innerregional transport should also be determined as well as the zones in which construction is either forbidden or restricted (zones for recreation and tourism, national parks, territories deficient in water and land resources etc.).

164. The above-described structure and methodological principles for drawing up plans for the development and distribution of productive forces in each Union republic and each region reflect the modern level of preparing data for planning when a precise mathematical solution for determining the most advantageous versions of an economically efficient distribution of productive forces has not yet been attained.

165. At present intensive research is being carried on in the field of creating interregional, interindustry models of the development and distribution of productive forces. It should be mentioned that the development of this kind of model is extremely difficult.

166. The most important result of the solution of the global interregional, interindustry model will probably be the determination of the general optimal proportions of the development of regions that are to be specified both in the plans for the development of each industry and for the development of each region. On the basis of the global interregional, interindustry models an estimate of the resources in regions can be made. This is a very important problem of planning the distribution of productive forces.

Preparation of information

169. The solution to the complex problem of the economically efficient distribution of productive forces in a region or in the whole country requires a great deal of varied information. This information may be divided into two major groups - statistical and long-term. Preparation of information can be done only be specialised statistical bodies and research institutions. It is most important for the success of territorial planning to set up a network of such organizations.

170. The principal information required for territorial planning includes the following: information on a branch of industry that contains the necessary data concerning the economy of each industry that is used in the analysis of this particular branch of industry. It includes information concerning existing economic facilities, the volume and nomenclature of production, statistics on the performance of large-scale enterprises.

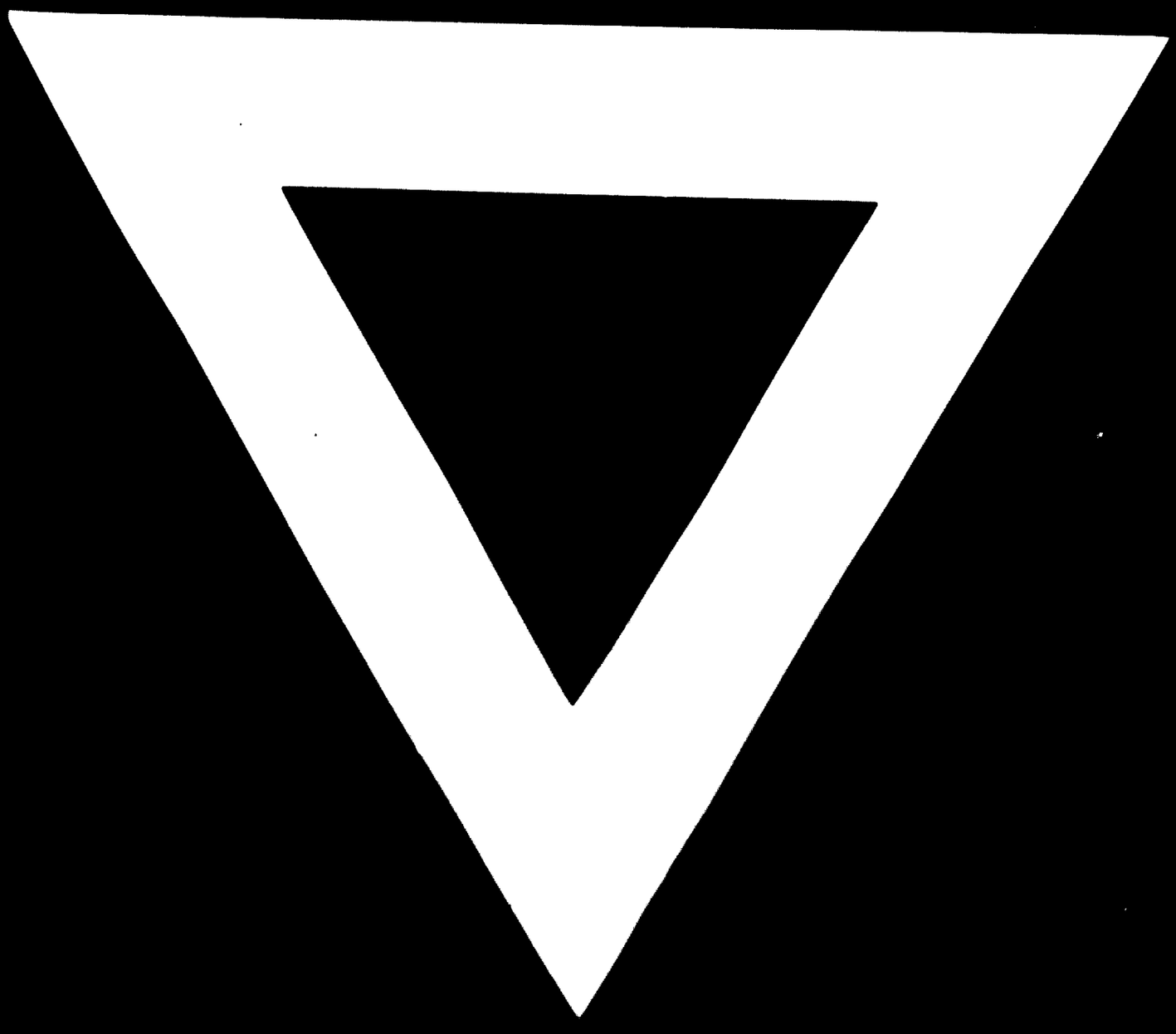
171. One of the important items in this information is an analysis of the changes in costs depending on the capacity of an enterprise. For many industries it is also necessary to determine standard nomenclature of goods to be produced by each enterprise (in particular by the enterprises of the type of a combine) and possible technologies for their production.

172. To determine the coefficients of the costs of the manufacture of various kinds of goods is especially hard but quite indispensable. Here one should bear in mind possible technical progress in the planned period.

173. Regional information should contain the following main sections: estimation of natural conditions and resources, data concerning the population and manpower, estimation of the existing economic facilities, living standards (differentiated according to the types of towns and rural areas), data concerning the growth of towns enabling one to determine their rational size, infrastructure etc.

174. Besides that it is necessary to set up a system of statistical accounting in each region that would include all the main parameters of production and non-production activity in the given territory.

175. The problems of the distribution of productive forces of the country are diverse and complex. A rapid growth of industry requires planning based on a wide range of research. This report shows only some aspects of a scientific approach to planning the rational distribution of productive forces in the country as a whole and in each region.



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