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I N D E X

/10. FINANCIAL BALANCE

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/DEVELOPMENT OF

DEVELOPMENT OF FORMS AND METHODS OF PLANNING IN THE USSR *

Planning economy came into being in the USSR as the result of the victorious October Socialist Revolution and the transition of the ownership of land and the main implements of production into the hands of the Soviet state. In all the further years, planning economy development in the USSR was based on strengthening and developing public ownership on the means of production both in the cities and villages. The development of the forms and methods of planning of national economy went on in accordance with the level of the socialization of production, the growth of productive forces and the problems which had to be solved by the Soviet government at one stage or another.

The development of planning in the USSR has passed through a number of historical stages which differ essentially in the form and method of planning guidance in national economy. The first, initial stage, includes the period from 1917 to 1921. That was the period when the principles of economic planning were laid down under the difficult conditions of the civil war and intervention, when the system of planning and the economic institutions were formed and the first great perspective plan of Soviet economy development - the plan of the electrification of Russia was under creation.

The period from 1921 up to the early thirties might be considered as the second large stage of development of Soviet planning when the problems of the restoration of national economy after the civil war and intervention were being solved and the industrialization of the country was in progress. The economy of the country was multi-structural at that period. Therefore, direct state planning of socialist production was conducted in conjuction with the wide-scale economic regulation of private economy. The system of current annual planning of national economy was formed within these years and the first five-year plan was worked out. The third stage, the period of the fulfilment of pre-war and post-war five-year plans, brought fundamental quality changes in the planning system.

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* By A. D. Kurski

/Direct planning

Direct planning, based on the prevalence of socialist forms of economy, covers all branches of national economy, social and cultural construction, and the technical and economic development proves the acute need of perspective and current plans. The contemporary stage of planning is the period of achievement of great targets in the construction of a communist economy which were reflected in the general perspective and seven-year plans of development of the USSR national economy. Using the extensive experience of planning acquired in the previous decades, as well as the planning experience of other Socialist countries, the Soviet state is improving its whole system of planning, seeking new and more effective forms of planning management, and strengthening the scientific and technical as well as the economic basis of the plans in all sections of the planning system and the economic factors of planning. This paper deals mainly with the first three historical stages of planning while the organization and the methodology of planning at the present time will be the subject of other reports.

The economic and the organizational activity of the Soviet State started immediately after the victory of the October Revolution, and the planning of national economy was the most important manifestation of that activity. The principles of planning economy were laid down in the first Acts of the Soviet state. One of such revolutionary economic Acts was the Decree on Land, adopted in November 1917, which abolished the right of land-owners on property without any compensation and declared that the right to private land ownership was annulled forever.

In the field of industry, our country commenced from the workers' control over production, which was actually the first practical school where the working class learned how to manage their national economy, to the nationalization of large enterprises.

The "Rules on Workers' Control" stated that "in the interests of the systematic regulation of national economy, there was introduced a workers' control production, the buying and selling of products and raw materials and their storage, as well as over the financial activity of

/enterprises in

enterprises in all industrial, business, bank, agricultural, transport, cooperative and productional companies and other undertakings having hired workers or giving out work to be done at home".

The workers' control over production gradually developed into the management of state industry. Large enterprises and whole branches of industry became the property of the Soviet State. By the middle of 1918, large enterprises of the mining, metallurgical, textile, electrotechnical, timber and woodworking, cement, glass, ceramic, leather and flour branches of industry were nationalized.

One of the most important prerequisites for the organization of socialist planned economy was the nationalisation of banks. In order to create a unified bank which would serve the interests of the people, the Act of December 14, 1917 on the nationalization of banks stated that bank activity was a state monopoly and all existing privately-owned banks and banking-offices were united with the State Bank. This was done to guarantee the proper functioning of national economy, the liquidation of bank speculation, and the deliverance of workers, peasants and all the working population from the yoke of bank capital. The establishment of a monopoly on foreign trade, promoted the setting up of a planned economy.

The system of economy and the planning bodies were created within this period. The Supreme Council of National Economy was established in December 1917. Its task was the organization of national economy and State finances. The Supreme Council was to work out the general norms and plans of regulating the economy of the country, coordinate and unite the activity of the central and local regulating bodies.

By the middle of 1918 the Soviet state occupied a commanding position in the country's economy. Heavy industry, transport, banks, large agricultural enterprises (state farms) all of which comprised the economic foundation of planned management in national economy were in the hands of the state. The main problems of planning at this stage were defined by the necessity of organizing nation-wide calculation and control of production and distribution as well as the overcoming of spontaneity in economy. "The organization of calculation and control over the largest enterprises, the transformation of the whole state economic

mechanism into one great machine, into an economic body which would work in such a way that hundreds of millions of people would be guided by one plan - that is the gigantic organizational problem which we must solve", - stated V.I. Lenin. There was unified plan of national economy at that time, and the planning of the production of enterprises which were in the hands of the state, was effected by means of working out the plans for different industries. These plans included the production targets and the inter-coordination of the plans only. The Soviet government headed by V.I. Lenin dealt with the problems of economic reconstruction directly. The planning of industrial development was effected by the Supreme Council of National Economy which was the main economic body of the country at that time.

The initiative of the local Soviet bodies and the activity of the wide masses of working people were becoming more and more the basic support for the centralized planning guidance. The principle of democratic centralism the importance of which was continously stressed by Lenin, was actually in force in the planned guidance of economy. Lenin stated that it should be clearly understood how much democratic centralism differs from bureaucratic centralism, on the one hand, and from anarchism, on the other. "Centralism, if understood in the real democratic sense, means the first historically created possibility of complete and unhindered development of not only the local features but also of the local innovation, the local initiative, and of the variety of ways, methods and means of movement towards the general goal". (Collected Works, v.27, 4th edition, p.181).

Unfortunately, the civil war and the intervention which broke out in 1918, delayed the development of Soviet socialist economy and planning. But even at that time, the war proved the undisputable superiority of a regime based on the public ownership of the implements of production, and the highly important significance of centralized planning guidance of economy in the mobilization of all the resources required for the defense of the country. Supplying the front with food, uniforms and arms, the planned organization of military production, the right distribution and consumption of fuel and food, and the efficient organization of all means

/of transport

of transport - such were the problems of primary importance. Rigid centralization in the planning of production and in the distribution of products were required under the conditions of war, the economic blockade and economic dislocation, the more so that there had been a temporary loss of important industrial, raw material, fuel and food districts by Soviet Russia. The problem of working out a unified state economic plan stipulated for quite a number of years became vital when the period of peaceful construction began. The first perspective economic plan stipulated for 10 - 15 years was worked out and adopted with the help of many outstanding scientists and specialists by the end of the civil war in 1920. The general political goals of the plan and the main principles of its elaboration were outlined by V.I. Lenin. Commenting on the first perspective plan Lenin stated that "it is a unified economic plan worked out as a first probe, by the best scientific forces of the country according to the order of its highest bodies. It is a real scientific plan which contains exact calculations compiled by specialists on all the principal problems". (Collected works, v.32, 4th edition, p. 116).

A wide scale programme of construction of electric power stations and the implantation of electric power into all branches of national economy and every-day life was taken as the basis for this plan. And this plan became historically known as the GOELRO plan (GOELRO was the State Commission for the Electrification of Russia). Lenin's famous formula "Communism is Soviet power plus the electrification of the whole country" was concretely reflected in the GOELRO plan. Characterizing electrification as the material basis of a new society, V.I. Lenin indicated that it was not only the sole right way but, at the same time, the most economical way, in the sense of consumption of labour and time, to restore an economy destroyed by two wars, to further its rapid development, and construct the material basis of socialism.

Electrification created the possibility of the implantation of such local types of fuel as peat into national economy, and the possibility of utilizing the country's hydro-electric resources. The electrification and mechanization of mines promoted a considerable rise of labour productivity

/in the

in the coal industry. The new location of productive forces, and the electrification of railways were to solve the transport problem. The development of heavy industry and transport and the gradual implantation of electric power into agricultural production were to create the material basis for a technical rearmament of agriculture.

The GOELRO plan stipulated the construction of 30 distric electric power stations of 1.5 mln.kw total capacity. Under those conditions, that was a tremendous programme of electric power stations in Russia in 1913 that the capacity of all the electric power stations in Russia in 1913 amounted to slightly more than 1 mln.kw. The plan of electrification of Russia was based on the careful study of the state of economy in the different regions of the country, the electric power resources and the possibilities of their utilization and the state of production and the sources of energy for industry.

The methods of balance basis of planned projects - the calculation of electric power balance, the balances of fuel, the main types of equipment and construction materials - were all for the first time to coordinate all the parts of the plan while working out the first perspective plan.

Alongside with the material balance the financial balance defined the means required for the fulfilment of the planned program of construction of electric power stations, and for the restoration and development of industry and transport was worked out. The question of the division of the country into economic regions was of great significance. It gave the possibility to work out the complex region plans, properly inter-coordinated, and defining the perspective for inter-region distribution of labour.

Many foreign specialists considered at that time that the execution of the electrification plan was unreal for such a backward country and was doomed to failure. However, history has ridiculed these predictions. The advantages of Soviet planned economy made it possible not only to fulfil but to considerably overfulfil the GOELRO plan. Specifically: electric power stations of 4.3 mln.kw total capacity were into operation.

/The targets

The targets of the first perspective plan and their fulfilment are characterized by the following data:

	1920	GOELRO plan	1935	1935 % as to plan
Gross industry production (% to 1913)	13.7	180-200	570	3.2-2.9 times more
Coal (mln.tn)	8.7	62.3	108.9	175
Oil " "	3.8	11.8-16.4	25.1	213-153
Peat " "	1.4	16.4	18.5	113
Iron ore "	0.164	19.6	27.1	138
Pig iron "	0.116	8.2	12.5	152
Steel "	0.191	6.5	12.5	192
Rolled metal (mln.tn)	0.147	7.0	9.4	134

The GOELRO plan became the initial stage of the elaboration and execution of further perspective and current plans. Our country changed its policy of "military communism", forced by war conditions, to a new economic policy (NEP) in 1921. This policy was based on the replacing of the food assessment by taxes, on the development of trade, the implantation of economic calculation of a credit system. The above-mentioned measures created the economic prerequisites required for the successful development of planning under the conditions of peaceful construction. The basic features of the planning of national economy within this period were stipulated by the multi-structural character of economy (patriarchal, i.e. to a large extent natural small-scale peasant economy, small-scale commodity production by peasants and craftsmen, private capitalism, state capitalism and the socialist sector of economy).

According to approximate calculations, the specific proportion of separate economic structures of gross production in the national economy amounted to the following figures in 1923-1924: patriarchal - 0.6%,

/small-scale production

small-scale production - 51%; private capitalism - 8.9%; state capitalism - 1.6% and socialist - 35%.

As can be seen, the small-scale production structure represented by 20 million small peasant farms as well as by craftsmen enterprises predominated in the economy of that time. Small-scale peasant economy was the source of natural and capitalist relations in village.

The capitalist structure covered the small and medium-scale privately owned enterprises in industry, agriculture and trade. After the revolution the soviet state planned to widely use state capitalism in the form of concessions, leases and commission enterprises in the different branches of national economy. But neither the Russian capitalists nor the representatives of foreign capital agreed to that. Therefore, state capitalism did not have any noticeable significance in Soviet economy.

The socialist economic sector which covered all the state-owned industrial enterprises, transport, state farms and trading organizations as well as the different types of cooperative societies, was the bearer of progressive trends in economy. The specific proportion of the socialistic sector in 1924 amounted to 59.8% of the productional funds and 35% of the national income.

The socialist sector of economy was the basis for the planned production of national economy, as the economic law of gradual development, proving the deep economic necessity and possibilities of planning came into being and spread its effect, on the basis of the public ownership of the implements of production.

However, identical forms and methods of planning and regulation of economies so different in nature, could not be used under the conditions of a multi-structural economy. Therefore, the direct planning of the socialist sector of economy was conducted in conjunction with the indirect planning (economic regulation) of the private sector. Direct planning meant the establishment of the production targets for the state socialist enterprises, their centralized supply with raw materials other materials and equipment and the appointment of wholesale fixed prices for the produced goods. Indirect planning covered various methods of economic regulation of the private sector enterprises by means of the development of commodity-money relations.

/Trade had

Trade had a particularly important significance in the economic regulation of the private sector in the early twenties. Private trade covered more than half of the retail commodity circulation in 1924.

At the same time Socialist industry produced more than 3/4 of the whole aggregate industrial production. The concentration of the main bulk of the industrial produce under state ownership and the development of state procurement of agricultural products made it possible to economically influence the private market and the influx of market prices. All the goods manufactured by the socialist industrial enterprises were sold at fixed prices, established by the state. These prices were relatively lower than those of the private market. At the same time the Soviet State rendered regular help to state trade - transportation goods, credits, etc. It was only natural, that the private market could not withstand this competition and gradually curtailed its activity. The Socialist sector in trade, on the contrary, grew steadily. And already in the year 1928 state and cooperative trade covered 3/4 of the total retail commodity circulation.

This trade policy played a great role in regulating small-scale peasant economy. By executing centralized procurement, the state concentrated in its hands the regularly increasing part of the agricultural produce and utilized it according to plan. By selling industrial goods in the rural area, the state systematically developed trade ties between industry and agriculture. At the same time together with consumer goods an ever increasing role in the trade of rural regions was played by the goods of industrial production. Thus on the basis of trade relations, transition to a production union between the town and rural regions was gradually carried out.

One of the main targets of the planned guidance of agricultural economy was to create conditions for the cooperation of the peasant farms. The state rendered systematic help to the peasants by supplying them with machines, organising land exploitation, and giving them credits. All this favoured the gradual transition from the original forms of market cooperation to production cooperation. The main masses of the peasantry were convinced in practice that the collective manner of economy as

/compared to

compared to the backward and small peasant economy was more profitable and advantageous. And already in 1930, 1/4 of all the small peasant farms were combined in collective farms. One third of the total sowing area belonged to these collective farms.

The growth and consolidation of socialist economy made it possible to improve the standard of planning. From current planning for separate branches of economy, financial and budget plans introduced unified annual control figures, covering the whole of the national economy.

The first control figures were formulated for the economic year 1925 to 1926, and since then they have been annually elaborated. All the activity concerning the realisation of the GOELRO plan and current planning was concentrated in the State Planning Commission (Gosplan), created in 1921 and headed by a colleague of V.I. Lening, G.M. Krjijanovsky, who had previously headed the elaboration of the plan for the electrification of all Russia. Just after the formation of Gosplan, a whole net work of branch planning commissions was formed, the purpose of which was to elaborate a general plan for the development of industry and transport, and also the utilization of all material resources.

The working out of a unified all-state economic plan, the manner and way it was to be fulfilled and the coordination of all the recommendations and production programmes of various bodies were the problems Gosplan had to solve. In the early period of Gosplan's existence, its activity was primarily concentrated on current planning - fuel and food supply and the organisation of transportation service.

The restoration of national economy and its rapid development required the elaboration of not only current plans but of long term plans as well, especially in connection with the development of wide-scale construction work.

Gosplan was faced with the problem of elaborating a five-year plan of development of national economy together with the annual control figures. An important stage in the development of Soviet planning was the creation of the first Five-Year Plan (1928-1932). In the course of its elaboration heated debates took place in determining specific indices and trends alien to socialist planning were successfully overcome.

/It will be

It will be of interest to compare the original versions of the first Five-Year Plan with the plan which was finally approved:

As tentatively planned:	Gross output of the last year of the Five-Year Plan in percentage to the year preceding the Five-Year Plan	
	Industry	Agriculture
for 1925/26 - 1929/30	271	156
for 1926/27 - 1930/31	180	124
for 1927/28 - 1931/32		
a) Starting version	177	124
b) Optimum version	209	131
Five-Year Plan for 1928/29 - 1932/33		
a) Starting version	235	143
b) Optimum version	279	155

The Five-Year plan approved in its optimum version, proceeded from the necessity of solving in the shortest possible period of time the task of socialist industrialization, and providing the development of a heavy industry in the country, which would ensure the rearmament of agriculture as well as the other branches of national economy with new equipment and machinery. In the course of the elaboration of the first Five-Year plan and its implementation the task was set to eliminate the disproportion between the development of industry and agriculture. The expansion of large-scale industrial construction and the collectivisation of agriculture made it possible to solve one of the most critical problems of economy at that time - the liquidation of unemployment in the country.

One of the important problems of the first Five-Year plan was to find the resources for the development of heavy industry. At that time our industry was not sufficiently developed, our internal resources were quite insignificant, and the hope of procuring foreign aid was out of the question. Therefore, the implementation of the first Five-Year plan required great sacrifices from the Soviet people, and the necessity of carrying out a strict policy of economy in all fields of national economy.

/The advantages

The advantages of planning presented the possibility of concentrating and effectively utilizing all the sources of accumulation and all the financial and labour resources to fulfil the plan and build the foundation of socialist economy.

The socialist reconstruction of national economy has defined the fundamental changes in planning. The importance of a plan increased in not only industry but in agriculture as well. This was effected in the planning of the sowing areas, the development of cattle-breeding in the republics and districts of the country, and the introduction of agricultural engineering. It became possible to determine on a sound economic basis the rate of increase of gross and commodity output of agriculture, to plan the required proportion in industrial and agricultural development, directly co-ordinate development of the processing industry with the quantity of the agricultural raw materials and foodstuffs delivered by the collective and state farms (colchos and sovhoz) and carry on a planned technological rearmament of rural economy.

The elaboration and approval of the state plan of national economy instead of the annual control figures which were just preliminary directives signified a higher level of planning. Thus the Five-Year plan and the annually formulated and approved development plans of national economy represented a sound system of planning, combining perspective and current planning. The elaboration and fulfilment of the second Five-Year plan for the years 1933-1937 was a highly important step in the development of planning. During the second Five-Year plan the targets of building a socialist society in the Soviet Union and the completion in the main of the technical reconstruction of national economy were set and successfully solved.

The transformation of a multi-structural economy into a unified socialist economy as a result of the fulfilment of two Five-Year plans can be characterised by the following table:

/Specific proportion

Specific proportion of socialist economy (in %)

	1924	1937
In basic production funds (including livestock)	35.1	99.0
In national income	44.0	99.1
In gross production of industry	82.4	99.8
In agricultural gross production	3.3	98.5
In retail commodity circulation	76.4	100.0

The prevalence of socialist economy in all branches and fields of national economy has raised the significance of a plan in the Soviet economic life. It became possible to include in the state plan all branches of industry as well as agriculture, transport and social and cultural construction. In the course of the fulfilment of the first Five-Year plan full scope planning was stipulated only for heavy industry; in the second Five-Year plan detailed planning directives were given to all branches of industry. The programme of agricultural development of the first Five-Year plan had in view mainly the individual peasant farms and worked out the measures of their economic regulation and the preparation of a material base for the introduction of a cooperative system. The second Five-Year plan in the field of agriculture was already based on the socialist sector and included a number of detailed state directives.

The second Five-Year plan in contrast to the first, included considerably more extensive and well substantiated plans of capital construction, and the technological rearmament of various branches of industry as well as the development of scientific and research work. In this plan for the first time a wide-scale system of material balances was used and technical and economic indices of technological development were present, showing the utilization of equipment, fuel, raw materials and other materials.

The successful fulfilment of the first two Five-Year plans made it possible to formulate the main economic target for the future Five-Year plans, that is to overtake and surpass the most developed capitalist countries of Europe and the USA in regards to production volume per capita.

/One of

One of the most important stages in the fulfilment of this target was to have become the third Five-Year plan (1938-1942).

The aggression of hitlerist Germany against the Soviet Union in 1941, however, interrupted the fulfilment of the third Five-Year plan. The war conditions of 1941-1945, naturally changed the methods and forms of planning. The following targets were of decisive significance at that time: a rapid and well planned transfer of all economic life to a military footing, the establishment of a sound and effectively functioning military economy, the shifting of a great number of enterprises to the eastern regions of the country and at the same time carrying on the restoration of economy in the regions which had been liberated from the German fascist troops. In the fulfilment of these enormous targets the socialist economic system demonstrated great indisputable possibilities and advantages.

After the victorious completion of the Great Patriotic War the Soviet Union was faced with new problems of peaceful reconstruction of economy, the restoration of the pre-war level of industrial and agricultural production and then a substantial improvement of this level, and primarily in the field of heavy industry and railway transport. These targets were laid down as the basis of the Five-Year plan of restoration and development of national economy for the years 1946-1950 (the 4th Five-Year plan). As the restoration work was being successfully completed, the planning of the following targets in national economy acquired ever-increasing importance: a) carrying out vast reconstruction undertakings; b) systematic utilization of the achievements of scientific and technological progress in the engineering industry, chemistry and power engineering; c) the rapid growth of the living standard of the population. The fifth and sixth Five-Year plans were aimed at achieving these targets.

The planning of national economy in the post war period was based on the application and further development of the planning principles which had been elaborated in the many years of planning experience of the Socialist State. These are first of all the following most important principles:

/a) Democratic

a) Democratic centralism, giving the possibility to combine centralized planning guidance with the wide-scale participation in planning of the local bodies, enterprises and workers collectives;

b) Combining perspective plans with the current, more detailed and effective planning;

c) Selection of the leading link in planning and ensuring the rapid development of the progressive branches of economy;

d) The inter-linking of all the targets of the state plan, proceeding from the necessity of appointing the most optimum in the given conditions, rates and proportions;

e) Increasing the economic efficiency of the plans the utilization of new reserves while fulfilling these plans, by means of the development of socialist emulation and by wide application of bonus principles for high productive results.

By consolidating and developing socialist planning economy the Soviet Union has entered a new period of its development - the period of full-scale construction of a communist society.

The perspective plans of to-day and first of all the general perspective plan for the years 1960-1980 are aimed at fulfilling the tasks of communist construction. The creation during the period of two decades of the material and technical foundation of communism and providing on this basis the highest living standards in the world for the population, in comparison with any capitalist country, is the fundamental target of the general plan.

In the realisation of these targets an important part will be played by the fulfilment of the Seven-Year plan of development of national economy calculated for the years 1959-1965.

A perfection of the planning system of national economy and the management of production was called for by the new gigantic targets confronting the Soviet Union.

The management of industry through the ministries and administrative bodies was replaced in 1957 by a territorial system of management through

/the Councils

the Councils of national economy of the economic regions. This made it possible to combine more effectively centralised planning on all-union scale with the operative management of enterprises and the complex development of the economic regions. At the same time on the basis of the development of the principles of democratic centralism the whole system of planning is being perfected. The scientific, technical and economic basis of the plans is being improved upon the methods of their elaboration and are being perfected as to their complete and thorough substantiation of the targets with carefully worked out norms and balance calculations. The methods of estimation and evaluation of the economical efficiency of the planned undertakings are also being improved upon. Mathematic methods are being introduced into planning, as well as modern computing and calculating techniques. All the measures mentioned above are aimed at a still further increase in the significance of the role of planning in the development of national economy, and at successfully solving the problems of building a communist society.

ORGANIZATION OF PLANNING TO-DAY *

Planning is the most important function of the socialist system of economic management. The forms and methods of management and planning are developed and perfected according to the demands of material production. In its turn the whole system of economic management exerts active influence on production, on the rate of technical progress, on the growth of labour productivity. That is why in our country great attention is devoted to the problem of management and planning. Socialist management is based on the principle of democratic centralism. Lenin wrote: "...Taken in a really democratic sense, centralism presupposes the possibility, created for the first time in history, of full and unhampered development not only of local peculiarities, but also of local independent activity, local initiative, a diversity of ways, means and methods of advancing towards a common goal"1/.

In 1963 substantial measures were taken in the Soviet Union to improve the organizational structure of the management and planning system. Speaking of the main features of modern management and planning organization, we have to make note that, first of all, the principle of centralism in planning receives its structural realization in Gosplan (State Planning Committee of the USSR) - the central body of the state planning system. This body works out the five-year plans of economy development, distributing their long-term tasks by years, by branches of economy, by Union republics and large economic areas. Gosplan determines the order, the time and the common methods of five-year-plan drafting as well as the physical and value cost balances together with the plans for distributing equipment and materials among Union republics and different branches of economy.

The task of Gosplan is to work out together with the Union republics, the Council of National Economy of the USSR, the State Building Committee of the USSR, the State Committee for the co-ordination of scientific and research work and other organizations,

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1/ V. I. Lenin, Works, Vol.27, P.181, 4th ed. /the main

* By A. N. Efimov

the main trends of economy and to draft projects of national economic plans. Not only does Gosplan design national economic plans but it also checks their fulfilment. It also devises means of undertaking timely measures to prevent any kind of discrepancy in the development of national economy which may spring up during the realization of the plan. The most important task of Gosplan is to coordinate the national economic plans of the Soviet Union with those of socialist countries. This work is based on the principles of international socialist division of labour which were worked out together with other socialist countries.

In 1963 Gosplan of the USSR became a Union-Republic body. This change raised its significance in organizing planning in the Union republics. Decisions adopted by Gosplan of the USSR are obligatory for the Gosplans of all the Union republics. If a short time ago the republican Gosplans were only under the authority of the Councils of Ministers of relevant republics, now they are subordinated both to the governing bodies of the Union republics and to the central planning body - the Gosplan of the USSR.

Further development of democratic principles in the system of management and planning of national economy is realized by establishing such a system of plan drafting according to which the decisive role in the whole planning system belongs to plans worked out by enterprises, state and collective farms. Already the main trends of economic development for 1966-70 were first determined by enterprises, on building sites and by production boards of state and collective farms, then by Councils of national economy and lastly by the Union republics; a special stress being laid on the utmost mobilization of internal resources. In the present situation the Gosplans of the Union republics work out plans for all the economic branches. This is quite different from the times when they were concerned only with the drafting of plans of local significance.

The new forms of planning organization in the central apparatus of Gosplan are characterized by a substantial intensification of synthetical, and analytical methods of work and extensive use of the method of economic generalization.

/With the

With the aim of promoting the composite character of developing interdependent branches of industry the previous departments for industries, each of which had particular specialization, have been substituted by composite departments inside the Gosplan of the USSR which deal with the national economy development plans for heavy industry, consumer goods, agriculture, etc. Their task is to plan the development of a complex of branches of national economy concerned.

Stressing the increasing significance of synthetical methods, it is necessary to point to another feature of the reorganization process in the planning system, namely, the more detailed industrial character of the plan. This is realized by the establishment of State committees for the basic branches of economy. State Committees for chemistry metallurgy, the fuel industry, oil extracting, oil processing and oil chemical industries and various branches of engineering industry, the complex of the timber and timber processing industries, light and food industries as well as for vocational and technical education have been established under the Gosplan of the USSR. A number of state production committees are subordinated to the State Building Committee of the USSR. This includes committees for installation, assembly and special work, for the building up of the Central Asian economic area, for transport construction, for civil engineering and architecture and for the building materials industry.

At the present time the State Committees have authority over leading design offices of plants, over research institutes, designing and technological designing institutes, over designing organizations with experimental enterprises and bases.

The State committees draft projects of plans for the development of those branches of national economy with which they are concerned.

The Council of National Economy of the USSR - a Union-republic body - has been established to guide the realization of the economic plans. It comprises boards dealing with the main industries, with inter-republican deliveries of metal production, the output of the engineering and electrical engineering industries, the output of oil-products and coal, chemicals and technical rubber products, timber and building materials, raw materials

/for light

for light and food industries, etc. The Council of national economy of the USSR has also an agricultural board dealing with deliveries of agricultural machinery and technical equipment, a board for transport and a board for supplying building sites with equipment. A significant role in organizing the work of the Council of National Economy of the USSR belongs to the functional departments which co-ordinate the plans worked put by all the subdivisions of the Council.

On the basis of the proposals sent in by Union republics, Councils of national economy in different economic areas, ministries and departments, the Council of National Economy of the USSR works out production and distribution plans on a more diversified basis that envisaged by the State economic development plan of the USSR, plans of inter-republican deliveries of production for all Union needs; plans of cooperative deliveries of the basic assemblies and parts for machinery and equipment. What concerns its economic activities, the Council of National Economy of the USSR is endowed with the right: to alter the yearly plans of Union republics, economic councils, ministries and departments within the bounds of the indices envisaged by the State economic development plan as a whole; to fix additional rates for output and deliveries and other indices, of the plan to adopt decisions concerning redistribution of material resources and to make alterations in plans of material and technical supply.

The Supreme Council of National Economy of the Council of Ministers of the USSR, which was established in 1963, guides the development of all the industries, the building industry, and co-ordinates the work of Gosplan of the USSR, the Council of National Economy of the USSR, the State Building Committee of the USSR and the state committees for industries. It has direct authority over the state committees for aircraft technique; geology; inventions and scientific discoveries; application of atomic energy; co-ordination of scientific-research work; defence technique; radio-electronics; ship-building; standards, measures and measuring instruments; electronic technique; and over the state production committees for the gas industry, middle-scale machine-building industry, power engineering and electrification.

/The Councils

The Councils of national economy of economic areas - the middle link in the industry management system - play an important part in managing the industries. They bear the responsibility for both the elaboration of plans and their realization. The Council of national economy has special boards for those branches of industry that have been developed in its particular economic area, functional departments and services. These boards organize the development of current and long-range plans by those enterprises and organizations which are under their authority. They ensure the fulfilment of the state plan, the receipt and distribution of the necessary material funds among the enterprises concerned, and check the proper realization of those funds. All the composite planning operations inside the Council of national economy are carried out by the economic planning board. It organizes the elaboration of long-range and current plans for all the industries of the economic area concerned,[1/] engaging the services of all the other departments and boards of the Council.

At the present time the importance of territorial economic councils has grown considerably due to the consolidation of economic areas. In the Russian Soviet Federative Socialist Republic 67 economic areas have been cut down to 24, in the Ukraine - three are now 7 instead of 14. The Central Asian Council of national economy has been set up to guide the work of industrial enterprises in Uzbekistan, Kirghizia, Turkmenistan and Tadjikistan. After their consolidation the councils of national economy have become powerful economic centres.

This consolidation was based on the production principle which took into consideration the basic branches of industry. Thus, in the Ukraian.SSR the coal industry of Donbass, which was previously subordinated to two councils of national economy is now in the authority of only the Donets Council. The oil industry of Northern Caucasus was previously subordinated to four economic councils. Now it is in the authority only

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1/ With the exception of a small number of enterprises, which are under the direct authority of ministries; a number of enterprises under district authority; and the enterprises dealing with every-day repairs and other services.

/of the

of the Northern Caucasus Economic Council. The oil industry of the Ural and Volga areas, formerly supervised by the Tatar, Bashkir and Kuibyshev Councils is now in the authority of only one - the Middle-Volga Council of National Economy.

Alongside of consolidation the economic councils, important measures have been adopted to improve the economic territorial division of the USSR and to develop regional industrial trends in economic planning. In 1963 the division of the USSR into larger economic areas was officially approved.1/

With the purpose of conducting a more detailed study of the country's large economic areas and ensuring a most effective and complex development of each area, in accordance with the all-Union division of labour, 16 planning committees for the USSR economic areas have been established, 10 of which are in the RSFSR and 3 - in the Ukraine, and all of which are subordinated to the Gosplans of the two Union republics.

Planning Committees established in the Central Asian Transcaucasian and Baltic economic areas are subordinated to the Gosplan of the USSR.

The main tasks of these planning committees are the following: to work out projects for the most effective utilization of capital investments and local natural resources, production funds and labour resources; to procure additional means for increasing industrial and agricultural output; to improve the distribution of productive forces in accordance with production specialization and inter-district transport communication.

During the last few years a new step has been made to develop local initiative and to raise the level of economic management by creating production unions which have been called "the Soviet firm". By the ending of 1963 RSFSR numbered about 100 firms, which united more than 568 enterprises. The legal and organizational statue of this new form

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1/ At the present time the territory of the USSR is divided into the following large economic areas: 1) North-Western, 2) Central, 3) Volga-Vyatsk, 4) Central-Black Earth, 5) Volga-Region, 6) North-Caucasus, 7) Ural, 8) West-Siberian, 9) East-Siberian, 10) Far-Eastern, 11) Donetsk-Dniepr, 12) South-Western, 13) Southern, 14) Baltic, 15) Transcaucasian, 16) Central-Asian, 17) Kazakhstan, 18) Belorussian and independently Moldavian.

/of management

of management of socialist industry has not yet been finally determined. There are different points of view as to whether the firm is an enlarged enterprise or whether it amalgamates a number of enterprises. In this respect many questions remain to be answered. The organizational and production structures of the firms will be continuously improved as experience is accumulated. But what has already become evident is that the firms simplify economic management to a considerable extent and promote the development of co-operative and combined production. The development of this form of industrial management, from our point of view, will enable in some cases to do away with the boards for industries inside the economic councils and thus bring management closer to the production process.

In this way, alongside of enlarging the economic councils and thus showing the tendency towards centralization of management, the establishment of firms emphasizes the elements of decentralization in production management. This shows once again the unity between centralism and democratism in the management of national economy.

The reorganization of the system of economic management introduced new forms of planning organization, determined a new system of working out plans and their interdependence. The present-day system of plan drafting is based on the propositions of the Party program which reads that "in planning an ever increasing importance should belong to plans and proposals coming from the bottom, beginning with the enterprise".

Under the conditions of socialist society the whole complex of economic construction for the needs of industry and cultural life, all the aspects of public life are included into the system of planning. The planning bodies are faced with the complex problem of co-ordinating the work of hundreds of thousands of industrial, agricultural, transport and other enterprises, and a large network of shops, cultural organizations and service stations. In conformity with the organizational structure of the management and planning system of national economy the state plan is worked out in two aspects: by <u>industries</u> and according to <u>the territorial</u> principle (by areas).

The plan treated by industries is worked out under the general guidance of the state committees for industries, the relevant ministries

/and departments.

and departments. During previous years, before the establishment of state committees for industries, plans treated by industries covered for the most part only the production programme and capital construction projects. Now the plan for industries will include all the economic aspects, i.e. plans of labour outlay, production costs, profitableness and other synthetical aspects. Plans treated by industries attach primary importance to the development of the most effective industries and technological processes; to all-round specialization and co-operation of industries; to mechanization and automation of the processes of production; to the production of samples of the newest machines, mechanism, equipment and consumer goods. In working out plans particular attention is devoted to working out and realizing progressive rates of expenses for materials, fuel and labour; to making a full and rational utilization of production capacities; to raising labour productivity and cutting costs.

Planning according to the territorial principle is carried out for the industry by the councils of national economy, and for agriculture - by the territorial production boards.

Planning commissions of the Agricultural executive committees of Soviets of Working People's Deputies work out composite plans for the development of rural economy and forestry of the region (territory), including subsidiary and experimental farms of ministries and departments, and plans for developing services and trade in the village.

Local, urban, and district planning commissions work out and submit for approval to the executive committees of the local Soviets projects of composite plans for the development of economy and culture in towns and regions. After approval these plans are forwarded to higher planning bodies.

The planning commissions of industrial executive committees of the Soviets work out composite plans for the development of arts, trade, culture, education and health services, every-day services, municipal economy, public services and amenities in towns and villages.

Local economy development plans are considered and approved by the Councils of Ministers of autonomous republics and by the industrial and agricultural executive committees of territories and regions. Composite

/plans for

plans for different areas are worked out by the Gosplans of Union republics together with the planning committees of big economic areas.

Under present-day conditions the economic development plans of Union republics have a composite character which enables them to embrace all the industries, both in the production and non-production spheres. These plans have to be co-ordinated from beginning to end. This important problem has made the Gosplans of Union republics lay a special stress on the significance of balance estimates. During the process of working out long-range plans the Union republics will work out not only the material balances but financial, labour-resources, national product and national income balances as well.

This system of planning can be pictured in the form of a pyramidal diagram, the basis of which is constituted by plans of industrial enterprises and farms. Above them come the plans of the economic councils, territorial production boards and other territorial management bodies, after that - the plans of Union republics. The State economic development plan of the USSR tops them all.1/

The interdependence of plans pertaining to different sections of national economy is based on the actual features of extended socialist reproduction, i.e. on the conditions of production, distribution and consumption of material wealth. The organizing role of the plan manifests itself in two ways. First of all, the plan lays the foundation for organizing the production process inside the enterprise or economic body. At the same time, a highly developed system of labour division which is typical of socialist economy, enables each enterprise (plant, factory) and farm (state and collective) to function only by exchanging the results of its production process with other units of the country's economy. This shows the external function of the plan.

The correlation of internal and external functions of the plan provides the objective conditions for determining the indices necessary for co-ordinating the production process inside the enterprise, and

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1/ See general scheme of the drafting of state economic development plan of the USSR.

/the work

the work of each particular enterprise with other production units. The plan indices showing the internal function of the enterprise have to give thorough and exact information concerning the correlation between different production sections of the enterprise and the economic data of the processes of production. The external function of the plan requires that the indices guarantee the proportional development of national economy, the organization of production relations of the enterprise, and that they determine the economical relations between the workers of the enterprise and society, between the enterprise and the state.

The plan of an enterprise shows the correlations between different shops and sections in fulfilling the various elements of the production process. The production plan of an enterprise, for example, a middle-scale machine-building plant includes in its indices many thousands of machine components which undergo numerous phases of production processes. Naturally, the elaboration of the production plan of such an enterprise requires the most exact calculations, which under the conditions of growing technique are performed with the aid of electronic computing machines.

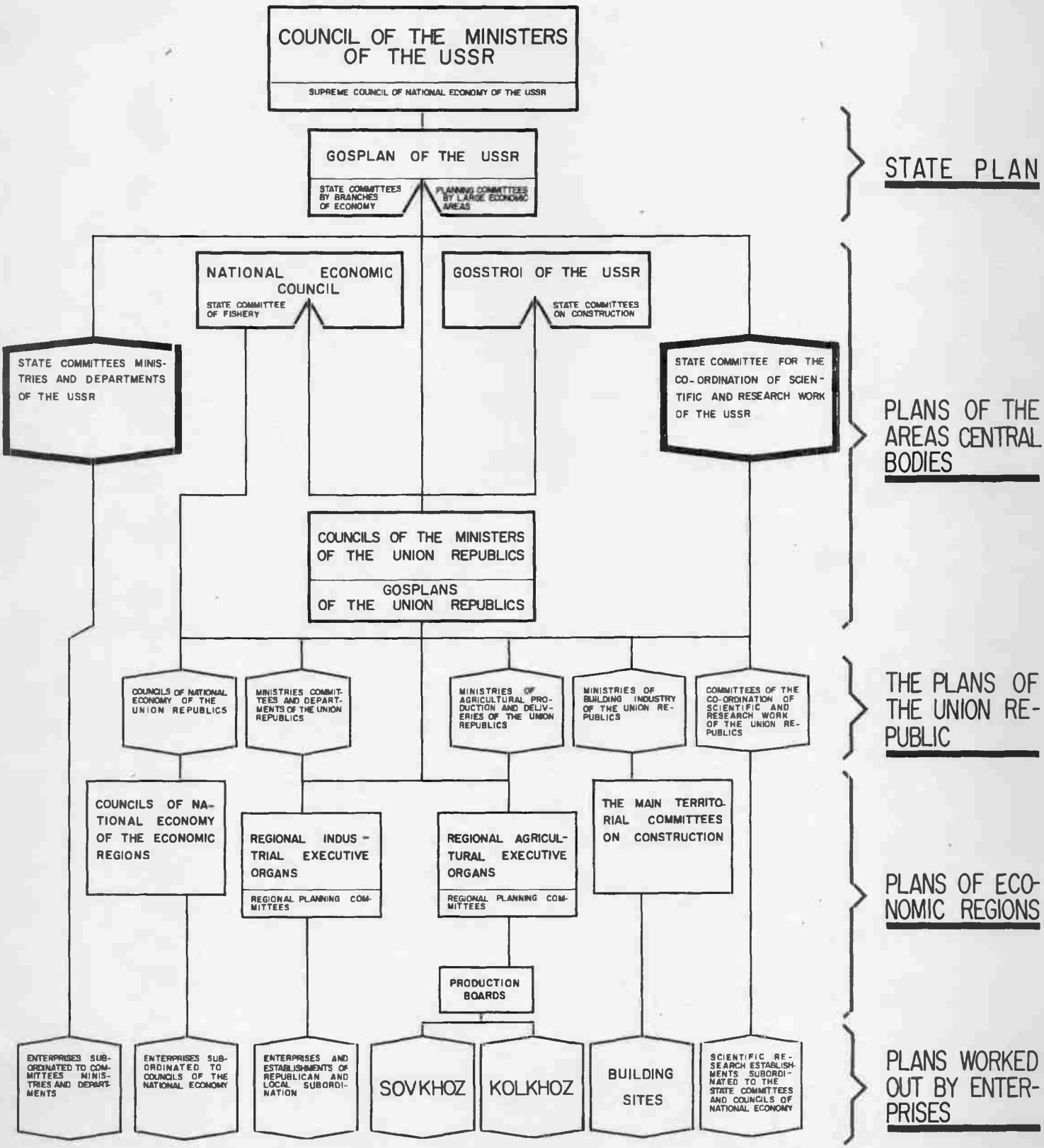
In other branches of economy, such as agriculture, production planning acquires other organizational forms. But there too the plan covers in detail all the elements of the production process. In this way the plan organizes the production process and determines the task of each member participating in this process.

In speaking of external correlation of production plans from the bottom upwards and vice versa, it is necessary to stress that the indices of these plans are aggregated from the lower units upwards. We can observe the most significant distinctions in the degree of detailing the indices of the plan if we compare those of the primary production unit, i.e. the enterprise (farm), and those of the higher units of management. This is called forth by the social character of the production process.

Let us take for example the planning of agriculture. The plan of agricultural development is worked out by collective and state farms with respect to concrete conditions and capacities of every farm. Volume of agricultural production is the main element of this system. The volume of production that will be sold to the state is determined for every farm.

/This is

GENERAL SCHEME OF DRAFTING THE STATE ECONOMIC DEVELOPMENT PLAN OF THE USSR



This is the main feature of the farms' external function and does not diminish the significance of those indices that determine the internal aspect of production. These indices cannot be regulated by the higher units of management. The decision of the CC CPSU and the Council of Ministers of the USSR from 20 March 1964 draws attention to the following: "...What cultures should be sown and in what proportions? How many head of live-stock should be kept? What is the most effective way of utilizing the land in order to receive the highest crops and fulfill the state plan? - All this is the business of the members of the kolkhoz and workers of the sovkhoz; they know their resources best of all and they will be able to use these capacities to the utmost".

The system of national economic planning can be considered from another point of view. The point is that production goes on not only in regard to space but to time as well, and in this sense planning is usually divided into current and long-range. Lenin used to say: "One cannot work without a plan intended to cover a lengthy period of time and to achieve good progress". But in the every-day practice of economy development many years have witnessed a break between the current and long-range plans. During recent years the Communist Party of the Soviet Union undertook a number of measures to eliminate this break.

The long-range plan for the coming five-year period of 1966-70 is being drawn up under entirely new conditions, when the most efficient organizational prerequisites have been created to guarantee uninterrupted, continuous planning. The plan for 1964-65 concludes the seven-year period and becomes the basis for the elaboration of the national economy plan for 1966-70. The five-year plan will give a more concrete character to the tasks of creating the material and technical basis of communism, which have been worked out in the CPSU Programme for 1970. The process of drawing up a 5-year plan has two stages. The first step is to draw up a project covering all the main trends in the development of the national economy of the USSR, and their most important indices. The second step is concerned with developing the plan according to each succeeding year, each particular industry, each Union republic and economic area. During the years that will follow, the yearly targets will acquire more precise character based on the actual indices of economy development,

/and in

and in this way will keep the five-year plan period running a year ahead. In this way the principle of uninterrupted planning will receive its practical implementation. The two steps in drawing up a perspective plan testify to the utmost importance of applying a new organizational principle which enables to take the fullest account of all the capacities and resources of production.

The quality of the state economic plan of the USSR first of all depends on the quality of the plans which are worked out at enterprises and building sites. The economic grounds for this plan have to take stock of all the internal production reserves, thus demanding utmost activity and initiative on the part of the workers of plants, factories and building projects. That is why the plan is worked out with the participation of Party, Soviet, economic, trade-union and komsomol organizations. Centralised planning combined with all-round participation on the part of the masses - this is the key to the most effective results that can be produced by the planned socialist system of economy.

The practical implementation of the principle of uninterrupted planning requires most precise co-ordination of current and long-range plans. In this connexion, the five-year plan will be worked out on an annual basis with indices of diversified assortment. The most important rule in the annual distribution of perspective-plan targets is that rythmical pace and proportional development must be ensured; in other words, the plan must be annually balanced. With this purpose annual balances of production and consumation, production efficiency, labour resources, finances and national economy should be worked out.

However high may be the degree of accuracy in working out long-range plans, it cannot ensure the plans' annual stability. This has introduced the practice of correcting the annual targets, which has become an important element of the principle of continuity in planning. However, these annual alterations of the long-range plan must be carried out on a combined scale and involve all the interdependent indices. If annual plan alterations for individual enterprises do not lead to a necessity of correcting the plan of the whole economic region, these alterations are made by the

/economic council

economic council (for industry) or by an appropriate higher-level body. But alterations affecting inter-regional and inter-republican deliveries are considered and approved by the Councils of Ministers of Union Republic and then submitted to the Gosplan of the USSR to be included in the State economic development plan of the USSR.

The state plan covers the main tasks of the country's economy development for the given period. It unites the tasks of all the sections of national economy.

THE BASIC PRINCIPLES AND METHODS OF LONG-TERM PLANNING IN THE USSR *

Social production under the conditions of socialism is developing on the basis of a unified economy development plan. This has become possible due to the establishment of social ownership of the means of production. Social ownership unites all the sections of national economy and makes economic planning an objective necessity.

The balanced and proportional development of national economy is the great advantage of socialism. It manifests itself, first of all, in the high rates of economic development. Thus, the average annual rates of industrial growth in the USSR for the 1918-1962 period exceeded 10 per cent, while in the USA they made up to only 2 per cent. Besides, social production in the USSR is entirely free from crises and slumps.

Within the 1913-1962 period industrial output in the USSR increased 48-fold and the country's national income 31-fold; the USA in the same period increased its industrial output only 5.7 times and its national income 4.1 times. In the USSR labour productivity is also steadily rising. In 1962, vers. 1913, the labour productivity of industrial workers in the USSR increased 12.6 times, while that in the USA increased 3.3 times. This brought our country from fifth place in world industrial output, which in 1913, to second place; at the present time it is surpassed only by the USA.

Far-reaching goals have been placed before the national economy of the USSR for the 1961-1980 period. During this period the gross output of industry must increase from 6.2 - 6.4 times, agriculture 3.5 times, the national income 5 times, the real income per capita 3.5 times. All this accounts for the immense significance of long-term planning. Their correct elaboration predetermines to a great extent the success of communist construction.

Long-term plans play a leading part in the whole economy planning system of the USSR. They rest upon the economic programme of building a communist society in our country.

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* By N. M. Oznobin

/This programme

This programme is scientific, in the full meaning of this word, for it is based on the knowledge of the objective processes of social development.

The plans of the national economy development of the USSR also have a scientifically based character. Their elaboration and implementation are based on a conscious application of the objective economic laws. It is the reflection of the demands of the objective economic laws in national economic plans that constitutes one of the basic principles of planning.

But this does not imply that these economic laws should be applied passively. Quite the contrary, their application presupposes an active and creative effort on the part of the people to reorganize social relations.

In the practice of planning economic bodies do not only study the different forms in which the economic laws manifest themselves, but they also analyse the actually existing environment and the established structure of social production; they determine the economic potentialities and the tendencies of technical progress. Proceeding from the concrete conditions of time and place, they determine the requirements of society and the resources for their fullest satisfaction.

The co-ordination of planned tasks with the demands of economic laws is a criterion of the scientific level of the plan and its practical value. That is why in working out optimum and actual national economy plans there must be perfect co-ordination between their targets and the demands of economic laws, including the actual conditions of economic development.

Another important principle of socialist economy planning is the attainment of the highest production results with the lowest possible outlays, i.e. the principle of the highest economic efficiency of production.

Maximum economic efficiency of social production is achieved by a most rational utilization of material, labour and financial resources, and national resources; by developing and introducing the newest machinery and technology, cutting out waste and reducing the costs of

/production. That

production. That is why in order to include a particular task in the plan, it is necessary to work out a most precise calculation of its high economic efficiency, which, in particular, must ensure the high quality of output, low operation outlays, the reduction of specific capital investments, their quickest repayment, etc.

The principle of the highest economic efficiency of production presupposes the economy of time. That is why a steady rise in social labour productivity as a most important means of increasing the efficiency of social production should be the outset for plan designing. Due consideration of this factor enabled the planning of an average 6.3-fold increase in the gross industrial output of the USSR with a 1.6-fold increase in industrial labour force for the 1961-1980 period.

The principle of the highest economic efficiency of social production subordinates all the other principles of long-term planning. The implementation of all these principles must serve one purpose - to increase the economic efficiency of production.

The observation of the principle of the main link in planning means that the most favourable conditions should be created for the development of the progressive branches and industries, which would promote technical progress, increase labour productivity, accelerate the rates of industrial output growth, reduce the cost prices of output and raise the living standard of the Soviet people.

The development of the progressive branches and industries brings huge profits to the national economy. As a rule, these branches and industries are the most economical. Besides, their growth improves to a great extent, the structure of social production and in this way promotes the establishment of the most rational proportions in the development of national economy.

In the USSR, first place among progressive industries belongs by right to the chemical industry. This industry creates the material conditions for the chemicalization of all the branches of the national economy. It enlarges the raw-material base for industry, and produces entirely new materials, among which are those with previously set properties; it ensures the growth of such new branches as atomic energetics,

/radio-electronics, rocketry,

radio-electronics, rocketry, etc. In the 1964-1970 period the volume of chemical output will increase from 3 to 3.3 times. The chemical industry will develop at a most accelerating rate (17 - 19½ annually) as compared with other branches of economy. The long-term plans also envisage a rapid development of the most progressive branches of the chemical industry, e.g., the output of plastics, chemical fibre, glass-plastics, lavsan film, synthetical rubber, mineral fertilizers, bio-preparations, synthetical alcohols and fat substitutes. The high rates of development will enable the chemical industry to satisfy the requirements of the population, of agriculture and industry in chemical products.

However, the chemical industry is not the only progressive branch of the national economy. While giving if preference, the planning bodies envisage a rapid development of a number of other progressive branches and industries, which are of great importance for the acceleration of technical progress, the improvement of quality and the reduction of cost prices of output as well as for the increase of the economic potential of the country.

But the priority development of the most progressive branches and industries will bring forth the necessary economic results only if a harmonious development of all the branches of economy is ensured. This brings to the fore another important principle of long-term planning, viz, the principle of ensuring proportionality in the development of national economy. No social economic system can develop without observing definite proportions in the national economy, but under the socialist system the proportionality of social production is established consciously, by means of the national economic plans.

A long-term plan is a unified national economic plan all the sections and indices of which are co-ordinated with the utmost care. It unites the complex of plans for enterprises, industries, branches and different spheres of economy as well as for Republics and economic areas.

In order to achieve the proportional development of the national economy it is necessary for each branch to have its own plan, which would include tasks concerning output in its definite assortment, the

/exploitation of

exploitation of power capacities, labour, material and technical supply, the cost prices of output, etc. These complex tasks, in their turn, should be closely co-ordinated between themselves as well as with the other sections of the plan.

In the plans of Republics and economic areas the output programmes are co-ordinated with the targets for labour, transporting, merchandise turnover, reduction of cost prices and capital construction. This means that the plans of the Republics and economic areas, as well as the unified national economic plan, must have a complex character.

The economic plan establishes a number of significant general economic proportions which include the correlation between industry and agriculture, the production of the means of production and the production of consumer goods, between output and transporting, consumption and accumulation, merchandise turnover and the income of the population, etc.

The creation of sufficient reserves is an indispensable condition for the proportional development of economy. By applying the law of the planned and proportional development of national economy, the state, under socialism, has the means of determining the proportions of material reserves which are an objective necessity. They are necessary to compensate temporary discrepancies in the development of economy.

The complex co-ordination of all the sections of the national economy plan ensures the implementation of a unified economic policy and the attainment of the highest economic results in the interests of society.

In drawing up long-term plans great importance is attached to the mobilization of internal production reserves and the utilization of the newest achievements of science and technique. This determines the following principle in planning: the elaboration of output programmes with due regard for the fullest use of the reserves of enterprises and the introduction of technical achievements on a large scale. A huge reserve for economizing capital investments and raising the efficiency of social production is brought to light by making better use of the existing production capacities. Such factors as improving the use of

/the basic

the basic funds, making the most of equipment throughout all the shifts, eliminating discrepancies between different production processes, and doing away with irrational outlays, promote to a great extent, the growth of output without additional capital investments.

Great opportunities are created for the growth of output by modernizing equipment, mechanizing and automatizing production processes, introducing new technology as well as substituting more productive new machinery for out of date equipment. Measures for promoting technical progress are included in the long-term plan in the shape of concrete targets concerned with the realization of proposals submitted by research and designing institutes, which are aimed at raising the technical and organization levels of production. The main task of the plan for the development of new technique is to ensure a constant increase in labour productivity and a high rate of social production development.

An important means of raising the efficiency of social production is the improvement in the utilization of capital investments. This brings forth another principle of long-term planning, viz., the principle of raising the efficiency of capital investments.

Capital investments are expenses made for the reproduction of the basic funds. Their greater part ensures the accretion of the basic funds in the national economy. Their economic efficiency is determined by the annual increase of the net national product in its physical volume (the gross national product excluding material expenses), as the result of these investments. The index of the economic efficiency of the summary capital investments in the national economy is determined by the ratio of the annual accretion of the net national product to the capital investments responsible for this increase. In the final analysis, the economic efficiency of capital investments is manifested in the increase of social labour productivity.

The efficient utilization of capital investments ensures the highest rates of output with the lowest outlays within the shortest period of time. Further technical progress and the increase of social labour productivity promote the growth of production per rouble of capital

/investment. Only

investment. Only due to a significant rise in the efficiency of capital investments was it possible to plan a 6.3-fold increase in industrial output with a 5.4-fold increase in capital investments in industry for the 1961-1980 period.

An increase in the efficiency of capital investments is realized, first of all, by concentrating them in the construction projects of progressive, i.e., the most important units for the development of national economy, and also by using them to complete the enterprises under construction, with the purpose of shortening the period of construction work and making the fullest use of production capacities. Of great importance in increasing the efficiency of capital investments is their implementation in increasing the industrial capacities by the reconstruction and technical rearmament of those enterprises which show the greatest possibilities to increase output within the shortest period of time and with the lowest outlays, as compared with the construction of new units.

Another important principle is that of the continuous character of planning. The economic foundation for the continuity of planning in the development of the national economy is constituted by the continuous character of the process of extended socialist reproduction.

Under present-day conditions continuous planning implies the correct combining of long-term and current plans. Of the foremost importance in ensuring planning on a continuous scale are the five-year plans with their division according to years. The national economy should have annual perspective targets worked out for several years ahead, which constitute the basis for developing current plans. The continous nature of planning is ensured by the fact that while the alterations of the annual targets for the original five-year plan are being worked out for the coming year, the basic economic trends for the final year of the five-year period are drawn up at the same time. Due to this, there is always a five year perspective for economy development. This practice enables the Republics, economic areas, branches and individual enterprises to have continuous five-year plans.

/The continuity

The continuity of planning increases the organizing role of the plan in economy development, strengthens the unity between the centralized planning authorities and the broad creative initiative of the masses, promotes the singling out and mobilization of reserves and increases the economic efficiency of social production.

All the most important principles of long-term planning are implemented with the help of definite methods of working out plans for the development of the national economy.

The most general method of planning is the method of dialectical materialism. Dialectical materialism studies the most general laws of the development of nature and society, while economic science deals with specific economic laws.

But in reality, general and specific laws are interdependent. Hence, the application in planning practice of the method of dialectical materialism that is based on the comprehension of economic laws, is quite logical. This method demands the consideration of economic processes in their correlation and in their continuous movement, which is realized by transition from insignificant and latent quantitative changes to new qualitative transformations. Knowledge of the most general laws, expounded by dialectical materialism enables us to forsee the general tendencies in the development of social production.

A specific method used in planning is the analytical method or the method of economic analysis. It is mostly used to work out the targets of the economic plan. In order to elaborate a particular target, an analysis must be made of the achieved standard of development. An erroneous calculation of the initial level will inevitably lead to errors in working out targets.

Economic analysis covers a wide range of problems on the development of interdependent branches of production in Republics and economic areas. It demands a national-economic approach to the study of economic phenomena, the complex study of the development of different branches, the comparison of interdependent indices concerning the production activities of co-operating industries, the revealing of reserves for a more effective use of production capacities and an increase in labour productivity.

/Economic analysis

Economic analysis cannot limit itself to the consideration of average data. Its task is to study the experience of the foremost enterprises with the aim of applying this experience to long-term planning. Economic phenomena are considered by comparing the results of a series of years. Particular attention is devoted to the analysis of changes made in indices, which characterize the efficiency of social production, including: specific capital investments, labour productivity, labour-consuming features, outlays per rouble of output, etc. This enables us to determine the rates, proportions and progressive changes in the structure of production, as well as the regularities of national economy development.

In analysing the initial level of development wide application is made of economic grouping. Thus, in order to determine the influence of technique on labour productivity, enterprises are grouped according to the level of their technical armament. To determine the progressive indices and the standard of their distribution, enterprises are grouped according to their more or less equal conditions of labour.

The economic analysis of the national economy development enables us to reveal the reasons for disproportions, to work out means for the quickest elimination of these short-comings and for the utilization of the reserves available. However, the proportions and rates of national economy development obtained as a result of economic analysis should not be used mechanically in long-term planning.

The analytical method is used at all the stages of long-term planning and by all the units of the planning system.

Great importance in the process of long-term planning is attached to the method of quantitative analysis. The aim of this analysis is to determine the quantitative indices, e.g., the division of the national income into the consumption and accumulation funds, the elaboration of output targets according to the rates of growth, the volume of output, etc.

The elaboration of the quantitative indices in output programmes demands numerous calculation operations. Without them it would not be possible to determine and prove the expedience of a single plan target. The technical and economic calculations have to be carried out with the

/utmost care.

utmost care. Insufficient proof of the expedience of planned targets can upset the reproduction process or lead to the approval of a long-term plan, which does not fully meet the requirements of objective economic laws, and, consequently, does not ensure the implementation of the principle of the highest efficiency of social production.

The basic task of long-term planning is to determine the requirements of the national economy for the planned period and the resources for their fullest fulfilment. Firstly, the required increase in output for the most progressive branches of the national economy is determined. Then, on the basis of these indices, planned targets are worked out for all the other branches of the national economy complex. The expedience of all the planned targets (the volume of output, the rates of output increase, the accumulation and consumption funds, etc.) is proved by detailed technical and economic calculations. In industry, calculations of this kind are used to show the expedience of production capacities, the volume of output produced as a result of specialization and co-operation, the growth of labour productivity, the reduction of production costs, etc.

In particular, the production capacities of an enterprise are determined by the highest possible annual rates of output for articles of definite nomenclature and assortment. The capacity quotas are calculated according to the most modern technological rates, taking into account the introduction of the newest technique and the organization of the production process. In the practice of economic planning the technical and economical calculations of the production capacities of the enterprises under construction are usually based on the designed capacity rates of equipment and on technically grounded production quotas.

Thus, the technical and economic substantiation of the expedience of a plan's targets becomes an indispensable condition for long-term planning, but not a single target can be included into the plan before it is balanced with other targets and sections of the national economic plan. This accounts for the wide use of the balance method in long-term planning. It ensures the unity of the national economic plan and the co-ordination of all its targets.

/The correct

The correct application of the balance method enables us to reveal the disproportions and to outline new proportions for the national economy, more progressive in character; to take all-round account of the actual conditions for economy development. In the practice of long-term planning, physical, labour and cost balances are applied as well as the balance of output and product distribution for industries.

Inasmuch as there are special reports devoted to types of balances, we shall, as an example, examine only one type, viz., the national income balance.

The national income is a part of the gross national product, created by the different branches of material production. It consists of the gross national product minus the quantity of output products consumed within the year. According to its material aspect, national income comprises all the consumer goods produced by society and a part of the means of production intended for the extention of production and for the replenishment of reserves. In its cost aspect the national income comprises all the new value produced during the year. Only this value can be used by society to satisfy personal and social requirements.

The national income is calculated according to different branches of the national economy: industry, agriculture, construction, transport freight transporting, communication services (for production purposes), trade (deliveries, public catering, material and technical supplying) and other branches. In their turn, these branches are divided according to the forms of property.

The decisive role in creating the national income of the USSR belongs to the socialist sector of production - to state and co-operative - collective-farm economies. The share of the socialist sector (including the income from the subsidiary personal households of farmers, workers and employees) in the national income constitutes 99.9 per cent, about 75 per cent of the national income being produced by the state sector.

The volumes of the gross product produced and the material outlays for production are calculated for each branch and for the national economy as a whole. The amount of the national income for the particular year is determined as the difference between both of these volumes.

/The initial

The initial distribution of the national income is already realized during the production stage. It consists of personal income and the net income of society. The personal income of the working people includes: the wages of workers at state enterprises, the monetary income of farmers and workers engaged at enterprises of consumers' co-operative societies, the income of farmers, workers and employees from subsidiary households and, finally that of privately-owned peasant farms and handicraftmen who are not members of any cooperative.

In order to ensure the development of the branches of the non-production sphere of economy, i.e., education, culture, health services, science and others, part of the national income is redistributed through the state budget, the sphere of services and public organizations. Part of the income of the population employed in material production is transmitted in the form of taxes and duties to the system of finance, where it makes up different funds, and also in the form of service remuneration. At the same time, the people employed in material production receive additional income from the state in the form of paid leave, social insurance, compensation to large families, etc. This results in the fact that the consumption fund exceeds the initial income fund.

The process of the distribution and redistribution of national income ends up in the emergence of final incomes. The distributed national income is then again divided into two parts: the non-production consumption fund and the accumulation fund, including reserves. The non-production consumption fund is used for the satisfaction of personal material and cultural requirements of the peoples and society. It comprises the personal income of the population and social resources. The personal consumption fund in its material aspect includes foodstuffs, clothes and shoes, furniture and household goods, articles of culture, fuel, electric power, water, etc. The working people receive up to 70 per cent of the personal consumption fund through state, co-operative and collective-farm trade. Personal consumption of the population comprises nearly 90 per cent of the whole non-production consumption fund. The social consumption fund is the source of state expenses for providing the population with schools, hospitals, establishments for children, sanatoriums, etc.

/The accumulation

The accumulation fund is alloted for the expansion of production, the non-production funds and for the establishment of state reserves. This fund ensures the increase of the basic and turnover production funds and the further growth of national consumption.

Thus, in the USSR the national income belongs entirely to the people and is used for the further expansion of production and to raise the living standard of all the members of the socialist society.

The balance method of planning is based on the application of progressive rating systems, i.e., on the rate-planning method. In order to make economic calculations or to draw up a well-grounded balance it is necessary to work out progressive planning rates. Progressive technical and economic rates determine the highest possible outlays of labour and equipment per unit of output or given volume of work. These rates are worked out by enterprises, planning organizations, research and designing institutes. As a rule, they exceed the actual average indices and approach the draft rates or those of the foremost enterprises. Such rates promote technical progress, the growth of labour productivity and the improvement of output quality. Progressive rates enable us to achieve a most optimum structure of the national economy.

These are the basic methods applied in drawing up long-term economic plans. In the practice of planning these methods are supplemented by more specific methods with a limited character, such as, the method of variants, the index method and others.

The application of the above-mentioned methods promotes the elaboration of a unified national-economic long-term plan which corresponds to the economic laws of socialism and ensures the attainment of the highest results with the lowest possible outlays. The main organizational principle in planning is the principle of democratic centralism, according to which centralized state planning is combined with the broadest creative initiative of the working masses. That is why one may consider the plan of national economy development to be the result of extensive and fruitful work of hundreds of thousands of people. Our Soviet people have every right to regard the task of planning as a matter of their vital concern.

PLANNING OF RATES AND PROPORTIONS OF NATIONAL ECONOMY DEVELOPMENT *

(from the experience of socialist countries)

Importance of Economic Development Rates

In different historic epochs the production expands unequally, at different rates. In the subsequent formations the development rates are higher than in the previous ones. Capitalism develops faster than feudalism and socialism advances more rapidly than capitalism. This is a natural process but not an accidental phenomenon. Humanity advances forward in spite of all zigzags of history. Production technique develops, productivity of labour increases, old social relationships are substituted with new, more progressive ones, new stimuli of production growth appear. All these make it possible to increase the rates of economic development. And the needs, developing together with the society progress, demand that this possibility should be utilized.

The expansion of production was just a barely noticeable "molecular process" before capitalism, and its rates could not be of any importance. Material conditions for the achievement of more or less high rates arise only along with the development of mechanized production. This may be illustrated by the following example. The average annual increases of the industrial production in Britain in 1700-1780 when the mechanical production almost did not exist amounted to 0.9 per cent. But on the basis of mechanical production in the XIX century in some countries the rates reached 5-6 per cent a year. Thus, the modern technology enables to achieve higher rates of economic development. The degree of realization of this possibility in various countries depends on social conditions.

High rates of development of the national economy are of great importance to all countries. They enable the developed capitalist countries to expand their home markets, to diminish unemployment, to increase their economic potential and supremacy in the world capitalist economy. In the capitalist countries, however, the rates of development are greatly

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* By A.I. Notkin

/affected by

affected by spontaneous economic forces, and they are too far off from the desirable rates. Relatively high rates of one period of years are followed by low rates of another. For example, in the Federal Republic of Germany the rate of increase of the industrial output reached 11.2 per cent in 1960, then slackened to 3.5 per cent in 1963; in Italy from 15.3 per cent to 5 per cent, and in Japan from 25.8 per cent to 7.5 per cent respectively. In the years of crises and depressions the production even declines. The governments of the developed capitalist countries, of course, endeavour to resist the decreasing of rates, in particular, by increasing the state expenditures, especially for military aims. However this proves insufficient, since the prime role in the rise of conjuncture is played by spontaneous forces, by the competition of monopolies and private enterprises.

For the developing countries the rates of economic development determine the periods within which they receive their economic independence. They begin their development from a low level. While in the USA, for instance, the national income per head of the population makes about 2.500 dollars a year, almost in all African countries the national income is less than 100, and in some countries even less than 50 dollars. Therefore the periods of a considerable increase of the living standards depend also on the rates of economic rise of the developing countries.

In socialist countries the rates of the development of national economy determine periods of the socialist and communist transformation of their economy and of the achievement of such a level of output per capita, which is higher than that in the most highly developed capitalist countries. Nowadays the world socialist economic system includes countries with different levels of development, and it is necessary that less developed countries should catch up with more developed ones. On the basis of higher rates in the less developed countries the levelling of the economic development of all socialist countries takes place. This is illustrated by the following table:

/Average annual

Average annual rates of the expansion of industrial output in some socialist countries in 1951-1962 (in percentages).

USSR	11.4
Poland	12.3
Czechoslovakia	10.4
GDR	10.5
Hungary	10.1
Rumania	13.3
Bulgaria	14.2
Mongolia	13.3

These data show that, though in all socialist countries the rates of industrial growth are high, the countries which were in the past agrarian or where agriculture was prevailing, now develop their industrial production at the highest pace. In the process of socialist industrialization they turn into developed industrial-agrarian countries. This ensues from the socialist transformation of society. Socialism is not only social property of means of production but also high labour productivity and high living standards of the people. But a high level of labour productivity and high living standards of the people may be achieved only at high rates of the economic development.

In the socialist countries the whole national economy, its structure and the main trends of its development are planned. The rates of this development are planned too. It goes without saying, that the rates cannot be determined arbitrarily. They are planned in conformity with both the laws of social development and the concrete historic conditions in each country.

What are main criteria of planning economic development in the socialist countries?

/Firstly, it

Firstly, it is the rates of growth of the gross national product, which according to the Soviet statistics is the sum of the gross outputs of the branches of the national economy and includes all material costs of production and the net national product (national income).

In the second place, it is the rates of growth of the national income which is determined in the USSR according to the method of production as the gross national product received in the branches of material production, excluding material costs of production in those branches. The index of rates of the national income growth in socialist countries is of excludingly great importance, because the national income is a source of consumption and production growth.

Thirdly, it is the rates of growth of individual branches of the national economy (industry, agriculture, transport and commodity circulation).

In order to determine a physical volume of the gross national product, the national income and gross outputs in branches of the national economy, all rates are estimated not in the current but in comparable prices of some year taken as the initial basis of calculation. Since the structure of the national economy and the correlation of prices change, one basis of the calculation of rates is replaced from time to time with a new one, for better comparability.

In planning rates of economic development there are two approaches in their determination. The first - pure empiric - consists in determining rates for the future according to the achieved rates in the past. This is a wrong method, since it does not take into account the changes of conditions and the particulars of economic development at each moment given. According to the second - scientific approach - along with the rates in the past period, the achieved level of development, the resources and factors which will determine the growth of economy in the future are also taken into account.

/What are

What are those main factors which should to regarded while planning rates?

Labour resources and productivity of labour as factors determining rates of economic development

The labour resources of society and their growth greatly influence the rates of economic development.

Along with the population growth the number of able-bodied increases too. This labour force can be used for production expansion in town and in the countryside. This factor is of an especially great importance for the growth of industry and towns. But they develop not only due to the natural growth of the population, but also due to the migration of people from the contryside to towns.

Agrarian countries, taking up the path of industrialization, usually have large resources of labour force in agriculture and the countryside in general. These surplus labour forces may be used for developing industry and other kinds of non-agricultural activity.

At the beginning of industrialization in countries with surplus manpower in agriculture, rates of economic development depend to a greater degree on the number of able-bodied population and the possibility to draw it into various spheres of non-agricultural production activity. However, as the possibility of the growth of industrial towns diminishes due to the migration of population from the countryside the growth of labour productivity becomes the decisive factor for the production growth.

In all more or less developed countries the increase of labour productivity is the prime factor, determining rates of the development of both the whole national economy and its main branches. This is connected not only with the fact that at the certain stages the agrarian population absolutely diminishes and the surplus labour force in the countryside is exhausted but also that in towns ever increasing needs for manpower for unproductive activity arise, since with the growth of culture a considerable part of the population able to work is engaged in the sphere of education, public health services and other services.

/The process

The process of the redistribution of able-bodied population between town and the countryside, between productive and unproductive spheres in capitalism and socialism is principally different and proceeds in different forms. In the capitalist countries spontaneous migration of a part of the population from the countryside is connected with the bankruptcy of petty producers. The spontaneous redistribution of the population in towns among spheres and branches of non-agricultural activity is caused to a greater degree by unemployment, due to the fact that a considerable part of workers and employees is pushed out of some spheres of activity and is forced to switch over to others. But in the socialist countries the redistribution and the utilization of increasing labour resources is carried out in a planned manner. For instance, in the USSR the plan of development of the national economy is drawn up together with labour balance. But we wont discuss this point here because it is a subject for a special report, and we shall turn to characterizing another factor of economic growth - productivity of social labour.

The growth of labour productivity is determined in the plan of the national economy, first of all, on the basis of a possible increase of power consumption per worker. Experience shows that the dynamics of labour productivity in industry and construction within big periods of time approaches the dynamics of power consumption per worker. And this is quite natural. At the present level of development of the technology the providing the worker with further technical equipment leads to a corresponding growth of the consumption of energy, and primarily in terms of electrical power per man-hour, or per worker. However, the planning of increase of labour productivity is not limited to determination of its quantitative dependence on technical progress, expressed through the growth of power consumption per worker. Concentration, specialization and distribution of production, the organization of production in enterprises, quality of natural resources, changes in the structure of branches of industry are also taken into consideration. All this has a great influence on the growth of productivity of labour. The rise of general culture and skill of those engaged in production is of a great importance for the increase of labour productivity. In the USSR and other socialist

/countries all

countries all these factors, determining the growth of labour productivity, are planned. Therefore, while determining the rate of economic development, it is possible to calculate more or less exactly to what extent it may be achieved due to the growth of labour productivity.

Accumulation and rates of economic development

The growth of the population engaged in production and the increase of productivity of their labour demand expenditures on the means of production.

To include in the production an additional number of persons able-bodied, it is necessary to give them proper instruments of labour. These instruments of labour may be more or less complicated, but they are indispensable. Since the rise of labour productivity is to some extent due to technical progress, the society has to have expenditures on the substitution of manual labour with mechanical labour, the substitution of old machines with modern ones. In all cases additional quantities of raw materials and power are necessary. On that ground a part of the national income is to be directed to production accumulation, increasing production funds, i.e., for the output of the means of production. The rates of economic development depend to a great degree on the fact, what part of the national income society can allocate in the given moment for production accumulation. One of the most important tasks of planning consists in economically substantiated determining this portion of the national income.

If in connexion with the increase of the number of the population, engaged in production, and with necessity of increasing labour productivity, we sharply enlarge the norm of production accumulation (i.e., its share in the national income), this will limit the growth of the public consumption for the nearest period of time. This type of economic advance is possible only under extreme conditions, when it is necessary within a short period of time to overcome the technical and economic lag of the country and to consolidate its defensive capacity. In normal conditions of peaceful development the rate of the production accumulation in socialism is planned so that the accumulation and the growth of current consumption

/are combined

are combined in the best way. In other words, a socialist society does not aim at maximum rates at all costs, to the detriment of rise of the well-being of the people.

The determination of the norm of the production accumulation is also connected with possibilities to draw new natural and labour resources into the economic turnover.

As the experience shows, the problem of natural and labour resources is always solved by means of scientific, technical and economic progress. During centuries the exhaustion of natural resources (forests, minerals, arable land, water resources) was prognosticated many times. However, the advance of science and technology has led to the discovery of new, often more rich natural resources, to the improvement in the utilization of less rich resources, to the saving of natural resources and the substitution of one kind of resources with another, more effective one. For example, wood fuel was substituted with much more effective mineral fuel; and in prospect atomic energy will substitute for mineral fuel. At present light metals, plastics, synthetic fibres, rubber, etc. play more and more considerable role in the raw material balance. In spite of this, when we plan economic development for a relatively short period of time (for example, for five years) we have to consider the availability of discovered and cultivated natural resources and the possibility of getting missing raw materials on the world market. The consideration of this factor also has influenced on planning the rate of the production accumulation and the rates of economic development, and the disregarding of this factor may cause disproportions and excessive strain in the economy.

The prognostications of the exhaustion of labour resources proved unfounded too. The continuous growth of technical equipment of labour has led to a great saving of labour force and created conditions for the reduction of working time. At present in the Soviet Union a working day is reduced to seven hours, and in some industries with difficult conditions - to six hours, and a working week is reduced to 40 hours. While planning accumulations and rates, one has to consider an available

/scale of

scale of training skilled workers and specialists within each given period and the distribution of personnel in the country. The modern highly mechanized production requires not man-power in general but man-power of a definite quality. In keeping with this, the Soviet Union has a wide network of training skilled cadres for all branches of the national economy. According to the census of the population in 1959 in the USSR the number of persons with a higher, incomplete higher and specialized secondary education was 13.4 million, i.e. more than 9 per cent to the total population of the USSR at the age of above 16 years. The number of diplomaed engineers employed in the national economy of the USSR amounted to 1,135,000 in 1960 compared with 590,000 in the USA.

The limits of accumulation are sometimes connected in the economic literature with rates of the population growth, which allegedly determine the increase of consumption demand. However, the increase of consumption demand caused by the growth of population determines only the so called demographic investments, i.e. the lower limit of accumulation. The need for accumulation and investments necessary for technical progress and the rise of the well-being of the people greatly surpasses this lower limit. Thus, if the natural growth of the country population amounts to 1.5 per cent, and 3 per cent of the national income are spent for each per cent of the increase of national product, then the demographic investments will make 4.5 per cent.

In various countries the average annual rates of the population growth and the expenditures of the national income on one per cent of the increase of national product differ. Therefore, the share of demographic investments in the national income of various countries is different. Here we discuss only the method of determination of the share which is equal to the product of the norm of the production accumulation (i.e. its share in the national income) per one per cent of accretion of the national product, and the average annual rate of the population increase within a definite period of time. It goes without saying, that this share may be calculated for each separate year. The determination of the share of demographic investments is especially important for

/countries where

countries where the population grows rapidly, to which a number of developing countries may be reffered. Along with this, it should be stressed that a real rise of the economic level and the well-being of the people is possible only when the norm of production accumulation is higher than the lower demographic limit. In the USSR the first value is almost seven times greater than the latter is.

At the same time, the socialist countries pay much attention to saving the fund of production accumulation on the basis of the reduction of fund-consuming production, i.e. to the reduction of expenditures of the means of production per unit of output. At present the technical progress enables to achieve this. Industrialization in the XIX century was based on the wide initial introducing of machines into manual production processes and non-mechanized branches and industries. With this intensive introduction of machinery, naturally, the number of means of production in operation increases faster than the output obtained with the help of these means of production. The introduction of means of production (machines, fuel electrical power, lubricating oils etc.) serves to a greater degree to saving manual labour but not to an increase of output. The separation of various functions of agriculture, domestic industry and household and their transformation into independent mechanized industrial branches and industries contributes to this.

When a high degree of industrialization is achieved and the major part of production processes are being mechanized, the further advance of the already mechanized production consists in replacing less perfect machines with more up-to-date ones. Under these conditions possibility often arises not only for the further saving of manual labour but also for increasing productivity of the means of production themselves and for increasing output per the given amount of the means of production. New improved machines operate at great speed and process a larger quantity of raw materials per unit of time. Increased throughput of machines is connected in many cases with the introduction of powerful assemblies (at power stations, in metallurgy, in transport and other branches) which make it possible to get much more output per unit of capacity, weight

/and cost

and cost than before. Expansion of the opencut method of production of minerals (which is now possible as a result of improvements in the mining technology), getting the same quantities of oil out of a less number of wells with new techniques of extraction etc., contribute to a rise in the productivity of the means of production. Small improvements of the available technical equipment, which makes it possible to increase the production capacities of enterprises without large additional investments, plays not a minor part. Since the twenties of the XIX century all this resulted in a prevailing trend to increase output faster in comparison with the growth of the application of the means of production in industry. Certainly, this does not mean that at present the initial installation of mechanization does not take place, but it plays a subordinate role.

Apparently, in our epoch the reserves of initial mechanization are greater in the developing countries embarking on the path of industrialization. However, it does not mean that they have to repeat a long way of the developed capitalist countries. With up-to-date technical equipment it is possible to carry out the initial mechanization of labour on rather higher level and within shorter periods than in the XIX century, especially if we consider the increasing economic help of the socialist countries to many developing countries, taking up the path of independent political and economic development.

The growth of productivity of the mechanical production, the reduction of funds consumption per unit of output allows to maintain high rates of economic development at a lower rate of the production accumulation and to use additional resources for the expansion of consumption. Therefore, while planning the rates of development and production accumulation in socialist countries, a special attention is given to economy of accumulations and investments.

The socialist countries develop in a close economic cooperation and grant each other long-term credits at low interest. These credits also contribute to the maintenance of high growth rates without increasing the rate of accumulation. To repay credits after several years, when the country achieves a higher level, is doubtlessly easier than to make investments out of the own national income at each moment given.

/Basic proportions

Basic proportions in the development of national economy

The high rates of economic development and the increase of consumption are ensured in socialism by planning proportions of the national economy: between industry and agriculture, between mining and manufacturing industries, between the output of the means of production and consumer goods, between production and freight transport, between capital investments and the production of building materials and equipment, among the output of consumer goods, retail commodity circulation and money incomes and expenses of the population etc.

We can not discuss here all these proportions but shall choose some of them.

Industry and agriculture. As a result of industrialization the centre of gravity of economic advance is shifting to industty. It produces means of labour, building materials, chemical products, fuel, electric power and consumer goods for the whole national economy. Therefore, the planning of industrial output determines to a great degree proportions of development of the whole national economy.

While planning the industrial output in the USSR, the system of priority, the principle of primary development of these or those branches, which play the major role in the rise of the whole national economy at a given moment, is used. Before the war machine-building, metallurgy, coal industry and power industry had such priority. Nowadays along with more progressive branches of machine-building and power industry chemical industry is put forward whose task is to provide agriculture with mineral fertilizers and light industry with chemical raw materials.

The development of many branches of industry is interconnected. This refers, first of all, to mining industries and branches of industry processing their production. For example, iron-ore and coking coals are processed at the plants of iron and steel industry, and rolled metals are used mainly in machine-building and in metal-working industry. Therefore, the development of these industries is planned in a certain complex otherwise disproportions would rise. In order to avoid disproportions in the development of interconnected branches of industry in the USSR

/apart from

apart from plans of development of the whole national economy, balances of distribution of the most important products, for example, balances for metals, electric power, fuel, building materials, equipment, etc. are worked out, and an interindustrial distribution balance too. All these balances make it possible to coordinate production, distribution and consumption of various kinds of materials, equipment, the development of mining and manufacturing industries. Establishing progressive norms of expenses of materials and equipment plays a great part in this.

However, agriculture even with modern technical equipment remains the most important raw material base and the single source of food for the country. The development of food industry and, to a great extent, of light industry is based on agricultural raw materials. Thus, in the production of the bulk of consumer goods industry is dependent on agriculture. And this means that while planning the production of consumer goods in industry it is necessary to provide it with a proper volume of agricultural raw materials. Besides, growing towns require foodstuffs in ever increasing quantities. The Soviet society receives a definite quantity of agricultural raw materials and food from state farms (state enterprises), but the bulk of raw materials and food is bought in collective farms (co-operative organizations).

The up-to-date agricultural production in the USSR is all-round mechanized. At present it is being intensified. Estimating the volumes of output and purchases of agricultural products, the Soviet state, in its turn, must plan the amount of supplies of tractors, trucks, combines and other agricultural equipment, mineral fertilizers and fuel to the state and collective farms to ensure the required amounts of agricultural output. Besides, a certain quantity of consumer goods, manufactured in industry must be directed to the countryside.

Thus, the planning of interrelations between industry and agriculture deals with two streams of goods: from the countryside to town and from town to the countryside. Planning must provide for their adequacy to each other.

/Output of

Output of the means of production and consumer goods in industry. The technical progress of mechanical production conditioned the primary development of output of the means of production. Manual labour is more and more substituted with complex machines.

Machines, materials, of which they are made, as well as fuel and energy, with the help of which they are put in motion, play an ever greater role in the total output of the country. This process took place not only in XIX century. It is going on at present both in the capitalist and the socialist countries.

As regards the development of the USSR national economy, the process mentioned above is characterized by the following data. Within a decade, from 1952 to 1962, the total national product in the USSR increased 2.4 times, and the output of machine-building increased 4.8 times, the output of electric power and heat energy - 3.6 times.

Thus, the primary development of output of the means of production is directly or indirectly connected with a faster growth of the industrial output of up-to-date machines and electric power. Lately faster advance of the chemical industry should be included here.

In each period of history the most progressive branches manufacturing the means of production develop faster. The direct economic result of this is an increase of power consumption per worker and an increase of labour productivity. From 1950 to 1962 the consumption of electric power per worker increased in the Soviet industry 2.2 times and labour productivity increased 2.3 times.

The experience of the Soviet Union and other socialist countries shows that primary development of the output of the means of production is especially great in periods when a country overcomes its lag of heavy industry. After creating an up-to-date industrial structure wide possibilities arise for bringing closer rates of the growth of output of the means of production and consumer goods. In the long run the means of production are necessary for the production either of instruments of labour or consumer goods, or means of defence. The more the output of means of production is developed, the more of them may be utilized for expansion of the production of consumer goods.

/Feasibility of

Feasibility of bringing closer the growth rises of output of production means and consumer goods is of great importance for a socialist society, because its aim is the most possible satisfaction of the requirements of peoples. It is natural, that planning proportions of the development of national economy must exploit this possibility to the full.

In planning proportions of economic development in a number of socialist countries, the consideration of foreign trade relations plays a great role. Many countries experience shortage in natural resources or don't have all branches of industry, which they need. Some countries have to export machines and production of other branches of manufacturing industry, in order to get in exchange foodstuffs and raw materials for industry which they need (for example German Democratic Republic and Czechoslovakia). Other countries, on the contrary, export raw materials and foodstuffs in exchange for machines. While planning proportions between industry and agriculture, between output of the means of production and consumer goods, the effectiveness of foreign trade both with socialist and with capitalist countries, equivalence of exchange and country's trade balance are taken into account; and this introduces certain correctives into the proportions mentioned above. Some countries force the advance of agriculture in order to bring down their dependence on the import of foodstuffs, other countries do it in order to get resources for export and to exchange for machines. The same case is with raw materials for industry. At last, some countries speed up machine-building and other branches to get raw materials and foodstruffs in exchange for machines and manufactured goods. But in all cases planning in all socialist countries aims at the maintenance of high rates, at the rise of the people well-being, ensuring economic and political independence, consolidating the world socialist economical system and increasing help to developing countries. A peculiarity of foreign trade among the socialist countries consists in that this trade is based on mutual profitable, stable, regular developing social distribution of labour among them and that it is organically connected with their co-operation in the production sphere and co-ordination of their long-term and current plans of production and construction.

/The socialist

The socialist countries take into consideration the possibility of trade relations with capitalist countries on equal terms, when they plan proportions of their economic development. Since planned socialist economy should not depend on whims of cunjuncture of the world capitalist market, a preferable form of trade relations with capitalist countries is, in most cases, long-term agreements on goods delivery.

The correlation of basic proportions of economic development in socialist countries is realized, while planning economic development, through the balance of national economy. In this balance are determined: the correlation between production, production and unproduction accumulations, current consumption of the people, between output of the means of production and consumer goods, between industrial production, agricultural production, goods transportation, commodity circulation, between socially different sectors of national economy, distribution and redistribution of the national income between the production sphere and unproduction sphere and inside these spheres as well as the growth and the utilization of basic funds and labour resources of the society. Thus, the national economy balance, as a set of its component tables, represents a concrete synthetic model of the plan of national economy.

As economic development creates conditions for planning optimum proportions, the balance of national economy plays ever increasing part in planning the national economy.

At certain stages of economic advance priority in the development of some leading branches of the national economy and industry is the initial point in working out plans. However, as the industrial structure is developing, the branch method of making a plan proves insufficient. The degree of solving mutually related tasks of the rise of labour productivity and well-being of the people more and more becomes the criterion of optimum of the planned rates and proportions, since labour productivity determines to a larger extent possibilities of the rise of the people's consumption, what, in its turn, promotes the increase of labour productivity. In this way, the whole system of planning rates and proportions of economic development is directed to the solution of key tasks of a socialist society - the rise of labour productivity and well-being of the people.

/INTER-INDUSTRY BALANCE

INTER-INDUSTRY BALANCE AND ITS APPLICATION IN ECONOMIC DEVELOPMENT PLANNING*

Planning in any country, interested in economic development, should be aimed at solving three basic tasks, briefly summarized as follows:

1. Identification of targets for economic development within the plan period;

2. Ensuring balanced development in individual branches and elements of economy;

3. Finding an economically most effective (or optimum) way towards the achievement of planned targets.

Only after the solution of these tasks is it possible to draw up a deliberate, proportional and economically effective plan for developing national economies. The order, in which the targets of the national economic plan are listed, also defines, in principle, the sequence of plan drafting. In no case does this signify that the economic development figures, laid down at every stage of planning are not subject to further amendments. On the contrary, the final plan should be drafted through co-ordination of all targets mentioned above.

Most probably, in the course of drafting a co-ordinated variant of the plan, it may turn out that the targets initially proposed for economic development cannot be secured or, conversely, they are too easily achieved and, consequently, require amendment.

Drafting a balanced and, at the same time, an economically highly effective plan appears to be a most difficult task in practice. Yet, planning is not confined to indicating targets and drafting a balanced and effective plan. A plan turns out to be realistic and feasible only against the background of favourable economic pre-requisites, contributing to its implementation. Hence, one of the most important problems facing the planning agencies is to outline adequate economic policies (such as the relative price level, credit policies, foreign trade policies, etc.), which benefit the development of national economy along the scheduled lines.

Whatever the relationships between the planning aspects may be, every aspect has its own specific distinctions and requires specific drafting methods.

/The complications

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The complications encountered in drawing up a balanced plan are directly dependent on the level of economic development, the network of its productive relations, and the nomenclature of products manufactured in the country. Economy is highly responsive to fluctuations within any of its elements, and it is, indeed, a hard job to determine the nature and range of this response. It stands to reason that if planning agencies desire to direct economic development most effectively and deliberately they should have at their disposal sufficiently accurate methods for quantitatively measuring the effect of individual components on economy as a whole. Obviously, the demand for these methods is particularly pressing, when economy develops at an accelerated rate (or is expected to develop at such rate) and is characterized by abrupt changes both in the structure of production and consumption. This exact process is underway in the developing countries.

In this paper we shall describe a possible quantitative method for ensuring balanced economic development, viz. an inter-industry balance of production and consumption in national economy.

The inter-industry balance method is a natural development of the balance planning method, initiated in the USSR and continuously improved upon by the cumulative planning experience, acquired by socialist economy. National economic plans, drawn up in the Soviet Union, incorporate a system of material, labour and financial balances, utilized by the planning agencies to effect the required distribution of resources and to ensure proportional economic development. However, planning experience proves that in order to ensure the operativity and effectiveness of balances applied to a planned economy, planning technique should be based on mathematical methods and electronic computers, that make it possible within a very short time to draft and analyse several variants of economic plans.

At the present time, theoretical thought has offered several types of economic and mathematical models for inter-industry balance, which are distinct from each other in methods of introducing economic variables and, accordingly, in the volume of economic data required for realizing these

/methods. The

methods. The simplest of these models is an open static model of inter-industry balance, which allows us to determine the balanced branch gross outputs, required at a certain level, and the branch structure of the current material expenditures to ensure the desired volume and branch structure of the final product or consumption, productive and non-productive capital investments, increment in resources and reserves, and exports.

In further discussion we shall disclose the details of the open static model for inter-industry balance and the possible ways of applying the model to planning activities. We shall also consider the main problems associated with drawing up dynamic and optimum models of inter-industry balance.

The open static model of the inter-industry balance is represented below in its most simplified form.1/

$$X_i - \sum_{j=1}^{n} a_{ij}X_j = Y_i - U_i \quad (i = 1,2 \ldots n) \qquad (1)$$

wherein:

X_i - is the gross output of the branch i

Y_i - is the final product of the branch i

U_i - are imports of products to the branch i

a_{ij} - coefficient of direct current expenditures on the output in branch i per unit of output in branch j.

1/ The products included in the economic and mathematical model of inter-industry balance may be expressed in physical units (such as meters, tons, liters, etc.), units of value, or partially in both, physical units and units of value.

Whenever products are expressed in units of value, it becomes reasonable to utilize the prices, which were predominant throughout the year covered by the statistical inter-industry balance of production and consumption in national economy.

/A common

A common solution for the system of equations (1) is the expression:

$$X_i = \sum_{j=1}^{n} A_{ij} Y_j^*, \quad (i = 1,2 \ldots n) \qquad (2)$$

$$Y_j^* = Y_j - U_j$$

wherein:

A_{ij} - are coefficients of total economic expenditures on the gross output in branch i per unit of final output in branch j.

The equations (1) can be rewritten in the matrix form:

for which the solution is $(E - A)\, X = Y^* \qquad (3)$

$$X = (E - A)^{-1} Y^* \qquad (4)$$

wherein: $X = \{X_1, X_2 \ldots X_n\}$ 1/ is a column vector of gross outputs in individual branches,

$Y^* = \{Y_1^*, Y_2^*, \ldots Y_n^*\}$ is a column vector of the final product in individual branches.

A - is a matrix for the coefficients of current material expenditures.

E - I is a unit matrix

$(E-A)^{-1}$ is a matrix adverse to (E-A).

The system of equations (1) is based on simple economic preconditions and has an obvious economic interpretation.

The current material expenditures are supposedly in direct proportion to the level of branch gross outputs (in other words they are a a linear

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1/ In further discussion we designate a column vector by braces { } and a line vector by brackets [ ].

/uniform function

uniform function $X_{ij} = a_{ij}X_j$ and are footed by home production alone; conversely, imports, similarly to all other elements of the final demand are an autonomous economic variable, whose value should be determined by the planning agencies outside the model prior to drawing up a plan for home production.

The hypothetical directly proportional relationship between the level of current material expenditures and the level of the branch gross output only guide approximately defines the real productive economic relations, and arises definitely not from theoretical speculations or potentialities of electronic computers, but rather by the nature of the economic data about the functions of expenditures on production. The more and advanced our knowledge is about the subject, the more accurate and realistic the functions of inter-industry balance. The USSR and a number of other countries are presently engaged in research work connected with differentiating current material expenditures, directly related to the level of production, and expenditures, the volume of which does not depend on the above level and remains intact. Moreover, continuous research is going on to determine the intervals in the level of the branch gross output, with various current material expenditures corresponding to the said intervals. The last observation is particularly important in determining the functions of expenditures on production in mining industries and agriculture.

Whenever a distinction is recognizable between variable and constant current material expenditures on output, an equation for distributing the products in national economy may be represented as:

$$X_i = \sum_{j=1}^{n} a^*_{ij} X_j = Y^*_i + \sum_{j=1}^{n} X^*_{ij} \quad (i = 1,2 \ldots n) \qquad (5)$$

wherein:

a^*_{ij} - designates coefficients of expenditures on output in branch i per unit of output in branch j; the expenditures depend on the

/X^*_{ij} -

X^*_{ij} - level of the gross output in branch j; is the volume of expenditures on output in branch i and does not depend on the level of gross output in branch j.

When, apart from the data about the coefficients of current material expenditures, the planning agencies possess information on expenditures of labour and productive assets per unit of the gross output, it is feasible to compute the coefficient of total expenditures of these productive factors per unit of the final output; these coefficients play a prominent part in economic analysis and national economic planning. Introduce matrices:

$$T = \{trj\} \quad (r = 1,2 \ldots m;\ j = 1,2 \ldots n) \quad \text{and}$$

$$F = \{fkj\} \quad (k = 1,2 \ldots f;\ j = 1,2 \ldots n)$$

whose components, respectively, define direct expenditures of labour of the r-type and productive assets of the k-type per unit of gross output in the branch j. Then the components

$$T^* = T\,(E - A)^{-1} \qquad (6)$$

$$\text{and } F^* = F\,(E - A)^{-1} \qquad (7)$$

will reveal the total labour expenditures of the r-type and expenditures of productive assets of the k-type per unit of the final output in the branch j, while the components of vectors

$$\bar{T} = T\,(E - A)^{-1}\,Y^* = T^*\,Y^* \qquad (8)$$

$$\text{and } F = F\,(E - A)^{-1}\,Y^* = F^*\,Y^* \qquad (9)$$

characterize the total volume of respective expenditures of labour and productive assets, required for achieving the planned final product. In the absence of data about every type of differentiated expenditures of labour and productive assets on the output, the total expenditures per unit of the final output are governed by the following expressions:

/$\bar{T}^*$ =

$$\bar{T}^* = t\,(E - A)^{-1} \qquad (10)$$

$$\text{and } F^* = f\,(E - A)^{-1} \qquad (11)$$

wherein: $t = [t_1, t_2 \ldots t_n]$ and $f = [f_1, f_2 \ldots f_n]$ are, respectively, vectors of direct expenditures of labour and productive assets per unit of the gross output.

The matrices $(E - A)^{-1}$, T^*, F^*, $\bar{T}^*$, $\bar{F}^*$ are an important tool in planning economic development. The planning agencies, having in their possession the economic data provided by these matrices, can draw up an inherently balanced program for turning out final and gross outputs, determine the demand for labour resources and productive assets in implementing the program and make an over-all approach to appraising diverse variants of economic development.

Economic planning in the developing countries is facing the important problem of determining the correlation between home production and imported products. The inter-industry balance model (1) under consideration is only the first approach towards solving this problem. The assumption that the total imports are an autonomous variable and should be determined by the planning agencies before the volume of home production has been estimated, can be accepted for planning economic development in countries practically independent of foreign trade, yet it is unfavourable for countries with a reversed situation.

The easiest way in determining the volume of imports, as suggested by the solution of the inter-industry balance model, is the assumption of the following function for imports:

$$M_i = m_i x_i \quad (i = 1,2 \ldots n) \qquad (12)$$

The coefficients mi, indicative of the relationships between imports and home production and readily obtained through statistical

/inter-industry

inter-industry balances, can be, with the model constructed for the plan period, increased or reduced depending on the economic targets for the development of home production and foreign trade. When adequate information is available, the imports function (12) can be changed to:

$$M_i = m_i x_i + M_i^*, \quad (i = 1,2 \ldots n) \qquad (13)$$

wherein: is the volume of autonomous imports of products in branch i.

Upon introduction of the imports function (13), the inter-industry balance model is solved as follows:

$$X = (E + m^* - A)^{-1} \bar{Y} \qquad (14)$$

wherein: m^* is the diagonal matrix of the imports coefficients,

and $\bar{Y} = Y - M^*$.

The problem, rising upon introduction of imports in the inter-industry balance model, is likely to be solved to a fuller degree by the matrix of coefficients of imports expenditures per unit of the gross output. In this specific case, production and distribution of products in national economy is described by the following equations:

$$X_i - \sum_{j=1}^{n} \bar{a}_{ij} X_j = \bar{Y}_i \quad (i = 1,2 \ldots,n) \qquad (15)$$

$$M_i - \sum_{j=1}^{n} m_{ij} X_j = M_j^* \quad (i = 1,2 \ldots n) \qquad (16)$$

wherein: a_{ij} m_{ij} are, respectively, coefficients, of expenditures of home and imported products in branch i per unit of the gross output in branch j.

Obviously, the matrices $\bar{A} = \{a_{ij}\}$ and $m = \{m_{ij}\}$ satisfy

$$\bar{A} + m = A \qquad (17)$$

/The volume

The volume of home output is found from equations 15 and is described by

$$X = (E - \bar{A})^{-1} \bar{Y} \qquad (18)$$

while the volume of imported products is

$$m = m^*X + M^* = m\,(E - \bar{A})^{-1} \bar{Y} + M^* \qquad (19)$$

The provision of a matrix for coefficients of expenditures of imported product is of considerable importance for developing economies, in the countries relying to a great extent on foreign trade. Alongside the application mentioned above, the matrix can be adapted in determining the economic effectiveness of foreign trade, in the optimum models of the inter-industry balance relating to the problem under consideration, as to what is more profitable: home production or imports.

We have heretofore considered exports as an autonomous economic variable, yet this is a substantially vulgarized approach. Exports perform a dual function; in the first place the currency gained through exports is readily used to pay for imports in the current year; in the second place exports accumulate currency resources to provide payments for imports in years to come. If we put it differently, exports are in any case inter-related with imports. Depending on what currency resources are involved in payments for imported products and what functions are met by exports in the year under investigation, foreign trade relations can be differently mirrored in the inter-industry model. Several examplary cases are treated below:

1. Hypothetically, the country is out of currency resources, and the volume of imports is obtained on the basis of the function:

$$M_i = \sum_j m_{ij} X_j + M_j^*$$

When exports are not intended to accumulate foreign currency resources, imports should equal exports, presented as the function

$$\xi = e\,[1]\,M \qquad (20)$$

/wherein:

wherein: $e = \{e_1, e_2 \ldots e_n\}$ is the column vector, whose components show how much of the products manufactured by branch i, should be exported in order to import a unit of output.

Apparently, the above assumptions are true when $[1]\, e = 1$

2. If the equality of exports and imports is not required and an assumption is made, that exports are, in part, used for accumulating currency, then the function of exports is expressed by

$$\mathcal{E} = e[1]M + \mathcal{E}^* \qquad (21)$$

wherein: $\mathcal{E}^* = \{\mathcal{E}_1^*, \mathcal{E}_2^* \ldots, \mathcal{E}_n^*\}$ is a column vector of the autonomous exports.

Since imports are still met by the export currency gains, the pre-requisite $[1]\, e = 1$ is preserved.

3. In addition to the pre-requisites of the previous example, an assumption is made, that imports are practically defrayed by foreign currency resources accumulated over previous years.

Then, $\mathcal{E} = e[1]M + \mathcal{E}^*$, no $[1]\, e < 1$

A specific solution of the problem, related to introduction of foreign trade into the inter-industry balance model, should be sought for by the planning agencies in dependence of the available economic planning data and the targets of economic development in the plan period.

The principal advantage of the open static model of the inter-industry balance consists in the fact that it makes possible to measure the effect of variable volumes and branch structure of the final product on the level of the output in economic branches, employment of and demand for productive assets, or, to put it otherwise, to determine what contributes to achieving specific targets in economic development, which can be expressed in the terms of the final product or its components. It should be observed, however, that the economic and mathematical model of the

/inter-industry

inter-industry balance of the type under consideration does not necessarily view the final products of all national branches as autonomous economic variables.

In dependence of the available respective data and specific tasks for the plan period, the gross outputs of several branches can be treated as autonomous quantities, while the final products of other branches are treated as unknown quantities. The only condition within the framework of the inter-industry balance model demands that the number of unknown quantities be equal to the number of equations describing the distribution of products.

The type, complexity and branch structure of the plan economic and mathematical models are affected, above all, by the tasks undertaken by the planning agencies, and, secondly, by the volume and quality of the economic information in their hands. At the present time the second consideration constitutes, apparently, the main factor obstructing the employment of diversified models in planning development.

The principal data used in the inter-industry balance models in planning are provided, basically, by statistical tables of the inter-industry balance. The basic scheme of the said tables appears later in the discussion (pp.28, 29).

Quadrant I of the inter-industry balance scheme shows the components of the final product; quadrant II displays the current material expenditures (or intermediate products), met by home and imported products; quadrant III shows the depreciation of the productive fixed assets and components of the national income, and, finally, quadrant IV represents the depreciation of non-productive assets and incomes of institutions, organizations and workers, engaged in the non-productive sphere of the national economy (such as education, health service, housing and municipal services, state administration).

Items, placed outside the balance in the table, provide information on expenditures of imported products on the gross output in branches, indices of employment, and volume of the fixed assets in the productive and non-productive spheres of national economy.

/The statistical

The statistical table of the inter-industry balance, whenever such a table can be constructed according to the given scheme, makes it possible to obtain basic economic parameters, required to apply the open model of the inter-industry balance in planning practice.

Thus, the coefficients of current material expenditures of home products per unit of the gross output are described by

$$\bar{a}_{ij} = \frac{X_{ij} - M_{ij}}{X_j}, \quad (ij = 1,2 \ldots n) \qquad (22)$$

the coefficients of imports expenditures per unit of the gross output

$$m_{ij} = \frac{M_{ij}}{X_j}, \quad (ij = 1,2 \ldots n) \qquad (23)$$

the imports coefficients, indicative of the relationships between dependent imports and home produced goods

$$m_i = \frac{\bar{M}}{X_i} \quad (i = 1,2 \ldots n) \qquad (24)$$

In the event of failure to obtain a matrix for expenditures of imported products, the aggregate coefficients of expenditures are found from the expression

$$a_{ij} = \frac{X_{ij}}{X_j} \quad (ij = 1,2 \ldots n) \qquad (25)$$

The components of the matrix $(Y - \bar{A})^{-1}$ computed on the basic of data, furnished by the inter-industry balance table, reveal the total expenditures of home products per unit of the final output in every branch. The components of the matrix $m(E-\bar{A})^{-1}$ perform a similar role with regard to imported products.

When products, appearing on the inter-industry balance sheet, are expressed in units of value, it is arbitrary to use either consumer prices of producer prices, distinguished foom each other in overhead charges on products. When products are evaluated at producer prices, the overhead charges are "ascribed" to branches consuming the products, in other words it is required to show expenses occasioned by transportation and sales of product consumed as current material expenditures on turning out products in a specific branch. When products are evaluated at consumer

/prices, the

prices, the overhead charges are added to producing industries, that is the balance shows expenditures associated with transportation and sales of products in a specific branch. In the first example, the overhead charges are partially related to the final product and partially to the intermediate product, whereas in the second example, they are entirely considered as an intermediate product.

The inter-industry balances that have been constructed by now in a number of countries employ both kinds of prices. For instance, the inter-industry balance for manufacture and distribution of products in the USSR national economy in 1959 was drawn up at consumer prices.

Evaluation of products of consumer prices initiates several advantages, the main advantage of which is that products evaluated at these prices enter the real national economic turnover, and expenditures on transportation and sales are shown in terms of every specific kind of products. However, it appears more reasonable, particularly in considering the application of the inter-industry balance model to planning procedure, to reflect the products at producer prices.

Producer prices make it possible to reveal the existing inter-industry productive relations, not burdened with transportation and sales conditions, and, thus, they permit uniform distribution of products to meet various demands. When planning involves certain coefficients of expenditures of the statistical inter-industry balance at consumer prices, it is required to set out with a pre-requisite that conditions of production, as well as conditions of transportation and sales, are invariable in part which consequently, sacrifices the accuracy of plan estimates.

Construction of statistical tables for inter-industry balance is handicapped by the selection of a concept for a branch. Statistics in most countries of the world maintain that a branch is a combination of establishments, turning out, principally, products, relating to the type of this branch, in other words they employ a branch and an establishment classification. Quite obviously, however, the "branch and establishment" classification, utilized in drawing up an inter-industry balance, leads to distortion of the productive relations due to the fact that, frequently,

/an establishment

an establishment turns out products, related to another branch and described by a different structure of expenditures on production. To this end some countries, the USSR and Japan for example, adhere to statistical inter-industry balances, composed on the basis of a "branch and product" classification, that is the branch gross output incorporates only branch products, including products turned out by establishments in other branches. In drafting a current inter-industry balance for the economy of the USSR in 1959, on the basis of a 20 per cent representative survey, every establishment submitted data about the volume of non-branch products (according to the branch classification of the inter-industry balance), while the structure of expenditures on production was determined on the basis of information, supplied by establishments, for whom respective products were of the branch nature.

The table for inter-industry relations in US economy for 1947 found a compromising solution between the "branch and establishment" and the "branch and product" classifications by including, in the branch gross output, branch and non-branch products turned out by establishments in a given branch and products related to the type of the given branch, yet manufactured by establishments in other branches, furthermore, the latter products were accounted for as false branch expenditures.

No strong proofs are required to show that the "branch and product" classification yields more accurate and uniform distribution of products and the structure of expenditures on production. A specific solution as to what can provide a basis for a current inter-industry economic balance, is sought for by the planning and statistical agencies on consideration of the existing statistical potentialities for realizing (within a predetermined time) every feasible measure in adapting statistics to obtain adequate economic information.

The reliability of the expenditure coefficients, based on the data of statistical inter-industry balances, materially rises when there are several balances at our disposal allowing the construction of a dynamic series of major indicators of economic development. The importance of this fact is even greater, if economic development is subjected to sudden variations in productive structure, introduction of novel

/technological methods

technological methods of production, new kinds of raw and other materials, machine designing, etc. In determining the level of expenditure coefficients for the plan period, it is required, apart from analysing the dynamic series, to account for changes in the structure of the manufactured products, changes in the relationships between diverse technological methods of production, location of producers, reduction of material expenditures as a result of enlarged production, etc. Since a branch turns out several products, and the branch coefficients of expenditures are a weighted mean of expenditure coefficients of individual products, it becomes reasonable, in so far as adequate data may permit, to express branch coefficients as

$$a_{ij} = \sum_{k=1}^{m} \sum_{e=1}^{s} a_{ke} \frac{P_k}{P_e} d_e \quad (ij = 1,2 \ldots n) \qquad (26)$$

wherein:

a_{ij} - are plan coefficients of direct expenditures on the output in branch i per unit of the gross output in branch j;

a_{ke} - are coefficients of direct expenditures of product k on product l in physical form;

$P_k P_e$ - are prices of product k and product l, respectively;

d_e - is the specific weight of product e in the gross output of branch j.

When a branch turns out many products, the structure of expenditures can be disclosed only through representative products.

Expression 26 also provides for criteria, used for aggregating products in a branch. Here, only those products must be aggregated, which are characterized by a similar structure of expenditures or having constant specific weights in the gross output of the branch. Departures from this principle invariably occurring in practice, lead, to a certain extent, to sacrifices in accuracy. However, the accuracy of the estimates, based on the inter-industry balance model, is not substantially affected

/by all,

by all, but rather by the most important coefficients of expenditures, involving most of the material expenditures on production and, thus, governing the structure of the productive economic relations. For instance, out of nearly 4,300 non-zero coefficients of a 83 x 83 matrix for the USSR economy in 1959, only 500 coefficients were admitted to have great importance and involved over 90 per cent of the total current national expenditures. In the inter-industry balance, constructed for 1970 in 129 branches, about 1,500 coefficients required a careful approach. The attention of the planning agencies should, above all, be aimed at finding these most valuable coefficients.

Effective employment of inter-industry balance models in planning practice substantially depends on the extent, to which the methods for determining the branch structure of the final product, in its most part consumption, have been perfected. Until now, no adequate methods have been suggested for planning branch structure of consumption to be carefully tested in practice and equally used as a yardstick in all countries. Consequently, we have used the experience of the USSR to show, in a concise form, the basic factors to be considered in planning branch structure of consumption. They are:

(a) variation in level and structure of per capita incomes;
(b) relative level of consumer prices;
(c) age and sex consumption of population and size of an average family;
(d) distribution of population according to areas having traditional demands;
(e) scientifically supported standards of consumption for comestibles and non-comestibles.

The economic and mathematical model of the inter-industry balance must, on principle, be used in development planning alongside other models, every one of which is enabled to solve a specific planning problem. The nature of the model of the inter-industry balance can be influenced by the time, when the plan is drawn up, and the length of the plan period.

/The USSR

The USSR experience proves that the inter-industry balance model should preferably be used in long-range planning, at a preliminary stage of current plan drafting, when the principal outlines of the plan are determined, and at the ultimate stage of plan drafting to test how well balanced the plan indicators are.

The static model of the inter-industry balance is used with greater effectiveness in long-range planning, because in a similar situation economic development is not yet bound to capital investments made.

It appears, in any event, that the construction of a plan model for inter-industry balance must be preceded by a macro-economic model of national development aimed at measuring the rate of national income growth, the relationships between consumption and accumulation (productive and non-productive capital investments, growth of resources and reserves), the rate of labour productivity and the general level of employment.1/ These synthetical indicators of economic development must be shown in the inter-industry balance model in terms of a branch and be co-ordinated with the rates of growth in specific branches of national economy. Alternatively, the procedure may preferably be started by constructing an enlarged model of inter-industry balance, showing only the major branches of national economy (such as machine building, metallurgy, fuel industry, food industry, agriculture, etc.), and utilizing the data, obtained for constructing a plan inter-industry balance, indicative of developments in national economy in detailed terms of all economic branches.

Differentiation of the inter-industry balance data is substantiated, firstly, by the availability of adequate economic information, and secondly, by the nature and differentiation of indicators, in terms of which the planners desire to draft an economic development plan in any particular country.

Planning agencies, resorting to an inter-industry balance model in planning, must obviously concentrate their attention on industries, for the development of which, the country has most favourable conditions.

1/ The construction of this model is outside the scope of this paper.

/Careful analysis

Careful analysis must be made of the structure of expenditures on production in such branches, and of their demand for imported products, labour and capital investments. Detailed plans should be drafted for the distribution of their products.

The principal disadvantage of the static model for the inter-industry balance lies in the fact that the model does not interpret the trends of economic development. Capital investments are considered in the model as an autonomous economic variable and are not implied from the rates of economic expansion. These rates, in turn, are substantiated by the trends of final product components, such as consumption, capital allocations on cultural developments, education, science, health service, etc. Leaving in the dark the mechanism of production expansion, the static model of the inter-industry balance cannot furnish a satisfactory answer as to whether the economic development programme, based on the model, can be accomplished from the viewpoint of productive capacities. It goes without saying that the above approach should not be understood too categorically. The knowledge of productive assets before the commencement of the plan period, the trends of expenditures on production in diverse industries of national economy, the discovery, on the basis of a macro-economic model, of the rates of national income growth over the period, enables the planning agencies to determine the expected volume of capital investments, with a greater or smaller degree of accuracy, and to answer whether or not the estimates, based on the static model of the inter-industry balance, are sufficient to ensure the volume and the branch structure of the final product, planned for instance, at the end of the period and serving as a point of departure.

The static model of the inter-industry balance turns into a dynamic model as soon as productive capital investments made at the expense of products manufactured in every branch, cease to be an autonomous quantity, and become a function of the expanding production. In this event, the equations describing distribution of products in national economy in a definite year t are presented below:

$/X_i(t)$

$$X_i(t) = \sum_{j=1}^{n} a_{ij}(t)\, X_j(t) + \sum_{j=1}^{n} C_{ij}(t) \Delta X_j(t + \tilde{t}) + Y_i^{xx}(t)$$

$$(i = 1,2 \ldots n) \qquad (27)$$

wherein:

$a_{ij}(t)$ - are coefficients of current expenditures on the output in branch i per unit of output in branch j;

$C_{ij}(t)$ - designates capital investments made at the expense of products in branch i, required to increase the products in branch j by a unit;

$\tilde{t}$ - is the lag of capital investments from the time when investments are commenced to be made to the time when they yield products;

$Y_i^{xx}(t)$ - is the final product of branch i in the year t minus capital investments, made on expansion of production;

$\Delta X_j(t+\tilde{t})$ - is the increment to the gross output in branch j in the year $t+\tilde{t}$

$X_i(t)$ - is the gross output in branch i in the year t.

The value of the lag of capital investments shows to what extent the plan period is inter-related with the previous and subsequent periods. The length of the plan period is supposed to, at least, equal the time, required to accomplish the longest investment projects. Otherwise, the level of production in the plan period will be substantially dependent on the capital investments made in the previous period, and a portion of capital investments in the plan period will be inter-related with the expansion of production outside the plan. However, there is no escape from this inter-relation, notwithstanding any length of the plan period.

When an assumption is made, that the value of the capital investments lag is similar in every branch and equals, for instance, one year, the capital investments in the last year of the plan period have to be

/considered as

considered as an autonomous economic variable. With a 2-year log, the capital investments in the year last but one become an autonomous variable, etc. This situation does not improve even with a differentiated log of capital investments.

While the static model of the inter-industry balance contributes to a material increase in the level of the planning technique of current production, the dynamic model of t the inter-industry balance, in addition to the above mentioned function, is enabled to substantially improve the planning technique of expanding production and, thus, has a special importance in the developing countries. Balanced branch distribution of capital investments for economic development is one of the basic problems in planning economic development. The experience of economic development in the USSR proves, that the solution of this problem calls for the creation and the tireless perfection of balanced planning methods, among which the dynamic model of the inter-industry balance is destined to perform a decisive role. The dynamic model of the inter-industry balance combines inter-industry relations of current production and inter-industry relations of expanding production, and, thus, makes it possible to create a balanced plan of production and capital investments for several years to come. This plan aggregates co-ordinated yearly plans.

The application of dynamic models of inter-industry balance in planning economic development is at the present time obstructed by the absence of adequate economic information about the specific capital investments for an increment to the output (the matrix $B = b_{ij}$, $i, j = 1, 2, \ldots, n$), the log of capital investments in specific branches F_j the distribution of capital investments according to the years of construction, and the coefficients of utilized productive capacities. The provision of such information is an important undertaking for planning and statistical agencies in any country which are striving to make balanced plans for the development of national economy. Even if at an early stage, such information is not sufficient to construct a "perfect" dynamic model, still its importance should not be underestimated in improving the effectiveness of the static model of the inter-industry balance, used in planning technique.

/In the

In the opening pages of the present report it was mentioned that among the principal objectives to be achieved by the planning agencies in any country, is the drawing up of a variant of an economic development programme, which is not merely balanced, but which is also at the same time economically effective (optimum), from the point of view of specific criteria. In formal terms, the inter-industry balance models investigated above cannot solve this problem. They can be employed for analysing variants of economic development, distinguishes, for instance, in the formulation of targets, that would preferably be achieved over the plan period, but one can never be convinced, that the best variant has been selected. These models do not show, that one target in economic development can be achieved along various directions (for instance, labour saving or capital saving type of economic development). Yet, this is far from signifying that these models cannot at all lead to economically effective solutions. In outlining the principal parameters of inter-industry models for the plan period, viz. the coefficients of current material expenditures, capital consumption and labour consumption, the planning agencies must and can appreciate the most economical technological methods of production, investment projects, etc. Yet, it is true, that economically effective solutions cannot be continuously found within the framework of the inter-industry balance models under consideration. This problem can successfully be solved by optimum inter-industry models.

An optimum inter-industry model is presented below in a very generalized form

$$C = \sum_{j=1}^{n} C_j X_j \longrightarrow \max \ (\min) \qquad (28)$$

provided that

$$\sum_{j=1}^{n} a_{ij} X_j \leqslant R_i \ (i = 1,2 \ldots,m) \qquad (29)$$

and

$$X_j \geqslant 0 \qquad (30)$$

/wherein:

wherein:

C_j - are coefficients of the target function (for instance, coefficients of incomes, expenditures of labour and productive assets or product estimates);

X_j - is the utilization level of the productive activity, FORM j;

a_{ij} - are coefficients characterizing the expenditures (including expenditures of labour and productive assets in dependence of the selected target function) and the output when the productive activity of form j is utilized with singular intensity;

R_i - signifies restrictions (intermediate products, labour, productive assets, final products).

Unlike the above-examined model of inter-industry balance, every form of productive activity in the optimum model is enabled to yield several products above one. At the same time, the forms of productive activity can be arranged so that every form is adapted to produce only one product. In a similar situation, several productive methods can be differentiated within every branch and described as below

$$A_j^s = \left\{ a_j^{s_1}, a_j^{s_2}, \ldots a_{ij}^s \ldots a_{nj}^s, t_j^s, f_j^s \right\} \qquad (31)$$

$$(j = 1,2 \ldots n;\ S = 1,2 \ldots S_j)$$

wherein:

a_{ij}^s - are expenditures on intermediate products in the branch according to the S-method of production in branch j;

and t_j^s, f_j^s - are, respectively, expenditures of labour and productive assets according to the S-method of production in branch j.

Obviously, the number of productive methods is different in every branch, for instance, S_j may equal 1, which means that there is no choice of technology in a given branch according to the optimum inter-industry

/model. Finally,

model. Finally, the form of productive activity within every one branch may be described by similar coefficients of the current expenditures and have different coefficients of labour and capital consumption, and inversely. Various forms of productive methods should be drafted in every specific instance in dependence of the branch character, the available economic information and targets suggested by the planning agencies constructing an optimum inter-industry model.

The total output in a specific branch is described by the expression

$$X_j = \sum_{s=1}^{s} X_j^s \quad (j = 1,2 \ldots n) \qquad (32)$$

wherein:

X_j^s – means the utilization intensity of the S-method of production in the branch j.

Such elaboration of productive methods is a natural expansion of the inter-industry balance model and is readily accomplished.

In constructing plan optimum inter-industry models it is particularly important to find a criterium (or target function) indicating the priority of a certain variant of the economic development plan over other variants. Target functions can be, in principle, classified into two groups: provision of a maximum final output (or its components, for instance, consumption) with pre-determined productive resources (labour, productive assets, natural resources) or provision of minimum expenditures of productive factors for a pre-determined output and structure of the final product (or individual components thereof).

In choosing a target function for an economic development plan in every country, the planning agencies must take an insight into productive resources, when such are available only to a limited extent; targets for raising the living standards and other targets, which should be attained in the plan period. It should be noted, however, that the target function does not necessarily coincide with targets of the economic development plan in the country, For instance, the basic target of the economic development plan should be aimed at ensuring a definite level (in terms

/of volume

of volume and structure) of public consumption, and the provision of a predetermined level of consumption is chosen as the target function: (a) at minimum labour expenditures; (b) at minimum expenditures of capital investments; (c) at minimum total expenditures of labour and capital investments; the pre-determined level of employment in the plan period can be ensured through minimum capital investments, etc. For illustrative purpose, we note that the USSR planning agencies are presently engaged in preparing an optimum inter-industry model, which should, in 1970, ensure a final product at minimum total current expenditures, expenditures of labour and capital investments.

Utilization of optimum inter-industry models in planning economic development demands a great amount of differentiated economic information on production, which is not so readily obtainable. Consequently, it would be more reasonable, if the planning agencies in the developing countries, now engaged in solving the above problem, simultaneously start to practically employ the conventional static model of the inter-industry balance, which - as the USSR experience has proven - can be satisfactorily effective for drafting balanced plans of economic development.

/(Table) THE BASIC

THE BASIC SCHEME OF THE INTER-INDUSTRY BALANCE FOR MANUFACTURE AND CONSUMPTION OF PRODUCTS IN NATIONAL ECONOMY (IN UNITS OF VALUE)

Branches of consumption / Branches of production	Intermediate products		Final products							Gross output
	1,2 ...j ... n	Total	Consumption	Gross capital investments	Increment of reserves	Exports	Imports for final demand	Dependent exports	Total	
Current material expenditures 1	$X_1, X_2, \ldots X_{1j} \ldots X_{1n}$	W_1	C_1	J_1	S_1	$\mathcal{E}_1$	$-M_1^*$	$-\bar{M}_1^*$	Y_1	X_1
2	$X_{21}, X_{22}, \ldots X_{2j} \ldots X_{2n}$	W_2	C_2	J_2	S_2	$\mathcal{E}_2$	$-M_2^*$	$-\bar{M}_2^*$	Y_2	X_2
.	.....	.	.	.	.	.	.	.	.	.
.		.	.	.	.	.	.	.	.	.
	Quadrant II				Quadrant I					
i	$X_{i1}, X_{i2}, X_{ij}, \ldots X_{in}$	W_i	C_i	J_i	S_i	$\mathcal{E}_i$	$-M_i^*$	$-\bar{M}_i$	Y_i	X_i
.	. . . . .	.	.	.	.	.	.	.	.	.
.		.	.	.	.	.	.	.	.	.
.		.	.	.	.	.	.	.	.	.
n	$X_{n1}, X_{n2}, \ldots X_{nj}, \ldots X_{nn}$	W_n	C_n	J_n	S_n	$\mathcal{E}_n$	$-M_n^*$	$-\bar{M}_n$	Y_n	X_n
Total	$U_1, U_2, \ldots U_j, \ldots U_n$	U=W	C	J	S	$\mathcal{E}$	-M	$-\bar{M}$	Y	X

/(Cont.)

Value added in production a branch	Depreciation National income	$D_1, D_2, \ldots D_n, \ldots D_n$ D D'
		Quadrant III
		$N_1, N_2, \ldots N_j, \ldots N_n$ N N'
Gross output		$X_1, X_2, \ldots X_j, \ldots X_n$ X
Dependent imports	1	$M_{11}, M_{12}, \ldots M_{1j}, \ldots M_{1n}$ $\bar{M}_1$
	2	$M_{12}, M_{22}, \ldots M_{2j}, \ldots M_{2n}$ $\bar{M}_2$
	.	
	.	. . . . .
	.	
	i	$M_{i1}, M_{i2}, \ldots M_{ij}, \ldots M_{in}$ $\bar{M}_i$
	.	
	.	
	.	
	n	$M_{n1}, M_{n2}, \ldots M_{nj}, \ldots M_{nn}$ $\bar{M}_n$
Total		$\tilde{M}_1, \tilde{M}_2, \ldots \tilde{M}_j, \ldots \tilde{M}_n$ $\tilde{M}$
Labour		$T_1, T_2, \ldots T_j, \ldots T_n$ T T'
Fixed assets		$F_1, F_2, \ldots F_j, \ldots F_n$ F F'

Quadrant IV

MATERIAL BALANCES*

System and Classification of Material (Natural) Balances

The essence of planning of the development of national economy lies, first of all, in the balancing of all aspects of the expanded socialist reproduction and the ensuring of harmonic development of the economy at high rates and ever growing scales of production accompanied by a constant increase in the living standards of the people.

The balance method of planning comprises, at present, a system of material, labour and value balances which help to determine objectively justified and scientifically grounded optimal proportions in the national economy plans.

The greatest importance in the system of these balances is attached to material (natural) balances which help to determine objectively justified proportions between all sides of the expanded socialist reproduction process and to provide for a conformity between production and consumption (productive and personal).

The formulation of material balances, i.e., balances of the most important kinds of industrial and agricultural products, in current and perspective planning makes it possible:

a) To establish intercoordinated levels of output of industrial and agricultural produce.

b) To effect economically grounded distribution of capital investments among various branches with a view to ensure the required levels of the output of industrial and agricultural produce, expedient trends in the development of branches of industry and separate industries, to reveal and prevent likely partial temporary disproportions between branches of industry and regions, as well as partial disproportions in the development of separate manufactures within branches of industry and within economic regions, that cause wasteful usage of social labour and retard the economic development rates.

c) To fulfill the most sound distribution of industrial and agricultural products among union republics, manufacturing and construction enterprises with a view to provide for a required conformity between production and

* By Yu. I. Koldomasov

/capital construction

capital construction plans.

d) To formulate the state plan of inter-republican deliveries of industrial and agricultural products conforming to a most expedient division of social labour among union republics.

e) To coordinate the development of the economy in the USSR with the economic development of the socialist camp as a whole and of every individual country belonging to it.

It is noteworthy that temporary discrepancies springing up in the process of planned expanded reproduction, i.e., partial disproportions in the development of individual branches or individual manufactures, are caused mainly by an illtimed implementation of new productive capacities, under-fulfillment of production plans of individual types of products, violation of planned consumption rates of objects of labour and standards for consumption of labour tools, as well as separate miscalculations. This gives rise to difficulties in timely providing of separate enterprises and construction sites with needed means of production and the population - with certain kinds of consumer goods - and leads to under-utilization of productive capacities of some enterprises and construction establishments, to longer times of construction periods, irrational freight transportation and, in the long run, to losses in the national economy. To prevent and quickly localize partial discrepancies in the national economy corresponding state reserves are provided for in the material balances.

To avoid unexpected difficulties in the process of economic development in meeting the requirements of production and construction, in particular means of production, a great importance should be attached to the establishment of the nomenclature of the products on the basis of which the planning institutions work out the material balances. The above nomenclature allows for a practical expression of the most important principle of planning - singling out of a decisive, leading link in the national economy plans.

In order to raise the level of the all-round scientific grounding of the national economy plans the nomenclature of the products to which the material balances are worked out is successively broadened; the nomenclatures of material balances worked out to ground, the current and perspective plans

/ more and

more and more coincide, which provides for a close interrelation between both types of plans; the nomenclature of material balances is established on the basis of taking into account the likely requirements of the national economy in new materials, machines and equipment resulting from technical progress, introduction of the achievements of science and technique into the national economy and the progressive improvement of the structure of material production.

This was the way in which balances of approximately 750 of the most important kinds of industrial and agricultural products were elaborated and approved of while formulating a draft plan of the national economy development.

The material balances are formulated, as a rule, in natural terms and, if necessary, in terms of value. For example, to coordinate the volume of capital investments in the national economy with the gross volume of the output of the machine-building industry (with its enormous nomenclature) an aggregate balance of the equipment in terms of value is formulated; on the basis of this balance the planned volume of financial assignments for the purchases of equipment needed for capital construction is coordinated with the possibilities of deliveries of the equipment for capital construction and with the gross product of the machine-building industries.

From the viewpoint of the peculiarities of the methods for determining the necessities of the national economy in material resources and the part played in the establishment of proportions among the branches of material production in current and perspective planning, the material balances are classified into the following main kinds:

a) Balances of objects of labour: raw materials, fuel, electric power, and materials that comprise a material basis of the ready product and are fully consumed during every production cycle.

b) Balances of labour tools: machines, equipment, articles, of cabling and instruments that participate repeatedly in the production process and gradually - in the course of a number of years - transfer their cost to the manufactured products.

c) Balances of goods for social consumption - foodstuffs, clothing,

/footwear, articles

footwear, articles of cultural utility and domestic use.

The required ratios between the volumes of capital construction and industrial production, which determine to a great extent the proportions between consumption and savings in the national income, are established on the basis of balances of metals, building materials, machines and equipment.

Between industry and agriculture the diversified production and economic links are outlined in the balances of gross and state resources of agricultural raw materials (grain, cotton, meat, milk and dairy products, etc.) and the balances of industrial products, a considerable part of which is directed to agriculture (mineral fertilizers, tractors, agricultural machines, fuels to run the agricultural machinery, etc.).

On the basis of balances of gross and state resources of agricultural raw materials the rates of consumption of the agricultural products in the town and in the country are determined; the production programme of light and food industries is coordinated with the volume of state resources of the agricultural raw materials; the scale and rates of the development of agriculture are materially secured with appropriate means of production manufactured by the industry.

Interbranch and intrabranch proportions in industry are studied and determined on the basis of balances of industrial products formulated to a broad nomenclature. An increase in the manufacture of means of production in some branches of industry of manufacture is accompanied by a growth in their consumption in other branches and manufactures.

The balances of industrial products have a complex interrelation reflecting the whole of the variety of interbranch and intrabranch links in the national economy. The machine-building industry, for example, that consumes a considerable part of the output of the ferrous and nonferrous metallurgy as well as of several chemical industries, determines to a great extent, and links the levels of production, of ferrous and nonferrous metals, plastics, rubber, paints, varnishes and other products. The output levels of the ferrous and nonferrous metallurgy and of the chemical industry determine, in their turn, the requirements in the production of a corresponding volume of electric power, and the production of electric

/power determines

power determines the necessities in various kinds of boiler-furnace fuels. The resources of these are, through the oil balance, in connection with the resources of engine fuels, etc.

With full consideration of the changes in the industrial structure of the material production, the system of material balances, interrelated and based on scientifically grounded rates of the utilization of some kinds of industrial products used for the manufacture of other kinds of products, allows the balancing of the volumes of the output of various industrial products.

Interbranch and intrabranch links and proportions in agriculture are studied and determined in the same way as is done in industry, i.e., on the basis of formulating balances of agricultural produce. The balances of agricultural raw materials help to establish the required proportions among the development of grain industry, fodder base, cattle breeding and other branches of agriculture.

Between the development of national economy and the development of transport the proportions are established on the basis of the freights turnover, which, on the one hand, expresses the needs of the national economy in circulation of goods with a view to ensure the minimum total expenditures for the production and delivery of products to the consumer market and, on the other hand, defines the needs of all kinds of transport in the required means of production manufactured in various branches of industry. The links between the national economy and transport stand out most vividly in the balances of engine and boiler-furnace fuels, of electric power, metals, products of machine-building industry and tyres.

Balances of many kinds of products (for example, metals, equipment, etc.), are used at the same time for establishing the required proportions among different branches of the national economy (between industry and agriculture, capital construction and industry, national economy and transport, etc.), thus linking organically the diverse process of the expanded socialist reproduction into a complete whole.

The interbranch proportions in the national economy predetermine to a considerable extent the interregional proportions. The development of branches of the national economy is based on the utilization of mineral and raw materials and fuel and power resources in these or other republics

/and regions

and regions of the country. Therefore, the interbranch proportions determine simultaneously the proportions in the development of the productive forces of these republics and economic regions. Thus, the other side of the social division of labour among the national economy industries is its territorial division. This necessitates a classification of material balances into all-union, union-republican and regional as well. These are used to study and determine the most optimal distribution of production throughout the territory with a view to ensure rational interrepublican, interregional and intraregional production and economic links.

The material balances - like a mirror - give a concrete reflection of the state economic policy in the distribution and utilization of material resources. These balances determine export-import funds and aggregate material resources directed to ensure domestic home goods circulation and are connected, in this way, with the balances of external and internal commodities circulation, with foreign exchange plan and budget, i.e., with value and financial balances; the volume of production adopted for material balances link them organically with balances of labour resources and manpower requirements, etc.

Methods of Formulating Material Balances

Balances for the most important kinds of industrial products and agricultural produce are formulated for a planned period to the following conceptual scheme:

/CONCEPTUAL SCHEME

CONCEPTUAL SCHEME OF A MATERIAL BALANCE FORMULATED FOR PARTICULAR KINDS OF INDUSTRIAL AND AGRICULTURAL PRODUCE

(Unit of measure)

	Base year (reported year)	Planned year
I. Resources - total		
Increment: absolute		
in per cent		
Including:		
1. Production		
Increment: absolute		
in per cent		
Including production in Union republics:		
2. Import		
3. Other incomes		
4. Remainder by the beginning of the year-total		
Including: with suppliers		
with consumers		
Out of which are:		
a) In production		
b) In construction		
II. Requirements - total		
Including:		
1. Production and maintenance requirements with distribution among key directions and branches		
Repair and maintenance requirements		
2. Capital construction		
a) For construction and installation work at the expense of centralized sources of financing		
b) For construction and installation work at the expense of non-centralized sources of financing		
c) For cooperative house-construction		

/ d) For public

	Base year (reported year)	Planned year
d) For public construction in cooperative farms at the expense of undistributable funds of collective farms and long-term state credits		
3. Marketing fund		
4. Export		
Including: through general suppliers to furnish the enterprises under construction abroad		
5. State reserves		
6. Undivided reserves		
7. Carry-overs by the end of the year		
Including:		
with suppliers		
with consumers		
Out of which are:		
in production		
in construction		

When formulating material balances for a long period - 10-20 years - some intermediate years are singled out; when formulating 5-7 year perspective plans, material balances are drawn up for every year; in formulating current plans for 1-2 years it is advisable to outline half-years and even, when need be, quarters of years under planning in material balances.

Every article of material balances is in every way grounded by means of technical and economic calculations.

The volume of industrial output is defined on the basis of propositions submitted by enterprises and generalized by the regional Economic Councils and by the State Planning Committees of Union Republics, all-union ministries and departments, with simultaneous consideration of planned

/investments into

planned investments into development of certain industries and of the resulting balance of production capacities.

The balances of agricultural raw materials are formulated on the basis of planned volumes of state purchases of agricultural produce.

Import and export of products is planned in volumes that provide for the fulfillment of long-term agreements with countries of the socialist camp, as well as with capitalist and developing countries, which must ensure the required balance of the export-import plan for all kinds of products.

The carry-overs of products with suppliers and consumers by the beginning of the planned period is determined, as expected, from the data of the current statistical records; later on it is made precise and corrected by recording the actual remnants.

The resources of products include, side by side with production, import and remainder by the beginning of the year under planning, other incomes (secondary and other resources).

The balances take into account all resources of industrial and agricultural produce and determine the main ways of its usage in the planned period as compared to the reported period (base period).

The requirements of the national economy in industrial products are defined from the necessity to meet the requirements of production and maintenance (productive consumption), the requirements of capital construction, the volumes of planned deliveries to the inner and outer markets (marketing fund and export), to the state reserves and the reserves for emergency expenses in the period under planning, as well as the remnants at suppliers (supply and sale depots included) and consumers by the end of the year under planning.

The requirements of the national economy in agricultural produce are determined separately for industrial processing (grain to flour to articles of confectionary, etc.) and for industrial usage (for example, ethyl alcohol for synthetic rubber, vegetable oil for paints, etc.). In so doing, the aim is to reduce as much as possible and gradually eliminate the consumption of foodstuffs for non-food industrial needs by introducing various substitutes.

/The requirements

The requirements in industrial products for production and maintenance needs are determined, as a rule, by using the method of direct calculations, proceeding from the established rates of consumption and volumes of manufactured products. These requirements are specified along key channels of consumption. Thus, the rolled stock of ferrous metals is distributed for the needs of the machine-building industry, the key, most metal-consuming branches being outlined; for heavy, automobile, tractor, agricultural, electrotechnical machine-building, for the production of articles of cultural and domestic employ, etc.

The consumption of steel tubing is specified along the following key channels: machine-building, capital construction, laying of oil and gas pipelines, prospecting and production drilling for oil and gas; arrangement of oil and gas fields, construction of oil refineries, oil storage units, etc.

As for non-ferrous metals (copper, aluminium, lead, zinc, tin, nickel and others), the requirements are specified for the industries which manufacture cabling, articles of electrical industry and for other branches, large consumers of non-ferrous metals. For products of machine-building industry the utilization of corresponding types of machinery and equipment in capital construction, agriculture, etc., is defined.

Balances of state resources of agricultural produce must show the volumes meant for industrial processing, industrial consumption and the population needs. Within the balance sheets of industrial goods and foodstuffs their market and out-of-market consumption, and so on, and so forth, are outlined.

The emphasis laid on the key channels of utilization of material resources on the expenditure part of material balances ensures inter-coordination of balances of different kinds of industrial and agricultural products, thus making it possible to tie up the development of different industries of the national economy.

The requirements for repair and maintenance purposes in the expenditure part of material balances are brought out as a separate item (within the requirements for production and maintenance purposes) and established in volumes sufficient to preserve the capital funds (the

/ periods of

periods of their amortization being taken into account).

The requirements in material resources for capital construction are calculated on the basis of planned volumes of capital investments into national economy industries, and aggregate rates of consumption of materials per 1 million roubles worth of construction and installation work. The requirements in equipment are determined on the basis of project documentation for the objects under construction or, in part, on the basis of aggregate standards (for example, rolling equipment per 1 million tons of the capacity of ferrous-metal rolled-stock production; chemical equipment in percentage of the volume of capital investments, etc.).

For the formulation of material balances the Union republics, ministries and departments of the USSR submit to the USSR State Planning Committee and corresponding State branch committees the estimates, made to established forms and indices of requirements in material resources for the purposes of production, capital construction, repair and maintenance. These estimates take into account the changes in market and production reserves and also the volumes of incompleted production and capital construction. In the State Planning Committee of the USSR these estimates are verified, brought to conformity with the planned volumes of production and capital construction and serve to ground the material balance sheets to be approved of.

The marketing fund of the material balances is stipulated in volumes sufficient to meet the consumer demands of the population and the commodity circulation plan as well as to allow for commodity reserves required for a normal flow of trade.

In the export division a separate item is dedicated to material resources being transferred through general suppliers for construction purposes abroad. This fact expresses the peace-loving policy of the Soviet Union rendering unselfish economic and technical assistance to countries that have shaken off the colonial oppression for the purposes of their industrialization and consolidation of their economic independence. For example, the Soviet Union helps India to develop metallurgy, heavy machine-building, power engineering, oil production and refining industries;

/ Indonesia is

Indonesia is being assisted to create a metallurgical industry and a fertilizers industry; the United Arab Republic is being helped to successfully build the Aswan High Dam, etc. While formulating current and perspective plans of development of the USSR national economy the balances of industrial products are worked out to provide for a certain volume of it to be delivered to newly free and developing countries. The volumes of the economic assistance rendered by the Soviet Union to the newly free countries are strictly coordinated through the system of material balances with actual possibilities of the USSR economy.

The remainder by the end of the planned year of corresponding types of products with consumers, including those in production and construction, is calculated, proceeding from the necessity of an uninterrupted material and technical supply to production and capital construction, with regard to a minimum diversion of material resources from the sphere of productive and personal consumption, and organization of material and technical supply. In determining the magnitude of the remainder of finished products with manufacturers' taken into account is also time needed for sorting, expedition and shipment of finished products to consumers.

The expected remainder of material resources by the beginning of the year under planning and the remainder assumed to be by the end of the year with suppliers (supply and sale depots included) and consumers both in production and construction, are distributed among union republics, all-union ministries and departments, as specified in the supplement to corresponding balance and made use of when correcting funds for consumers, after having recorded the actual remainder by the beginning of the planned period.

When drafting up preliminary material balances in the initial stage taken as the basis are the estimates of enterprises and construction sites generalised by the region Economic Councils, by State Planning Committees of the Union Republics, all-union ministries and departments. These estimates help to determine the aggregate requirements in a corresponding product for production and maintenance purposes, for capital construction, domestic and external market, for building-up the required current and state reserves, optimally required commodity and production reserves in

/ the national

the national economy, and reveal the shortage or surplus of corresponding kinds of products.

Preliminary balances of gross and state resources of agricultural produce are formulated according to similar scheme, in conformity with the established order of agricultural development planning.

On the basis of preliminary material balance and proceeding from the necessity of ensuring some certain rates, scale and proportions in the development of the whole of the social production and the steady increase in the living standards, the State Planning Committee of the USSR together with the State Planning Committees of the Union Republics, the USSR National Economic Council, the USSR State Committee for Construction, the Ministries and departments of the USSR carry on the elaborate task of the most sound and optimal intercoordination of resources of the corresponding types of products with their consumption. This conformity is achieved by way of partial distribution of capital investments among industries and manufactures, adjustment of production and consumption volumes and changes in other items of the balances. The result is the formulation of intercoordinated material balances approved of within the plans of development of the USSR national economy.

Principles of Rating Material Resources

In order to determine the requirements of the national economy in the means of production, consumption rates of raw materials, fuels, electric power and materials for production and maintenance purposes and capital construction as well as the rates of utilization of machinery and equipment in various branches of the national economy are worked out.

The development of the national economy is closely connected with a wide introduction of scientific and technical achievements, improvement of production technology and the employment of new economical materials as well. Accordingly, the rates of consumption of raw and other materials, fuels and electric power as well as the rates of utilization of machinery and equipment should be progressive and technically grounded. In determining the above rates one should take into account the plans of introducing new machinery, most economical designs and projects; these rates are established to specific consumption of material resources and

/ rates of

rates of utilization of machinery and equipment actually achieved at advanced enterprises.

The formulation of rates and utilization rates is carried out directly at enterprises and in design organizations according to components items obtained, the required technical and economic grounds provided. The rate of consumption does not include materials consumed in adjustment, testing, running-in, instrumentation, packing and production waste, as well as losses in transportation and storage.

On the basis of individual rates of consumption the Economic Councils, Union Republics, State Committees of the branches of industry formulate aggregate rates used to estimate perspective requirements of the national economy in various materials. When passing over from individual rates of consumption of material resources to concrete kinds of products by their assortment to average aggregate consumption rates per item of the given product, the structure of the manufacture of the product by its assortment is established (for example, excavators by the capacity of bucket, automobiles by the carrying capacity, tractors by horse power, railroad cars by their design, etc.). In accordance with the specified individual consumption rates and the structure of the products manufactured, by their assortment, the average aggregate rate of consumption of material resources for the production of corresponding kinds of products is determined.

Similarly, by distributing the volume of construction and installation work among corresponding manufactures within every industry and making use of individual rates of material consumption, the average rates of material consumption in capital construction are determined.

Most precisely the requirements in material resources for capital construction are determined with the help of project documentation on the basis of the physical volume of the work. This is the way to determine the requirements in materials for every individual construction site. The same method is used when formulating current plans of the material and technical supply in territorial-construction departments. In order to determine the requirements of construction in material resources for the whole of the national economy and for union republics the method of estimating

/ the requirements

the requirements in materials per 1 million roubles worth of construction and installation work is made use of. The material requirements of capital construction are established on the basis of individual material consumption rates (of metals, prefabricated reinforced concrete assemblies, cement, etc.) per 1 million roubles worth of construction and installation work for individual manufactures.

The average material consumption rates per 1 million roubles worth of construction and installation work in various industries are determined in conformity with the planned distribution of the volume of construction and installation work in various manufactures within every industry and according to consumption rates, adopted within branches of industry. On the basis of average material consumption rates in different industries and the distribution of the volume of construction and installation work among them the average material consumption rate per 1 million roubles worth of construction and installation work for the whole of the national economy is determined.

The material requirements of the collective farms construction is determined on the basis of the planned structure of the distribution of construction and installation work at the expense of the indivisible funds of collective farms and long-term state credits (in volumes agreed upon), and corresponding individual consumption rates of material resources in agricultural construction. When calculating the material resources requirements of the collective farms construction one should consider the feasibility of using local building materials.

The rates of consumption of the objects of labour and utilization of labour tools reflect various processes taking place in the development of technology and improvement of the organization and production techniques. These rates may be looked upon as the primary element of the national economy structure. Directly dependent on them are alteration, improvement, resuscitation and continuous formulation of new interbranch and intra-branch proportions in the development of the socialist economy. The establishment of the above rates is a concluding stage of planning the introduction of scientific and technological achievements into the national economy. These rates reflect the technical progress in the national economy

/and represent

and represent a kind of bond between technology and economics. They link the planning of the technological progress and that of the development of all branches of the national economy. By these rates, which represent a measure of social required material expenditure, the material balances are linked organically with the planning of the prime costs of industrial products, the material expenditures for the production of which constitute a prevailing share in the total expenditures of social labour.

The technical and economic foundation of the rates of utilization of the means of production under rapid technical progress conditions is of vital importance for a further raising of the scientific standard of planning and ensurance of accuracy in the formulation of material balances.

MANPOWER BALANCE IN THE USSR *

Manpower balance does not only serve for the planning of manpower resources of society. It reflects the real correlation in the allocation of the labour resources of the country. The development of balance method in planning labour resources is closely linked with the practical demands of society. Therefore we think it worth while showing the progress of this method in connection with solving some concrete tasks facing our society in the distribution and utilization of manpower resources.

The major purposes of the balance method of planning manpower in the Soviet Union were: (1) to supply manpower for the developing national economy; (2) to ensure the employment of the population. On different stages of the development of the Soviet society either of these purposes came in the foreground but both of them were always considered in inseparable connection. At present these aims remain very important as there are conditions of the developing technical revolution which embrace not only the spheres of material production but also the spheres of public services and management. What path has the Soviet Union travelled to solve these tasks and what were the methods of their solution?

The growth of employment and methods of elimination of unemployment in the USSR

In the first years of the Soviet power, life put forward the problem of ensuring employment, i.e. providing able-bodied population with work. In pre-revolutionary Russia 75 per cent of the population engaged in the national economy were known to work in agriculture. The number of unemployed was large. In rural areas unemployment existed in the form of concealed agrarian-overpopulation: a considerable part of peasantry owned very little land cattle and was therefore engaged in agriculture only part of the year. At the same time in the agriculture was engaged a great many of land workers. Even in 1928 after the reconstruction of the national economy ravaged by World War I and by the Civil War, at the very outset of the large-scale industrialization of our country with the overall population of 150 mln people, workers and employees numbered only 10.8 mln of which 3.8 mln only were engaged in industry and a little over 700 thousand in construction. The number of workers engaged in agriculture was approximately

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* By M.Y. Sonin

/5 times

5 times more than of non-agricultural workers. The number of registered unemployed in town varied from 1.3 mln to 1.6 mln people.

The Soviet Union started industrialization without any support from abroad and lacking in capital and technical equipment. On the other hand the country had large reserves of manpower. In the first years of the industrialization new enterprises equipped with modern technical means had to be built using a great amount of manual labour. In such branches as timber, mining industry, and manufacturing of building materials the rapid growth of production was mainly at the expense of the wide use of manual labour. Almost all materials handling and other auxiliary operations were performed manually. All that required millions of new workers to be engaged in industry, civil construction, in transport and other branches.

The construction of technically well equipped enterprises allowed our country to raise the labour productivity and on that basis to get steadily increasing accumulation, which were used for further expansion of production, resulting in greater engagement of the population.

In the light of the aforesaid we would like to lay particular emphasis on some methods of direct increasing the employment of the population which were used in our country during first five-year plans and which can be widely applied by developing countries. Very interesting in this connection is the reclamation of fertile lands by people construction method. Building-up irrigation systems by this method does not require great expenditures but can ensure employment of wide masses of workers (as manual labour dominates in construction). The reclamation of new lands provides further expansion of agricultural production and building some enterprises for processing of agricultural products for export while the accumulation obtained could be used for the industrialization of the country.

In the first years of industrialization Soviet power tackled not only the problems of the employment of the population and of the elimination of unemployment but also the problems of training skilled personnel for the national economy.

The problem of unemployment was successfully solved as a result of industrialization and putting into operation a large number of new enterprises.

/The proportion

The proportion of workers and employees in the state sector of the national economy was rapidly growing. In the period from 1928 till 1932 the number of workers and employees doubled and reached 22.6 mln people.1/

The complete liquidation of unemployment by 1931 made it possible to radically reorganize labour exchanges. New institutions were established on their basis performing the functions of engaging labour forces into the national economy as well as its redistribution among industrial branches and different regions. Mass collectivization in agriculture was of vast significance for the elimination of unemployment. Small individual farms were united to large collective farms, new forms of agricultural production were managed and this enabled a rapid expansion of arable lands (which brought about considerable increase of employment); concealed over population in rural areas, one of the sources of unemployment in the town, was done away with.

In the following years of the pre-war period and especially in the post-war period the character of employment of the population in the USSR gradually underwent considerable changes. Because of introducing new technology into the national economy a still greater part of production increase was received as a result of growing labour productivity and not at the expense of the increase of the number of the employed.

According to the Central Statistical Agency of the USSR 51 per cent of the total increase of industrial output was obtained as a result of growing labour productivity during the first five year plan, 79 per cent during the second five year plan, 69 per cent during war years and the fourth five-year plan, 68 per cent during the fifth five-year plan, 66 per cent in the period of 1959-1962.

Due to the increase of labour productivity in industry, in construction and in transport the present stage of our economic development is characterized by a less speedy growth of the number of workers and employees.

The annual rate of rise in the number of workers and employees decreased from 9.2 per cent in 1928-1940 to 5.0 per cent in 1952-62. In industry respectively from 9.3 to 4.6 per cent.

The main origin of growth of the number of workers and employees lies in the natural increase of the able-bodies population. However, the natural increase, which in the long run effects also the natural increase of manpower resources, i.e. growth in the number of the population

1/ Statistical report "The National Economy in 1962", p.452.

/of working

of working age does not as a rule exceed 2 per cent annually while, even in the post-war period, the growth in the number of workers and employees was not lower than 5 per cent. Consequently both in the pre-war and post-war periods the rate and absolute increase in the number of workers and employees considerably surpassed the natural increase of labour resources. The growth in the number of workers and employees which exceeded the growth of manpower resources would be impossible without redistribution manpower resources (1) between the state and co-operative sectors (collective farms) and (2) between the sphere of social labour (all workers and employees, collective farmers and other persons directly engaged in social labour) and the sphere of personal labour (people engaged in domestic and individual household.[1/]

In both cases redistribution allows to increase the number of workers and employees, but in the first case it is done at the expense of reducing employment in collective farms, i.e., inside the sphere of social labour while in the second case at the expense of reducing employment in domestic and individual subsidiary household which guarantees the general rise of employment in the sphere of social labour at the expense of the sphere of personal labour.

Let us consider, for instance, the question of utilization of manpower from domestic household. Such redistribution raises social labour

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1/ Domestic household includes home-services: bringing-up children cooking, washing, making and mending clothes for the family, etc.

Although part of the work in domestic household is spent to make production in material from this production does not receive value expression and is not included into gross social product. A considerable part of labour in domestic household does not create production at all but has the form of services.

Personal subsidiary holding is the collective farmers',workers' or employees' household on small land plots. This personal holding is worked with small agricultural implements, and serves to satisfy the additional needs which is in individual property needs of families in agricultural products.

The main source of the income of the above mentioned group of the population is their work at state enterprises or in collective farms.

According to the 1959 State Census 9.865.000 people or 4.7 per cent of the whole population were engaged in individual subsidiary agricultural household.

12.860.000 people of able-bodies ages population,i.e. 61 per cent of the total population were engaged in domestic household. (Source: results of All-Union Population Census of 1959 pp. 96-99).

/domestic household.

productivity, for labour productivity in domestic holding is much lower than in social holding. This fact is very substantial for raising the share of women in production, for they are still mainly occupied with domestic household. The practice in the Soviet Union refutes the concept that with increasing income of the head of the family the role of the woman in social production is reduced as the woman is claimed to prefer housekeeping. The participation of Soviet women in social production is mainly stipulated by the fact that the level of payment of woman's labour in the USSR does not differ from that of man's labour. The most important factor determining increase in number of women workers, women employees, women collective farmers is the extension of public forms of meeting the daily needs of the family. In this connection a ramified network of children's instructions, schools, with extended school hours, boarding-schools canteens, cafés, home-kitchens and service establishments is rapidly developing in the Soviet Union.

In our country woman labour resources serve as one of the main sources of supplying with manpower the speedily developing industry and other branches of the national economy. The proportion of women in the increase of the number of workers and employees was gradually rising. Thus at the outset of industrialization, between 1929 and 1933, the total rise of manpower in industry was secured to 45 per cent through employment of women, and between 1940 and 1950 this was almost 64 per cent.

However, in planning policies to draw women power resources into the sphere of social production, it is necessary to take into account the two opposite trends which influence the field of utilising woman labour. The first trend, predominant in its impact, consists in facilitating labour conditions due to technical progress which extends the sphere of applying women's labour. This factor plays a decisive role in the dynamics of employment of women in social production. Thus, the proportion of women in the number of people engaged mostly in physical labour rose from 45% in 1939 to 46% in 1959, whereas in mental labour - from 33 to 54 per cent respectively.

/The other

The other trend consists of purposeful policies undertaken by the Soviet State to release women from a number of branches and occupations, with hard and harmful conditions (mining industry, many occupations in metallurgical, metal-working and chemical industry, in autotransport, etc.).

In view of the mentioned trend the problems of the utilization of women labour in the USSR were always regarded as having major state significance when working out plans of national allocation and utilization of manpower resources, especially for those areas where the utilization of woman and man labour is effected by certain irregularities due to the national peculiarities or to not sufficiently all-round development of the national economy.

Planning of Employment of Manpower and of its Rational Allocation in Branches and Areas. Specific and Territorial Balances of Manpower Resources.

The problem of the rational distribution and utilization of labour resources in the USSR is being solved in close link with the more general problems of economic development. Therefore current economic plans, and particularly long-term plans, take into account the available manpower resources and estimate the possible increase of labour resources; on the other hand they evaluate the demand for labour in the developing national economy. 1/ For that purpose major attention is given to maintaining proper ratio between growth of manpower and expansion of sphere of labour application, which guarantees the full employment and a rational utilization of labour.

The major aspect in planning the employment of manpower resources is the estimation of the rational allocation of labour resources in various branches of national economy and in economic areas, i.e. planning the structure of manpower employment.

1/ Labour resources embrace the population of working age (men from 16 to 60 and women from 16 to 55, excluding disabled).

Besides, people of older age and teenagers are included in labour resources (in report balance), provided they work in the national economy. The number of these people in plan balances (long-term) is evaluated with consideration of the existing trends to growth or reduction of employment of the groups mentioned, as well as the tasks facing our society.

/The experience

The experience in planning of manpower resources allows us to distinguish the following principal proportions in the distribution of labour resources: (1) among production and non-production spheres (2) among industrial branches of the national economy and agriculture, (3) among the sphere of social and personal labour (work in domestic and individual subsidiary household).

The main trends in distribution and redistribution of labour resources in the USSR are the following:

1. The increased proportion of people engaged in non-production sphere, i.e. in the sector of public services (trade, health service, education, etc.). This trend is originated by increasing labour productivity in the spheres of material production and bringing the latter up to the level high enough to meet the basic requirements of the population in material benefits. While in the years from 1928 till 1962 the total number of workers and employees in the national economy increased by 6.3 times, the number of workers of education increased by 7.6 times, of medical service by 3.6 times, of science and science services, by 27 times.

2. An increased proportion of workers engaged in industrial branches of the national economy (industry, construction, transport) in the total number of people engaged in material production. This increase is a result of the corresponding reduction of the proportion of agricultural workers. In the years between 1928 and 1962, the number of workers in industry increased by 6.4 times, in construction, by 7.1 times, in transport, by 5.3 times. Simultaneously the employment of manpower in agriculture has a tendency to relative and absolute reduction.

3. In agriculture there is taking place the process of increasing employment in public holding (social sphere) and a corresponding absolute fall of employment in individual subsidiary household.

The final goal of working out an national economy plan for manpower is "to strike a balance", to achieve concordance between the increase of manpower resources and the development of the sphere of applying labour force bearing in mind the most economically profitable distribution of manpower among various branches and spheres of the national economy. To

/achieve the

achieve the mentioned proportionality the planning institutions are elaborating various balances of manpower resources in which all labour resources are distinguished by their origin and all requirements for manpower are broken down into the spheres of application.

Reporting balances and plan balances of manpower resources reflect all the trends mentioned above. Below is presented a scheme of a plan balance of manpower resources for the national economy as a whole.

	Reporting period			Plan period		
		including			including	
	total	town	country side	total	town	country side
1	2	3	4	5	6	7
I. Manpower resource - total						
including:						
able-bodied population						
Working old men and teenagers						
II. Allocation of manpower resources according to the sphere of employment						
Engaged in public holding - total						
Pupils, (16 years and older) and students (quitting the main work)						
Engaged in domestic and individual subsidiary agricultural household-total						
III. Distribution of the engaged in the national economy						
total engaged ...						
including:						
In the sphere of material production						
including:						
in industry						
in freight transport						
in construction						
in agriculture and forestry out of which:						
in state undertakings						

/(State farms)

1	2	3	4	5	6	7
(State farms)						
in collective farms						
in individual subsidiary agricultural holding						
in trade						
Engaged in non-production branches (services)						
including:						
in education and art						
in science						
in housing and communal services						
in health service and social care						
in passenger transport and in communication services						
in state and public administration and in financial offices						

The manpower balance is not a fixed-address directive or a plan target, and it serves only as the base of the plan. A summary manpower balance together with a set of sub - balances serve as a basis for designing various plans for training and distribution of personnel.

Manpower balance must be flexible. It can be altered in conformity with the needs of material production. By means of rising labour productivity, redistribution of manpower and other measures our society and the Soviet state representing its interests can substantially expand within a certain period of time, the limits of labour force reproduction.

A proper application of the balance method as the key method for planning the national economy presupposes that manpower balances will be worked out on the initial and final stages of designing a plan for the development of national economy.

The manpower balance is inseparably linked with many divisions of the state plan for the development of the national economy. The following

/plan targets

plan targets and policies are worked out and formulated directly on the basis of the balance of manpower resources: Reallocation of manpower resources among various spheres and branches of national economy as well as among geographical areas of the country by the system of organized employment of workers:

Planned migration of the population;

Training of the young people graduating from professional technical schools and secondary specialized schools and assigning them to work.

Directing youth to production at public calls.

Manpower balance is also closely linked with plans for utilization of labour power, though the problems of the utilization of labour are not included directly into the contents of the balance (the basic figures, characterizing the utilization of working time and the labour-productivity are not included in the balance). When making the balance of labour resources it is necessary to proceed from the maximum economy of labour and from ensuring the rational utilization of manpower resources in all branches of the national economy. It is presumed by the fact that the higher labour productivity the less manpower is required (other conditions being equal) for the performing of the same volume of production, and vice versa. Consequently the growth of labour productivity relatively reduces the need in labour power. On the other hand balance calculations allow us to reveal the reserves for further raising of labour productivity. Thus manpower balance is connected through labour productivity with the balance of production.

The calculations of manpower balance of collective farms for 1959-1965 may serve as an illustration of such connection. In the first variant the calculations showed that with the projected at that time rates of raising labour productivity in agriculture, the collective farms could not release an amount of labour power required by industry. However, the further revision of the projections for raising labour productivity in agriculture substantially altered the long-term manpower balance in collective farms. It turned out that on the basis of mechanization in agriculture collective farms were able to release several million people for non-agricultural branches in 1959-1965.

/Manpower balance

Manpower balance is the main means for planning of proportions in the allocation of labour resources. It allows to avoid "bottlenecks" and unbalances in distributing manpower resources and in supplying the national economy with labour power.

The major principle of making manpower balance is separating key links. As is known the drafting of the national economic plans begins with defining its main indices.

Mostly they are indicative for development of the key branches and in some cases for more important regions of the country. Hence, the drafting of manpower balances must also start with isolating the main links. It is due to this fact that while working on the labour balances the prime importance must be given to calculations providing manpower to the key branches of material production: industry, construction, transport and in case of regional balances , to the manpower balance of Siberia and other eastern regions of the USSR.

In the system of interrelated balances reflecting in their combination the total process of reproduction of manpower the central place is occupied by the summary balance of the manpower resources of the country as a whole and summary balances of areas, regions and republics.

The main task in working out the summary balance of labour resources for the country as a whole is estimating to what extent the projected development of the national economy and of social and cultural construction can guarantee the use of manpower resources and the extent to which the available manpower resources can provide the projected volume of production. In the same line manpower balance is linked with material and financial balances. The principal practical task which dominates the whole drafting of summary plan balance of labour resources is providing the national economy with labour power according to the targets set by the state plan, in the sphere of developing production and cultural construction.

Therefore the prime purpose of the country's plan balance of power is to specify sources and forms of supply of labour power to the key branches of the national economy.

/Let us

Let us consider the question of rational distributing labour resources and redistributing manpower among the economic regions of a republic and of the contry as a whole, which is the most important aspect of balance planning of the structure of manpower employment. For this purpose current and long-term regional balances of labour resources are worked out in which the available manpower resources and their utilization are estimated separately for town and country-side. In many cases these balances reveal a necessity for the territorial redistribution of manpower resources. The scheme of summary territorial balances of manpower resources for an individual economic region differs very little from the earlier given scheme of balance for the national economy as a whole. In addition to summary territorial balances for individual economic regions specific balance calculations are also performed for instance to estimate the additional requirements for workers and employees, etc. The main difference is that whereas the reserves of manpower resources in the contry as a whole and their allocation are completely balanced, there will be in general no such agreement in the manpower balance for individual territories. Here the balance will reveal either the shortage or the surplus of manpower resources which is to be eliminated by suitable measures, in particular by the territorial redistribution of labour resources envisaged in its concrete manifestation in the balance calculation of the supply of additional requirements for workers and employees.

The balance calculation to meet additional requirements for workers and employees in a republic, an economic region, a state committee and a ministry is made in the following manner (in thousands of people)

1	Annual report 2	Annual plan. 3	Project of the plan (separately for years) 4
I Additional requirements for workers and employees - total			
including:			
for increase in the substitution			
for men who quitted (for studies, to the Soviet Army, on the expiration of labour contract, on pension, etc.)			

/II. Resources

1	2	3	4
II. Resources for meeting additional requirements for workers and employees - total			
including:			
graduates of professional-technical schools			
employing graduates of general secondary school (complete and non-complete)			
graduates of higher and highly specialized colleges			
eventual employment			
in social production of persons, who are engaged in domestic and individual subsidary household, as well as demobilised from the Soviet Army Engagement of collective farmers at state enterprise, in offices and organizations			
III. Balance (shortage or surplus of local manpower resources)			
Suggestions on reallocation of manpower resources among economic regions			
a) through the system of organized employment of workers and employees			
b) through a transfer of skilled workers etc.			
c) a result of families migration			

These are the main forms of the reallocation of manpower among economic regions: planned assignment to work of specialists and skilled workers, that graduate corresponding educational establishments, assignment to work of young workers at public calls; the system of the organised employment of manpower; migration. The supply of manpower of developing areas is strictly voluntary and performed on the principles of material incentives, of public recognition and encouragement.

/The experience

The experience shows that with other equal conditions it is economically profitable that the structure of industrial and agricultural production in this or that region should correspond in their labour consumption character to the available labour resources. At present, when industrial development in various regions has been practically evened out, the principle of allocating the labour-consuming branches of production in the regions with the big increase of labour resources is being widely applied.

It is characteristic for the USSR that in most of the national republics of the Soviet Union, in particular in Middle-Asian Socialist Republics (Uzbek, Tadjik, Turnkmenian, Kirghiz Republics) and Trans-Caucassian (Armenian and Azerbaijan Republics) it has been observed the greatest natural increase of labour resources. The high education level of the population, great number of specialists and skilled workers and practically unlimited possibilities for professional training of personnel, guarantee all the prerequisite conditions for the development of labour-consuming branches of industry with the wide application of skilled labour in these areas with the high density of the population.

Another important factor of the rational distribution of labour power among regions is the raising technical level of production in the regions of the shortage of labour resources for instance, in Siberia and in the Far East. In such regions automized and extensively mechanized production ensuring the highest labour productivity should be organized in the first turn, which results in reducing the requirement for labour power and substantially facilitates the solution of the problem of increasing industrial and agricultural production.

Planning of Training and the Balance of Skilled Labour Power

The growth and utilization of labour resources can manifest itself in two forms - extensive, i.e., with the increase of manpower in quantity, and intensive, i.e. by means of raising the quality of manpower. In fact both of these forms exist in close interaction. However the role of each of them in economic development is not equal. The increase of manpower in the number is limited by the natural increase of the population and of labour resources. The possibilities for the qualitative improvement of manpower are boundless.

/In the

In the years of the reconstruction of the national economy when the USRR did not have the sufficient number of qualified personnel of workers and specialists economic expansion to a great degree took place at the expense of increase in the number of workers. However industrialization and the technical reconstruction of the national economy put forward problems of training qualified personnel as the leading link in economic development.

Training skilled labour power and the cadres of specialists was brought about by systematic raising of general education level of the population by means of extensive professional training and by means of training in higher and high technical schools specialists with a higher and secondary special education.

On the first stage of industrialization the mass training of personnel was performed directly at factories and plants. A great number of plants, factories, electric stations and other enterprises were under construction. And every construction site, every new enterprise to be put into operation became in its way a forge of personnel. The workers mastered new professions and obtained new skills in course of labouring without quitting their jobs.

A broad network of special courses were set up at enterprises for schooling personnel, but the main form of education was individual training of newcomers by skilled workers. The working class brought up talented worker -specialists who, although without special education, successfully carried out the set tasks compensating the shortage of personnel possessing middle and higher qualifications.

In the time characterized by high rates of industrialization training directly at factories and plants turned out the most effective and rapid method of providing qualified personnel on a mass scale.

Disinterested help of more advanced republics of our country to less advanced was an important factor on the way of supplying the national economy with the skilled personnel of workers and specialists. For instance, a considerable number of skilled workers and of specialists of higher and middle qualifications were sent to Uzbekistan from the Ukraine and from the RSFSR who combined their work at enterprises with the training of local personnel. At the same time professional training of workers from Uzbekistan at enterprises of the central regions of the country was a wide practice at that time.

/Professional-technical

Professional-technical training played a leading role in training skilled personnel amongst the youth. In 1940 a centralised management of the system of professional-technical training of skilled workers was set up in 1940; simultaneously the system of State labour reserves was established in the form of the extended network of factory schools, and vocational schools are being replaced by special schools of professional-technical education with a more prolonged term of training. They are under the control of the corresponding boards of the Republican Councils of Ministers. The methodical management of the whole system of professional-technical education of the young people is exercised by the Committee on professional-technical education under the State Planning Committee (the Gosplan) of the USSR.

One of the major tasks of planning institutions and of the organization of training skilled personnel is to correctly estimate the factors influencing the alterations in the complexity of labour specialisation, to foresee the long-term changes in the professional structure of the employed labour power and on this basis to plan and perform the development of the most effective forms of training personnel in required proportions.

To achieve an agreement between the needs of the national economy in skilled personnel and the courses of meeting these needs, scientifically grounded balances of skilled personnel are worked out.

Below is given the approximate scheme of the balance of skilled personnel.

Additional requirements						Forms of meeting the requirements			
1	2	3	4	5	6	7	8	9	10
Profession	Real number of skilled workers by the beginning of the planned period	Planned number of skilled workers by the end of the planned period	For increase in the number	For the compensation of losses	Total	Graduation from secondary schools with vocational training	Graduation from professional technical schools	Training directly at enterprises and on the construction sites	Other forms of meeting the demand (to be listed)

/This scheme

This scheme of the balance of skilled personnel is usually made concrete by means of drawing-up individual balances for the personnel of higher and middle qualification (the balance of the personnel of specialists) and for the personnel of workers (balance of skilled workers). Further concretization of balance is performed in the line of working out the balance of personnel by individual professions, for individual branches, economics and regions.

The system of training skilled workers is continuously improving. Planning of the training and distribution of specialists consists ultimately in meeting the requirements of national economy and culture for specialists with higher and secondary special education. On the basis of the balance of the personnel of specialists and of skilled workers plans for the training of both are drawn up for individual professions. In elaborating these plans great importance is attached to supplying with specialists and skilled workers of leading branches.

DEMOGRAPHIC FACTORS AND PLANNING OF ECONOMIC DEVELOPMENT *

The main productive force of the society is a human being; in fact the labor resources are being recovered through population. At the same time the population takes a form of the consumer of the products produced. Therefore all economic development plans of the country as well as the plans of production, consumption and distribution should be closely connected with the data about population. However, in order to have the data about population to be reflected in the planned calculation proper statistic figures should be available. It is quite necessary to know the population for the beginning and for the middle of each year, composition of the population according to the sex and age, its educational level etc. All these data are obtained as a result of censuses which are carried out in every country. Such censuses are to be carried out regularly at least not less than once in 10 years.

Besides the information about the number and composition of the population a detailed data about birth and death rate should be also available.

It is clear enough, that the lack of this information, or when it is incomplete, still worse if the population data are not correct, it is difficult to provide for their use in planned calculation.

Therefore one of the most important tasks of the liberated countries and all developing countries as well should be the establishment of accurate and reliable population statistics.

The census data from one hand and data of the current population statistics from the other, create the possibility of determining the size and the composition of the population for all years between censuses. By adding to the initial population data the number of born and substracting the number of dead it is easy to get the size of the population in each given moment, since the balance of external migration (that is the difference between the number of immigrants and emigrant) in the most developing countries is close to zero.

Comparison of two time adjacent censuses of the population permit us to reveal underestimations in the current statistics, and to introduce respective correction factors based on it. But sometimes, on the contrary,

/the data

* By B.C. Urlanis

the data of current statistics helps us to disclose that the performed census did not cover the whole population.

It is not an easy task to establish accurate population statistics. In conditions of low population density and absence of the adequate experience it is difficult to get such a population statistics which in its accuracy, coverage and reliability would be up to the standard of the population statistics of those countries where it exists from 100 to 150 years. Therefore it is necessary to widely practice the selective surveys which would give valuable data on factual birth rate, age coefficient of fertility, actual death rate, average living span, educational level of the population and many other. In the Soviet Union such selective surveys have already been practised during the first post-Revolution years. For example, in the Soviet Union in 1920, when the necessity had arised to get information about the crop acreage, total amount of harvest number of cattle in 25 million farms it had been decided to limit survey by 1/20 of all farms and then supply the results to the whole number of farms. The annual general survey of all farms would have required an extremely great spending of money, labour and time.

The similar selective surveys could also be carried out for studying the birth rate, death rate, migration, etc. In particular, this method is widely used in India, where it helps to obtain the data about those processes, which remain completely hidden during the total survey. Besides, in some cases it is not advisable to study and check all the initial forms collected during the total census, but only the small part, that is once again to use the method of selective surveying.

In planned calculation, coefficients and indices, can be used, obtained on the basis of selective surveys. Here, however, one should remember, that the selective method can give a reliable information only when it has a mass character and covers at least ten thousands of surveys. In order to check the accuracy of the selective survey data, the theory of statistics operates with certain equations. With this help we would determine the range of possible deviation of the selective survey results from reality, i.e. from the results of the total survey, if any.

/Therefore, in

Therefore, in order to account for demographic factors in planning calculation, it is necessary to have beforehand the reliable statistical data even collected by the selective method.

Economic development plans should be based on the necessity to provide not only the production growth in general but also the increase of production per capita. This means that the production growth should always go ahead of the population growth. But not in all cases, however, this task can be easily solved. At the same time, it is known that the population growth in the developing countries is rather big as the following table shows:

Average annual rate of population growth in last five-years, per cent	Number of countries of Asia, Africa and Latin America which have the rate of the population growth
0.0 - 0.4	0
0.5 - 0.9	1
1.0 - 1.4	2
1.5 - 1.9	8
2.0 - 2.4	23
2.5 - 2.9	14
3.0 - 3.4	16
3.5 - 3.9	6
4.0 - 4.4	1
Total	71

From the table it may be seen that in most countries the rate of the population growth is 2%, but at the same time there is a great number of countries where it reaches three and more per cent per year (there are 23 countries i.e. 1/3 of all considered countries). (The Central American countries have especially high rates of the population growth). For example, the annual population increase is: Dominican Republic 3.4%, El Salvador 3.6%, Honduras 3%, Nicaragua 3.5%, Costa Rica 4%. But if we take into account the continuing decrease of the death rate, then it may be supposed

/that almost

that almost in half of all developing countries the annual population growth in the nearest future would possibly be 3 and more per cent.

Such rapid population growth 3 or 4 times exceeding that of the West European countries, put several very important economic problems before the developing countries. Among them, the necessity to coordinate the accumulation rate with the rate of population growth should be mentioned first.

It is of common knowledge that the increase of the population requires considerable capital investment, even in order to support the existing standard of living of the population. Funds spent for the building of the schools, hospitals, land reclamation, expansion of production capacity of the plants, as they are spent due to the population growth are called demographic investments. The higher is the rate of the population growth, the more is the share of the demographic investments.

The approximate calculations show that the growth of population by 1 per cent requires 4 per cent of the national income to be allocated for demographic investments, and the growth of the population by 2 per cent requires respectively 8 per cent of the national income, etc.

Thus in the most developing countries growing population requires the annual expenditure in the form of the demographic investments from 8 to 14 per cent of the national income. These investments can be allocated only at the expense of the accumulated part of the national income. Thus if accumulation in a country comprises 20 per cent of the national income the increase of the population by 3 per cent would require demographic investments comprising 12 per cent of the national income, i.e. more than a half of all the accumulations.

It is rather difficult to estimate precisely at present the specific share of the accumulation in national income of the developing countries. There are, however, sound reasons to believe that almost all the accumulation is spent to meet the demographic investments in those countries where the population growth is 3 per cent and more. As a result, the standard of living of the population remains practically without substantial changes, and scope of economic development is limited.

The way out of this situation lies in the field of growth of the labour productivity in national economy and especially in agriculture.

/However in

However, in the most developed countries, the standard of machinery application in agriculture is low and the rate of utilization of the labour resources is not sufficient. In number of Latin American countries and some other developing countries,,only agrarian reform could provide conditions for the raising of the crop yields, growth of the labour productivity and increase of the employment of agricultural population.

Together with these measures, the important role in the economic development of a country may belong to the proper demographic policy exerted, mainly in regard with birth control.

The rise of the cultural standard of the population, industrialization and urbanisation in the west-european countries had inevitably led to the drop of the birth rate. But it is rather doubtful, however, that in the African, Asian and Latin American countries the development would be similar. In any case, the experience of the passed years shows that in spite of the progress in the cultural development of the population and increase of the urban population, no drop of the birth rate in liberated countries is observed.

Almost in all countries, whose census figures for various periods of time could be compared, we may see the substantial population growth. 1/ At the same time we know that in these countries the population grows since death rate lowers and birth rate does not reduce.

In order to find out whether there is dependence between the proportion of the urban population and birth coeficient we would classify all developing countries according to the proportion of their urban population and estimate an average birth coefficient for each group.

Such data for 39 developing countries are presented in the following table: 2/

/Proportion of

1/ If not include two or three small Central American states.

2/ This table is based on the data published in "Demographic Yearbook", 1962. All the countries of Asia, Africa and Latin America included on which information abou proportion of urban population, as well as birth coefficient were available. Only 3 countries were omitted (Japan, Israel, Argentina).

Proportion of urban population (per cent)	Number of countries in given group	Average birth coefficient
0 - 9.9	7	47.2
10 - 19.9	5	38.2
20 - 29.9	5	41.9
30 - 39.9	12	42.2
40 - 49.9	5	39.1
50 and more	5	38.4
Total	39	41.6

These group averages witness almost complete lack of interdependence dence between the percentage of urban population and birth coefficient. Only the first group is somewhat exclusive by its high birth rate, and even this difference is mainly due to the influence of the Guinea and Togo data, which, by the way, could not be taken as fully trustworthy.

As a whole, we may see that the increase of the proportion of the urban population does not necessarily lead to the drop of the birth rate. If we take for example, such Latin American countries as Venezuela having the highest proportion of urban population, it will be noticed that it has a very high birth coefficient (44.4 percent in 1961). In Mexico more than half of the population lives in towns but birth coefficient also reaches a high rate (44.7% in 1962). In Brazil almost half of the population lives in towns, but the birth rate continues to remain on the high level.

Careful analysis of statistical data for developing countries gives the basis for a conclusion that the increase of the urban population by itself does not necessarily lead to the drop of the birth rate and does not diminish the general rate of the population growth. But the rate of population growth existing in the developing countries presently requires substantial demographic investments. Therefore the need to follow a certain demographic policy appears to be quite necessary. This policy should promote the limiting of the size of a family and thus would insure improvement in the bringing up of children and strengthen health of women.

/Of course

Of course, full success of such demographic policy can be achieved providing sharp rise in the cultural standard of the population and considerable improvement of its health and nursing servicing. It is also important to stress here that without progress of public education and health servicing and without increase of building of schools and hospitals no demographic policy would be good enough. Therefore rapid progress in education of national intelligence, as well as expansion of building programme of shools and hospitals is the task of primary importance for economic and cultural progress of developing countries. To solve this problem in a short time for those countries alone is very difficult. They need a serious help of the most economically developed countries.

The rise of the cultural level of the formerly backward and oppressed nations in certain social and political prerequisites, can become a reality, as the example of the Soviet Middle Asian Republics has proved. Thus, proportion of literates among population from 9 to 49 years old during the years 1926-1939 has been changed as follows, in per cent:

Republic	1926	1939
the Uzbek Soviet Socialist Republic	11.6	78.7
the Kazakh Soviet Socialist Republic	25.2	83.6
the Kirgiz Soviet Socialist Republic	16.5	79.8
the Tajik Soviet Socialist Republic	3.8	82.8
the Turkmen Soviet Socialist Republic	14.0	77.7

It follows that Soviet power has required only 12 years to eliminete illiteracy practically.

But this, however, was only the first step in raising the cultural standard of the people of the Middle Asian Republics. This was followed by a sharp increase in the education level of working people. Proportion of workers, government employees and peasants having high and secondary school (including 7 years of secondary school) education during the period 1939-1959 has been changed as follows (per cent):

Republic	1939	1959
The Uzbek Soviet Socialist Republic	6.1	44.7
the Kazakh Soviet Socialist Republic	9.9	44.7
the Kirgiz Soviet Socialist Republic	5.6	42.9
the Tajik Soviet Socialist Republic	4.5	40.7
the Turkmen Soviet Socialist Republic	7.8	49.7

/Thus in

Thus in spite of the war (1941-1945) the Middle Asian Republics during the last 20 years have great achievements in raising of the cultural level of their people. At present one half of all working people of these republics have either higher or secondary school education.

Emphasizing the expediency of the policy of population control in certain developing countries, it is necessary to draw the sharp demarcation line between the given policy and Malthus theories. Firstly, many althusians are professing misantropic theories expediency of wars, increasing of mortality and reduction of population. Secondly, malthusians deny the need of the agrarian reforms, they ignore the progress of science and technique, and try to frighten people with the danger of overpopulation. Thirdly, malthusian theories proceed from the concept that the population increase is the only reason of all the economic difficulties of the developing countries. In fact, the main difficulties are caused by the feudal and semifeudal exploitation of the working masses in agriculture and the low level of technical progress and lack of culture. The excessive growth of the population is not the reason for economic difficulties, but in certain countries it makes actually their economic progress somewhat complicated. By the way, when the problems of salt water distillation and artificial sprinkling in large scale will be solved, when science will solve the problem of albumen synthesis, then all the problems connected with the population growth will be considered already under completely different aspects.

While planning the economic development of the country, it is very important to have all the detailed information available about the composition of the population especially by age. The data about the population are the main source for the calculation of the numbers of the various contingents of the population: nursery, pre-school, school, draftee, pensionary and labour ages. For example, if in a country the introduction of obligatory primary school education is planned in five years, and children allowed to enter the school at 8 years of age; then knowing the numbers of the children of 3 years old at present and making certain correction for children mortality for the ages from 3 to 8 years old, the number of 8-year children

/in five

in five years can be easily determined. Further, after setting the number of school children per class, it is easy to calculate the number of the first classes and consequently the numbers of the teachers required. Thus, during the census carried out in Ghana in 1960, children 3 years old numbered 289 thousands. Proceeding from the rate of mortality of the Negro population in other African countries (for example Guinea 1.3 per cent at the age of 5-9 years old, and 5.2 per cent at the age of 1-4 years old), it is possible to presume that during the five years approximately,7 per cent of children will die. Thus, the number of children who reach 8 years of age will number 270 thousand. Taking 20 children in one class, we shall get the number of teachers required for the first classes equal to 13.5 thousand.

Age structure of the population make it possible to determine the future population of the country and the future labour resourses. This is usually achieved with the help of the method of the age shifting. But in order to determine the future population the age coefficients of mortality and age coefficients of fertility should be known.

Age coefficients of mortality are estimated as the ratio of the number of dead at this age during a year to the average number of living persons of the same age. As a rule, these age coefficients of mortality are estimated on the five-year age groups. For example, in the United Arab Republic n September 1960 there were 320 thousand men at the age of 55 to 59 years. At the same year at this age, 5 4 thousand men died. Thus the age coefficient of mortality equals 5 4 : 320 = 0.017, i.e. 17 men per 1000 inhabitants.

The age coefficients of fertility are estimated similarly. They represent the ratio of births of mothers of definite age to the total annual average of women of a given age. Thus, in Mexico, 461 thousand children were born in 1960 of mothers of 20 to 24 years old, but the total number of the women of that age in the middle of the year 1960 numbered 1542 thousand.From here on the age coefficient of fertility will be equal to 461:1542 = 0.299, i.e. out of every 1000 women of given age, 299 women give birth during the year.

/The age

The age coefficients of mortality and fertility are taken as a basis for the estimation of the future population. Knowing the distribution of women by main five-year groups from 15 up to 49 years and applying to the found coefficients, it is easy to get the birth data for the next year. Similarly having information about the distribution of population by age groups and applying mortality coefficients, it is possible to determine how many people in these age groups will live in the next year.

More accurately all these calculations could be done on the basis of so called mortality tables, which present the sealing of the sequence of the mortality of population. Unfortunately such tables are plotted only in the limited number of the developing countries, and even these are quite irregular. They are available in several Central American countries (Costa-Rica, Guatemala, Mexico), South America (Argentina, Bolivia, Chile) and also in certain Asian countries (Ceylon, Malaya, India, the Philippines, Thailand). However, the mortality tables in many of these countries had been plotted long ago and at present they become old. In Corea the mortality table was plotted for 1938, in Mexico for 1940, etc. Meanwhile there is a need to make such mortality tables regularly, and at least once in 5 to 10 years. On the basis of those tables it is much easier and simpler to carry out the perspective calculation of population.

Using the age coefficients of mortality and fertility one should consider that their exterpolation for the future has no ground in sound cases. The age coefficients of mortality has gradually dropped in several countries during the last years. Therefore this trend should be taken into consideration in perspective estimates.

The question about the age coefficients of fertility is treated similarly. If they are subject to some kind of evolution in some countries, it should be accounted for estimation of the amount of the future births.

In certain cases in order to determine the perspective population one can proceed not from the passive arithmetical calculations made on the basis of the well established proportions, but from the principles of the active demography, i.e. such demographic policy, which exerts certain influence upon the demographic characteristic. In fact, this is the

/best way

best way to connect planning with demography. But, however, in order to make planning calculations we should have in our disposal the efficiency data for certain economic and social-hygienic actions. For example, spending money to control malaria disease, the planner should know the relation between spendings and the results received. In other words, he should know how would mortality caused by malaria drop for this scale of actions undertaken for its elimination. Such information can be used for the planning of the mortality lowering.

This method can also be applied to the birth rate. Here the principles of the active demography will consist in finding the relation between definite financial and legislative measures aimed at raising of the cultural standard and expansion of the medical and sanitary service of the people, from one side, and fertility level, from the other. Such data can be used for planning of the birth rate reduction.

Here, the following question may arise: by what means and how one would determine the relations which characterise the efficiency of the various measures exersised and the expenses involved? We may only say, that while determining the above relation, it is recommended to use the past experience for a given country and other countries as well, along with the results of the various kinds of local or selective surveys.

The subject of the calculation can be not only the general quantity of the population, but for example, the number of population in labour age. If we will try to set some boundaries for the beginning and the end of the labour activity, population could be classified into three different categories:

- Below the working age;
- In the working age;
- Above the working age;

/Excluding from

Excluding from the total working-age population, those who are ill, invalids, etc. we would receive the able-bodied group of the working-age population. However, not the whole of the working-age population is engaged in the national economy of the country. Some part of this population is engaged in the domestic economy and various educational institutions. By excluding these people, we will have the number of the labour force in the working age. Still some able-bodied young men are in the military service. Without this group we would have the number of civil labour force in the labour age. Further one should bear in mind that certain amount of the population still continue to work being beyond the labour age. They are teen-agers and elderly people. If we include them all in the ranks of civil labour forces of labour age, then we will get the whole group of economically active population.

Then one should not forget, that there is an unemployment in several countries. Among the unemployed there are those who had lost their job and who achieved labour age but never had a chance to get the job. By excluding unemployed from the economically active group we would receive the group of employed population. It is also important to point out, that the employment of the population sometimes takes different forms. One may be employed only part of the working day or part of the work. If we exclude those who are partly employed we shall get the number of fully employed.

Together with the above-mentioned groups, it is important to determine the total labour resources of the country. We may get it by summarizing the number of able-bodied population in working age with the number of the employed but being beyond the limits of working age.

All above mentioned population groups may be considered in three different aspects. First for a definite given moment of time (for the beginning of the year, quarter, etc.), second for some period of time. For example, we may define the total number of those who have worked ("who have been employed") during the year, even though for the certain period of activity. Here we have in mind the number of persons who have been working all the year round and a number of persons who for some reasons have been employed only part of the year.

/Third as

Third, as average for a certain period of time. For example, the annual average of persons of definite category.

Knowledge of the number of persons of all categories in various aspects makes it possible to have an idea about the structure of labour resources and to plot the system of indices on its basis, which give the exhaustive characteristic of the grade of productive utilization of the labour resources of the country.

For economics of the developing countries particular importance has the study of partial employment of population. Partial employment of the population may have different forms. Thus the partial employment of agricultural population is reflected in the considerable part of the year able-bodied population not utilized for the productive activity, since in several cases there are no possibilities available to apply their ability. Such a situation requires the conduction of special selective surveys which would make it possible to define the scope of partially employed population and regions of its maximum occur Planning of the labour resources should be carried in such a way as to bring to the minimum this forced partial employment, giving the able-bodied population respective objects for their productive labo

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While planning the economic development of a country, migration processes should be also taken into account. Here the external migration connected with crossing of the state boundaries which does not have such great importance, can be ignored presently. As regard to the internal migration, it has double form. This is either moving from one city or village to the other, or transition from the rural population category into the urban population.

The control of the internal migration processes involves many difficulties since it requires continuous observation of the physical movement of the population. In order to know the size of internal migration, regular registration of the people going to and coming out of a concrete place should be established. However it is not always possible to organize it, even in the countries with well established population statistics.

/And in

And in this respect, selective survey can evidently be of a great help because it can give an idea about the scale of migration as well as about its reasons, i.e. the motives that make the population to leave native places. Besides, selective surveys will help us to locate directions of migration flows.

All data about migration of the population should be widely used to plan the economic development of the separate regions of the country. But control of migration processes necessary for planning of economic development does not mean that only passive demography and demographic statistics which register the facts could be applied here. Distribution of the population over the country must be the subject of planning as well as distribution of the industry. With the help of the concrete price and wage policy it is possible to influence actively migration flows in desirable direction adapting them to the task of fulfilment national economy plans.

It follows from above that demigraphic factors are of a great importance for planning of the economic development. The sole purpose of the production actually is the human being and satisfaction of his demands. Solution of all economic problems serves ultimately to provide a better life for people. Therefore in planning of national economy of developing countries, appropriate attention must be given to demographic factors.

METHODS AND PRACTICE OF AGRICULTURAL PRODUCTION PLANNING IN USSR *

Agriculture is one of the most important branches of material production and therefore its development was stipulated by the national economic plans at all stages of socialist construction. However, forms and methods of planned influence upon this particular branch of economy have varied.

It is well known that after the victory of the Great October Socialist Revolution in our country, banks, railways, land and other paramount means of production were nationalized and became public property. Basing on these main economic leverages the Soviet State exerted planned influence on agricultural production development which had been scattered among 25 millions of small peasant farms.

The main trends and forms of systematic influence on agricultural production prior to its socialist reconstruction were as follows.

The plans of socialist industrial development stipulated the expansion of manufacturing of agricultural machines and implements, fertilizers and consumer goods that stimulated an increase in the agricultural product influx to cities and industrial centres of the country.

It was through its financial and credit systems that the State rendered assistance to the peasants in organizing credit companies, consumers and marketing cooperatives. Thus they were not only guarded against private dealers and creditor-usurers but also educated in the spirit of collectivitism.

It was since the first days of the existence of the Soviet State that state farms had been created, i.e. model state agricultural enterprises intended to supply peasants with high quality seeds, pedigree cattle and at the same time be a school for improving the method of agriculture.

Great help was rendered to poor peasants through small interest credit, organizing partnerships for collective tillage and machine-hire stations. New agricultural collective farms were given great privileges in getting credits and taxing.

* By M.L. Terentjev

/Paramount importance

Paramount importance was attached to executing the correct price policy in relation to industrial goods purchased by the peasants and agricultural production. The main objective of this policy consisted in creating stimulus for development of both industry and agriculture through the equivalence of goods exchanged between town and country. To this end, the State had systematically regulated prices, fixed their maximum limit for consumer goods and agricultural products purchased by the State and co-operative organizations.

In order to ensure guaranteed and advantageous marketing of agricultural products, wide use was made of a system of contract agreements which stipulated quantity, quality and cost of products, and measures for material stimulation in terms of providing the peasants with fertilizers, extending them advanced payments et al.

Thus, although prior to throughout collectivisation, the direct agricultural production planning was absent, its systematic regulation nevertheless was performed by means of economic influence through prices, taxes, land legislation, credits, planned procurement and contracting agricultural production, organization of the artificial insemination and machine-hired stations,provision with machines and implements, seed advances, uniting the peasants in consumers cooperative societies, marketing-supply and credit cooperatives.

Alongside with the above steps, it was during the first years of existence of the Soviet State that the elaboration of all-state plans exerting direct influence on agricultural production was introduced into practice. For example, in 1918 plans of agricultural machine building development were worked out and had been passed the law on the plan for building irrigation systems in Turkestan where irrigation is the cornerstone of agricultural development. The State Plan for Electrification of Russia (the Goelro Plan) approved in 1920 had determined prospects for intensified agricultural development. For the first time an effective plan for agricultural development was elaborated and approved in 1927. The plan indicators were transmitted to the regions, areas, republics and served as a guidance in the operative work of the ministries, departments and local authorities. Farms had not received the planned indicators.

/The First

The First Five Year Plan for the Development of National Economy of the USSR included a detailed plan for development and socialist reconstruction of agriculture. Apart from economic indicators, it stipulated consolidation of the socialist sector in the countryside by means of uniting the working peasantry into productive cooperatives (kolkhozs) and developing State farms.

On completion of smallholder collectivisation the directive State organs started fixing target figures for agricultural production, procurement crop acreage, livestock, yields of various crops, livestock productivity in breed and other economic indicators. During the first stage of the socialist agricultural reconstruction such a method of planning proved its value in view of the fact that the collective and state farms were lacking in qualified personnel. This method of planning, however, contradicted the principles of democratic centralism which is the basis of economic management in our country and, particularly, planning methodology.

It was V.I. Lenin, the founder of the Soviet State, who elaborated and formulated the main methodological principles of planning. He has emphasized the necessity of strict observance of the principle of democratic centralism in planning. V.I. Lenin has taught that the central authorities must give directions as regards the ways and trends of economical development on the basis of a single all-state plan for development of national economy, whereas the elaboration of specific plans of production must be effected directly at enterprises together with wide masses of the working people.

The past ten years have been marked by great measures taken by the Communist Party and the Government of the Soviet Union aimed at democratization of the public and political life in our country. This applied both to the economic management and, first of all, to the production planning. The Leninist principle of democratic centralism has been restored in production planning. Drastic changes have been introduced in the long established practice of production planning in the collective and state farms by the decision of the Central Committee of the CPSU and the Council of Ministers of the USSR dated March 9, 1955.

/We have

We have already pointed out that in our country from the first days of the socialist reconstruction up to 1955, such an order of agricultural planning existed when the state and collective farms received from the centre targets not only for delivery and sale of farm products to the state and even for each farm all main production indexes were fixed. Practice showed, however, that such order of planning tethers the creative initiative of the managers of collective and state farms, agricultural specialists and all farm workers.

Since 1955 in conformity with the said decision, the following indexes are stipulated in a state plan as regards agriculture for each Union Republic:

- the scope of purchases of main items of agricultural production and its delivery to the All-union fund;
- the scope of State capital investments for agricultural development;
- the delivery plan for machinery and other material and technical resources (tractors and other agricultural machinery, fuel, fertilizers, chemical herbicides and pesticides, hardwares . equipment, construction and other materials);
- the labour and wage fund limits, the targets for reducing net cost for state agricultural facilities;
- the purchase and also plan of pedigree cattle;
- the measures for agricultural science development and personnel training;
- the long-term plan of crediting collective farms.

The planned target for farm products purchases is set with due regard to the necessity of meeting demands of our country. At the same time, the target for the Republics, regions, production boards, collective and state farms is established in accordance with specialization, concentration and real production potentialities of the projected scope of appropriate items of goods. The plan for delivery of machinery and other material and technical facilities for agriculture is worked out on the bases of request-orders of collective and state farms, scientific and other institutions with due consideration for their planned volume of production by industry.

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In the general state plan only the plan for agricultural produce purchases is set for collective and state farms, whereas the state farms in addition to that have fixed labour and wage fund limits, as well as targets for reduction of production cost and capital investment volume.

Having the target for farm products sale to the State, the collective and state farms work out their own production plans, stipulating the crop acreages and yield livestock number and productivity; they also plan the necessary agrotechnical and zootechnical measures, as well as the most important financial and economic indexes of the farm activity.

While planning production, the collective and state farms must envisage the cultivation of such crops and raising of such kinds and breeds of livestock that ensure the biggest amount of farm production with the least expenditure under specific conditions of a given farm, as well as better labour remuneration and facilitate more effective utilization of achievements of science and advanced practice with intensification of production.

It should be noted that in separate areas of the country, the local agricultural and planning organs infringed the established order of production planning in collective and state farms. The decision by the Central Committee of the CPSU and the Council of Ministers of the USSR dated March 20, 1964, decidedly denounced such infringements and reaffirmed that the authorities set for agricultural enterprises only targets for farm produce purchases, whereas for state farms, in addition to that, labour and wage fund limits, targets for production cost reduction and capital investment volume, i.e. indicators stipulated in the general state plan.

An approximate scheme of elaboration and approval of agricultural development plans is as follows.

Proceeding from the necessity of meeting the demand of the country in foodstuffs and agricultural materials for industry, the Union Government approves plan for state purchases of farm and livestock products for the USSR as a whole and for each Union Republic.

The Councils of Ministers of the Union Republics, having regional division, transmit corresponding State plan targets for state purchases

/of farm

of farm products to the territories, regions, and Autonomous Republics.

The Councils of Ministers of the Union Republics without regional division, as well as the Councils of Ministers of the Autonomous Republics, Territory Executive Committees and Regional Executive Committee transmit the plan targets to production boards and the latter, in turn, allot them to each collective and state farm with due consideration for specialization and real potentialities of production of the appropriate quantity of certain items of products.

Having targets for production sale to the State, the collective and state farms specialists, state farm workers and collective farmers elaborate their own production plans with wide participation of collective farmers.

In collective farms such plans are considered and approved at a general meeting of collective farmers, and on State farms they are discussed at general meetings of workers and then approved by the farm director. Production plans for farm products elaborated by collective and state farms are presented to production boards of collective and state farms. These plans are formulated in the established way with a limited number of the following indexes:

- availability of arable land under cultivation, crop acreage and yield and gross output of main crops;
- availability and utilization of natural grazing lands;
- development of vegetable-growing in closed soil;
- availability and utilization of irrigated, reclamated lands and irrigated pastures;
- utilization of local organic fertilizers, liming of acid soils and gypsum treatment of saline soils;
- plan for chemical treatment of agricultural crops by chemical weed-killers, herbicides and defoliants;
- plan for perennial fruits and berry plants and other kind of plantation;
- plan of animal products;
- production of animal products (cattle,beef, pork, mutton, goat's meat,poultry and other animals; milk, wool, eggs) and animal productivity;
- livestock and poultry number and providing them with fodder;
- demand and provision of seeds for next year harvest.

/Besides the

Besides the elaboration of farm production plans, the collective and state farms order material and technical facilities supply (machinery; fuel and lubricants; fertilizers, herbicides and pesticides; construction and other materials). These orders are sent to representatives of Vsesojuznoe Objedinenie "Selkhoztechnica" where are taken into account in comprising plans for material and technical supply of agriculture.

The production boards on the basis of plans of collective and state farms compile an aggregate plan for the above mentioned scope of indexes, separately for collective and state farms and for all farm categories as a whole.

The aggregate plan is presented to the Regional Executive Committee, Territory Executive Committee, the Council of Ministers of the Autonomous Republics and the Council of Ministers of the Union Republics (without regional division).

Regional (territory) Executive Committee and the Council of Ministers of Autonomous Republics transmit the mentioned above aggregate plans to the Council of Ministers of the Union Republics.

The Councils of Ministers of the Union Republics present the aggregate agricultural development plans to the Council of Ministers of the USSR.

On the basis of the presented plans the Gosplan (the State Planning Committee) of the USSR together with the Council of National Economy of the USSR and the Gosstroy (the State Building Committee) with the participation of the State Committee and the Ministries and Departments concerned elaborate a draft state agricultural development plan by indexes enumerated on page 4 as part of the general national economy development plan and present it to the Council of Ministers of the USSR for consideration. After consideration and approval by the Government, the draft plan of the national economy development is presented for consideration to the Supreme Soviet of the USSR and on approval it acquires the strength of law to be necessarily observed by all Union Republics, regions, production boards, collective and state farms.

Collective and state farms having the necessary data on their material and technical provision and financing, and also taking into account the results of their economic activities, at the end of December or at the

/beginning of

beginning of January work out production-financial plans which in addition to production and financial indexes stipulate measures for labour remuneration, capital construction et al. Production-financial plans of collective and state farms are considered and approved by production boards. To ensure scientific soundness of production-financial plans of collective and state farms as well as the development of agricultural plan as a whole, the appropriate standards are required. On the basis of the generalization of practice and experimental works the Soviet scientific institutions have formulated the following standards: consumption of fodder per unit of stock-raising production; demand for fuel and lubricants; labour rate for the cultivation of one hectare of main agricultural crops and the livestick care; demand for machinery and appliances for cultivating agricultural crops; applying organic and mineral fertilizers et al. Many of these standards have been considered and approved by the expert commissions of the State Planning Committee of the USSR.

During the elaboration of the plan and its implementation, each farm in conformity with the local, natural, economic and other conditions, may introduce amendments into the recommended standards.

Of particular importance for planning and organization of production are flow sheets of cultivating agricultural crops and livestock raising according to zone conditions. These flow sheets will be dealt with below.

Planning of national economy requires the balancing of all its branches, agriculture included. Experience shows that planning for the agricultural development programme is inconceivable without due regard to the development of chemistry, machine building, light and food industry, transport facilities, energetics and other branches of national economy, science, culture, etc.

The method of balance planning is particularly important for the elaboration of an economically sound plan. A proper use of this method helps to make up a realistic plan, uncover untapped reserves, reveal bottlenecks and disproportions coming in sight; it also helps to secure

/the most

the most rational combination of different production spheres with an emphasis on the leading branches whose successful development determine the progress of the economic activities as a whole. Balance planning is especially important in agriculture because many means of production are reproduced directly at a given farm (seeds, fodder, productive cattle, etc.)

The production and finance plan of the farm is developed by the following balance plans: balance of the agricultural production for fulfilling the state plan of deliveries, meeting the domestic needs of the farm and reaching the possible volume of production; balance of arable lands; balance of labour power; balance of power resources and other technical facilities; balance of fuel and lubricants, building and other materials; balance of monetary receipts and expenses, etc.

Balance planning is based on the actual accounting data for the previous years, and for the planned period it is based on the economically sound progressive norms proved in practice by the leading kolkhozs, brigades, farms and teams. The following and the most important stage of plan elaboration is the correlation of separate balances; in the course of this work the reserves are disclosed for the further increase in the output.

Let us consider the most essential forms of balance planning which are used for the production planning of an agricultural enterprise.

Agricultural production balance

For successful fulfilment of the production plan of merchandise production an economically sound balance of gross output is elaborated. The expenditure part of a collective farm balance, e.g. with respect to grain, provides for the amount of grain to be sold to the State and, partially, on the market for meeting the domestic needs of the farm (for seeds, workday payments to the collective farmers, public catering, forage and ensurance carryover funds). The income part of the balance provides for some measures to guarantee the amount of grain production necessary for meeting the demand. This procedure is used for the development of balances for all the most important items of agricultural production, whereas the balance of animal production is linked up with the renewal of the

/livestock and

livestock and with the balance of forage. Errors in balance planning may cause a great damage to the farm; particularly underfulfilment of the plan of State deliveries results in diminishing the collective farm revenues.

Thus, the elaboration of the production and finance plan of a collective or state farm begins with the balance planning calculation of agricultural output and defining the sources for meeting these requirements at the expense of self-dependent production.

To attain the possible capacity of agricultural production, the size of arable areas, yield per hectare (2.47 acres) and total yield by field crops are planned and substantiated by proper agrotechnical activities. Animal production is planned on the basis of available and potential growth rate of cattle stock and its productivity, the balance of foods, and on the housing capacities for cattle.

Balance of labour

The most important in planning the balance of labour is to determine the availability of labour reserves necessary for the fulfilment of works in scope and in time stipulated by the plan. It should be noted that there is often a shortage of labour power during the periods of maximum strain, mainly during the harvest seasons. In practice this lack of labour force is overcome by means of mechanizing the major labour-consuming processes. Therefore, the balance planning of labour reserves requires both assessment of available machinery and planning of undertakings in the field of complex mechanization of labour-consuming processes.

Labour force requirements are determined on the basis of flow sheets with due account for a steady growth of labour productivity and progressive norms of production. On this condition only will the balance of labour force rest on a sound basis.

Another not less significant problem is a full utilization of labour force throughout the whole year. Therefore, certain measures on the development of such branches of agriculture which enable to use manpower more efficiently are planned when surplus and incomplete use of labour force are revealed in certain periods of the year in the course of planning the labour reserves balance.

/The collective

The collective and state farms represent large, highly mechanized enterprises, and therefore the planning of labour reserves balance should not be limited to a mere comparison between the availability of and the need for able-bodied labourers. Consequently, the personnel requirements are established by professions. In case there is a shortage of hands in any particular speciality, certain steps are planned in the field of training of such specialists.

The proportion of female labour is rather great in the collective and state farms. For the best possible use of female labour, a great importance is attached to such measures as organisation of public catering, improvement of the consumer goods trade, building of kindergartens and nurseries.

Thus, in planning the balance of labour reserves, provision should be made for the availability of labour force for the most essential agricultural operations in full accordance with the technology of production and for the purpose of the most rational utilization of labour power and raising of its productivity.

Balance of arable lands

Successful development of agricultural production depends most of all on the availability of arable lands and their proper exploitation. Therefore, in the process of planning and analysis of the arable lands balance one should first of all decide how to use the available arable lands to the best advantage, i.e. what field crops would be most productive and profitable under the given natural and economic conditions.

The proper use of arable lands is one of the decisive forms of raising the output of agricultural products and, consequently, revenues of collective and state farms. So, certain measures on rehabilitation and increase of fertility of lands are taken into account in the process of planning the long-term and annual plans. In this connection, great importance is attached to such factors as the efficient crop rotation, wide application of organic and mineral fertilizers with due regard to the quality of soil and the nature of cultivated crops.

Our country has vast spaces of over-damp and arid lands. Now we are heading for a large scale expansion of the works on irrigation farming in

the country's southern regions and on reclamation of lands in the northwest regions. These large-scale all-Union undertakings are aimed at the maximum and most efficient utilization of arable lands regardless of rain or sunshine for increase of the output of agricultural commodities. In accordance with the above tasks, the annual and longterm plans of collective and state farms provide for certain measures on irrigation or reclamation of lands, improvement of meadows and pastures etc.

So, the proper and most efficient utilization of arable lands serves as one of the major factors of a sharp increase in production of grain, meat, milk and other agricultural products with the least possible expenditures of labour and capital per unit of production.

After the balances of agriculture output, labour reserves and arable lands have been comprised;other ways of securing the achievement of the required level of production are proposed. The planning of the material is of particular importance in elaborating the current and long-term plans for the collective farms and technical resources needed to achieve this level of production. Assessment of the demand for the material and technical resources requires thorough knowledge of the technology of production by field crops and cattle breeds. To this end, the agriculturists, zootechnicians, engineers and technicians comprise the flow sheets for the field crop cultivation and care of cattle which comprise all kinds and volumes of operations, the ways they should be performed, the necessary number of tractors of models, manpower and the number of required farm structures and facilities, etc. In addition, the flow sheets serve as a guide for organization of production processes by brigades, teams and by stock-breeding farms. The flow sheets are used for defining the limits of expenditures on the production needs, while the planned production cost is determined on the basis of direct expenditure of labour and capital.

Thus, flow sheets serve not only for planning the production technology but also for defining the most essential expenditure rates of material and labour reserves in terms of products and cost value. Therefore, application of scientifically developed flow sheets in agriculture greatly facilitates the process of production planning and helps to elaborate economically sound plans organize the production on a scientific foundation.

/Income and

Income and expenditure balance

Income and expenditure balance is a concluding section of the collective farm production and finance plan. The income part of the balance of a collective farm indicates the returns resulting from the sales of farm products to the State, cooperative stores, on the market, and to the members of the farm, as well as from realization of goods manufactured at the auxiliary enterprises etc. The expenditure part of the balance includes the data on the tax and insurance payments to the State, production expenditures, including remuneration, general management and administrative expenditures, loan repayments, and allocations for restoration of indivisible and other common funds.

The production and finance plan provides for the sources of investments and establishes the order of their utilization. The main sources of investment funds are, first of all, the collective farms' own savings, as well as the loan funds, mainly in the form of a long-term bank credit. The volume of investments is determined from the necessity for speeding up the expansion of production, for maximum economic efficiency and improvement of labour and living conditions of the collective farm members.

Intensification of agricultural production calls for a large amount of investments. In order to secure a greater gross income, the programme provides for an increase of both gross and commercial output and for a decrease of labour and capital expenditures in terms of per unit value. Only under this condition the balance of income and expenditure of a collective farm becomes active and the income/expenditure ratio is growing. At the same time, elaboration of measures on diminishing the labour and capital expenditures per unit of production requires a calculation of its planned cost price because the balance of income and expenditure of a collective farm would be otherwise unreal.

Collective and state farms are large agricultural enterprises. They may incorporate up to 10 to 15 subdivisions (sections, brigades, farms specialized teams, workshops, garages, etc.). Under these conditions the collective farms' own planning acquires primary importance.

/In order

In order to raise the responsibility of the workers of all the above mentioned subdivisions for the most efficient utilization of labour and capital resources, for increasing the production of agricultural goods and diminishing their cost price, and for effecting the remuneration in accordance with both quantity and quality of the goods produced, the brigades, specialized farms and other subdivisions receive annual production targets. They form the foundation of planned organisation of production on the self-supporting basis, which represents the socialist method of management.

The production target of a harvesting brigade indicates the sizes of harvest areas by crops, the total yields, the limits of expenditure of labour, material resources and money per unit of planned production as well as the limits of basic remuneration; besides, it establishes a material stimulation to encourage fulfilment of the cost accounting target in respect of the amount, quality and cost price (by direct expenses) of the product.

The production targets for stock-raising farms are established in relation to the livestock number and productivity and include the target figures for gross production of meat, milk, wool and other dairy productions, the limits of expenditure of fodder and other material resources and money the limits of labour expenditure, the basic remuneration funds, and (as in the case of harvesting brigades) the material stimulation for increasing the animal production and cutting the production costs.

The other collective farm subdivisions (garages, repair shops and other auxiliary enterprises) are also given the planned cost accounting targets in relation to the scope and cost price (by direct expenses) of the works performed, the limits of labour and capital expenditure, the remuneration fund and the material stimulation fund for overfulfilment of the production plans and cutting the production costs.

The efficiency of application of the farms self-supporting planning as the socialist method of management is evaluated from the standpoint of the growth rate of production and cutting the production cost by means of raising labour productivity.

/During the

During the period of the extensive construction of the material and technical foundation of communism, a special importance is attached to elaboration of the long term plans of the collective and state farms. These programmes provide for:

- the most rational exploitation and radical improvement of lands (irrigation and melioration, introduction of crop rotations, fertilizer usage, the most rational placement of various crops, etc.); the transition to a rational specialization and concentration of production and proper combination of agricultural branches; the introduction of a new advanced technology of cultivation of field crops and animal breeding; the complex mechanization of all branches of agricultural production; the construction of farm and public buildings and facilities, etc.

In the end, the following targets are determined on the basis of the abovementioned undertakings: the expected gross and net output; the growth of labour productivity and cutting of production cost; the revenues; the sources of capital expenditures, and the ways of increasing the remuneration of labourers.

The control of the plan fulfilment is an integral part of the planning policy. A systematic control of fulfilment of the annual production and finance plan and the long term plan of the production and economic expansion of collective farming enhances the responsibility of the leaders of the collective and state farms, teams and stock-raising farms and of other agricultural specialists for the results of their management activities; it also favours the development of the creative iniciative of the masses.

The control of fulfilment of the plan enables to reveal the untapped reserves, bottlenecks and disproportions coming in sight and to take measures at their elimination. It also enables preventing of any unpractical utilization of labour and capital resources and paves the way for increasing the labour productivity and cutting the production cost; it helps to exercise the control over the observance of the principle of material interest in order to relate the remuneration of workers to the quantity and quality of the produce.

/This control

This control may acquire various forms. Many collective farms follow the suit of the industrial enterprises and organise the groups of public control consisting of the most active members of the collective farm. Various commissions are also drawn into the work on plan fulfilment control.

However diverse and multiple forms of the control over plan fulfilment may be, it must always be effective. This is achieved only when the conditions exist for a wide publicity of results, conclusions and suggestions ensuring from such control and for their discussion in the brigades, on the farms, at the meetings of the board of the collective farms, at the general meetings of the collective farm members and at the general meetings of the state farm workers.

In conclusion, it must be observed that now when we follow the policy of accelerated intensification of our socialist agriculture by means of all-round chemization of plant-growing and animal husbrandry; large-scale development of irrigation and melioration of arable lands, and thorough mechanization; much greater demands are now made of the standard of planning. The expected great flow of material and capital resources into our agriculture calls for a more thorough economic study in each farm with a view to more rational utilization of ever-growing material resources. And it is inconceivable without the specialization and concentration of production. That is why a systematic work is going on now on the definition of specialization of each collective and state farm and creation of a wide network of poultry factories, pig breeding, vegetable and milk-producing state farms around large cities and industrial centres.

Today our country has at disposal all the material and capital resources necessary for a large-scale housing and cultural construction in rural areas. This will also require a good deal of planning work which has to solve the problems of location of settlements, cultural centres and industrial enterprises, the problems of road-building and many other important problems. They will subsequently be dealt with in the plans for 1966-70.

/FINANCIAL BALANCE

FINANCIAL BALANCE *

The financial balance in the USSR is composed by a number of interdependent and closely interrelated financial plans. Financial plans of individual enterprises, economic councils, ministries and departments, as well as the principal state financial plan or Budget, reflect the costs of national economic plan targets.

The State Budget incorporates the bulk of financial resources, appropriated for development of the national economy and culture, maintenance of general government agencies and state administration, and national defence. Financial resources are distributed through the state budget among individual branches of the national economy and economic regions. The bulk of the national monetary funds, accumulated under the budget items and utilized on a centralized principle, are advantageously used for development of all branches of the national economy and culture in accord with the incorporate national economic plan. The State Budget is voted on every year to become a law and is bound for execution on everyone concerned.

The budget, however, cannot reflect all financial resources of a country. They are immediately absorbed, to a considerable extent, by enterprises and organizations (depreciation outlays, a share of profit, etc.). The operation of state enterprises, running on individual financial accounts, is based on the profitability principle. Their expenditures, as a general rule, are met by their private receipts.

All state revenues and expenditures, within or without the budget, are accounted in the aggregate financial plan, showing total state finances. The aggregate financial plan is aimed at substantiating, in economic terms, the planned rates and proportions in the national economic development. The plan shows the total volume of the country's finances over the plan period, the sources of finance inflow and the fields of application. The demand for financial resources is estimated in dependence on the basic targets, reflected in the national economic plan in terms of capital investments, increase in material resources in the spheres of

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* By G. F. Dundukov

/production and

production and circulation, expansion of school schemes, hospitals, scientific institutions, children establishments, etc.

The aggregate financial plan is accounted simultaneously in all stages of formulation of the national economic plan. If, in that connexion, financial resources are found to be short to cover the expenditures, the economic plan draft is amended accordingly to raise the financial resources by means of expanded production, additional reduction in costs of production and circulation, saving resources in the non-productive sphere. These alterations may, in turn, demand corrections to be made in the volume of capital investments in economic branches, in distribution of material resources, in the growth rates of labour productivity, and in the interrelation between the growing labour productivity, and growing wages. When, however, after all available reserves for raising financial resources have been accounted, and the planned expenditures cannot be covered within the desired bounds, they are necesarily reduced. In that connexion, capital investments can be reduced, or the running of certain social and cultural projects may be put off to a later date.

The State Bank and the Long-Term Investment Bank draw up a credit and a cash plans, which serve to control the monetary circulation and exercise a timely redistribution of resources for expanded production.

An important stage in national economic planning is to produce balances for incomes and expenditures of the population. This balance acts as a yardstick in determining the interrelations between monetary receipts and expenditures of the population, the purchasing power of the population, the volume of commodity funds and the turnover, and, also, rates of growth in consumer goods production. At the same time, an exports-imports plan and a currency plan are prepared. Thus, the drafting procedure of financial plans is inherently related to national economic planning. A balanced aggregate financial plan predetermines balanced revenues and expenditures under the State budget, as well as other receipts and expenses.

The following scheme is applied in drafting an aggregate financial plan:

1. Financial

I. Financial resources

1) Monetary accumulations, made by socialist enterprises:
   a. profit
   b. turnover tax;
2) Receipts from enterprises and institutions under the social insurance scheme;
3) Depreciation outlays;
4) Foreign trade gains;
5) Other receipts from the socialist economy;
6) Monetary receipts from the population;
7) Other revenues.

II. Utilization of Monetary Resources

1) Capital investments in the national economy;
2) Decentralized capital investments;
3) Overhauling fixed assets;
4) Increment to current assets;
5) Increment to state material resources;
6) Other economic expenditures;
7) Allocation for education, health, pensions and allowances;
8) Allocation for science;
9) Military expenditures;
10) Expenditures on general government;
11) Other state expenditures;
12) Reserve fund;
13) Expansion of bank facilities for national economic crediting.

Among the economic sources of state financial inflow, recorded on the aggregate financial plan, are:

- net incomes of state enterprises, collective farms and cooperative enterprises, secured through primary distribution of the national income in branches, engaged in material production;

- incomes of enterprises and institutions, involved in the non-productive sphere, obtained through redistribution of the national income;

/- a share

- a share of incomes received by the population, collective farms and cooperative groups, permanently or temporarily appropriated by the state as compulsory payments or voluntary monetary installments;

- partly the value of fixed assets in the hands of the state, collective farms and co-operative enterprises, received in the monetary form as depreciation outlays or sales of outgoing property;

- other revenues.

The greater part of the net income is originated as a difference between the receipts, obtained through sales of products, and the cost of products. Moreover, a certain portion of the net income is reflected in the cost value or in the circulation charges, such as wages outlays, transferred into the social insurance budget; outlays of trade unions for cultural and sports facilities; outlays for research and mass training of personnel, and local taxes. These components of the national income are recorded under respective items of the aggregate financial plan.

The net income of state-owned enterprises is ensured in two principal forms, viz. profit and turnover tax.

Turnover tax is entirely appropriated by the state. A substantial share of profit is also transferred into the state budget, while the leftover is utilized by respective enterprises and organizations for expanding production, creating special funds and other needs.

The division of monetary resources, accumulated at enterprises, into two parts - profit and turnover tax - is aimed at consolidating individual economic accounts and ensuring stable budgetary revenues. If such accumulations were entirely left at the disposal of the enterprises for a long time, the enterprises would lose an incentive for economical operation, decrease in production costs, acceleration of assets turnover. Simultaneously, the government would be short of resources for uninterrupted financing of the national economy and other public needs.

Turnover tax is a part of monetary accumulations and cannot be associated with an excise duty. The turnover tax is levied in three forms:

1) as a difference between the prime price and the selling price;

/2) as

2) as percentage of the selling price;

3) as a fixed amount of products in physical form (tons, hundredweights, metres, deca-litres, etc.).

The turnover tax within the aggregate financial plan is determined in dependence of total predicted sales of diverse products and average tax rates on these products. In accordance with the standing taxation procedure, applied to different products, the average rate is expressed in rubles and kopecks per unit of the output or in percentage of the selling price.

In accounting the turnover tax, the volume and assortment of goods sold are established in conformity with the indices of the production plan. Indices of production, sales, prices and turnover tax rates must be coordinated with calculations, adopted for estimating profits, gained through sales of respective goods. Inasmuch as the time when the turnover tax is collected is not exactly the time when products are sold, it is, therefore, required in certain instances to effect carry-over payments, which are differentiated within the plan estimates. The turnover tax (as percentage of the selling prices) is determined approximately in the following manner. For instance, 5,600 million metres of cotton fabric are scheduled for sales. The selling price of one metre is one ruble, then the sales will produce 5,600 million rubles. With a turnover tax rate equal to 40 per cent of the selling price, the total turnover tax collected amounts to 2,240 million rubles.

Whenever the amount of sales over the plan year is materially higher than in the previous year, a part of the turnover tax will not be collected in the coming year. Assume, that the sales of cotton fabric are hypothetically 5 per cent higher than in the previous period, and carry-over payments were 100 million rubles at the start of the plan year. Under unchanged turnover tax procedure, the carry-over payments are expected to rise 5 million rubles and, therefore, tax gains will be 2,235 million rubles (2,240 - 5 = 2,235).

Profit of state-owned enterprises constitutes one of the main sources of financing economy and cultural developments and other national activities.

/The size

The size of profit is established in dependence of the figures of the national economic plan for the output, transportation, goods turnover, the volume of construction and installation work, and also the costs of production and circulation. In predicting profits, very important is to remember that the size of profit with regard to the cost (i.e. the profitability) is larger from year to year. This increase can be explained by:

- growth of labour productivity resulting from improved utilization of available machinery, mechanization and automation of the manufacturing processes, auxiliary and accessory operations, introduction of advanced methods in production organization and technology, elimination of working time losses, improving the proficiency of workers;

- saving material expenditures per unit of the output; reduction in wastes, introduction of more economical materials and designs, raw materials formula; reduction in purchase and transportation costs;

- improvement of quality, assortment and grade of products;

- reduction of discard in particular through improvements in process technology and a closer quality control of raw materials, fuel and other:

- eliminating nonproductive expenditures;

- specialization of enterprises and expansion of productive co-operation economically substantiated distribution of orders among enterprises with due regard to reduction of expenditures per unit of output;

- reduction in overhead charges, and in the first instance, management charges, reduction in expenditures through sound control and elimination of surplus staff.

Profit is estimated within the aggregate financial plan in terms of national economic branches, such as industry, agriculture, transport, communications, purchases, trade, construction, supply and sales, communal services and others. Due to a number of reasons, several enterprises may, for some time, operate for no profit, although the specific branch is profitable on the whole. In such cases the profit is planned on a balance basis, i.e. losses are deducted.

The aggregate financial plan states profits from sales of products. At the same time the figures of the national economic plan may be used to estimate output profits. It is a common knowledge, that part of

/finished products,

finished products, turned out over the plan year, will be delivered, but not paid by the customers in the current year, and, conversely, products turned out in the previous year, are partly paid by the customers in the plan period. Thus, production does not, as a rule, coincide with sales in time.

Therefore, the profit reflected in the financial plan, does not only depend on the volume of production, costs, wholesale price level, assortment and grade of goods, but also on the volume and profitability of finished products still in stores, or shipped and unpaid by the customers.

In profits from sales of products, it is important to estimate:

- profit on commodity products;
- changes in the profitability of leftover of finished products at the beginning and the end of the plan year.

The profit on output can be estimated in two ways:

1. direct estimates in terms of individual articles, on the basis of commodity products at prime prices and at cost;
2. analytical calculation.

The first method may be applied in practice only to enterprises or branches with a limited nomenclature of products, such as coal industry, peat industry, oil refining, sugar refining, alcohol industry, production of building materials, etc.

The profit, in terms of individual products, is estimated as illustrated below:

	Quantity	Factory price in rubles	Cost price of unit in rubles	Profit on output in rubles
Goods A	40,000	20	14	240,000
Goods B	23,000	18	14	92,000
Goods C	20,000	22	17	100,000
				432,000

Thus, the profit on output is found in the above manner.

However, it must be considered that a part of the above profit will be not received in the plan period (for instance 15,000 rubles) and a profit

/will accrue

will accrue from sales of products, made in the previous year (for instance, 10,000 rubles). Therefore, the profit on output, as shown above, will amount to 427,000 rubles in the plan period (432,000 - 15,000 + 10,000 = 427,000).

For estimating profit by the analythical method, it is required to determine:

- the base profitability of the commodity output;
- saving accruing from reduced costs;
- how affected is the profit by the changes in assortment, prices and grade and other factors.

Let us assume:

a. The profitability of the commodity output in the previous period was 10 per cent;

b. Savings accruing from reduced costs were estimated at one per cent and amounted to 40,000 rubles;

c. Profit goes up to 12,000 rubles as a result of changes in the grade;

d. Losses due to reduction in factory prices will amount to 20,000 rubles.

If one per cent savings from reduced cost equal 40,000 then the cost of the entire commodity output is 4,000,000 rubles.

Profit is estimated in the following manner. With the cost of commodity output equal to 4,000,000 rubles and a 10 per cent profitability, the profit amounts to 400,000 rubles, which is added up with savings accruing from reduced cost (40,000 rubles) plus gains from improved grade (12,000 rubles minus losses occasioned by the reduction in prices (20,000 rubles)). The total profit on the output is, therefore, 432,000 rubles.

Profit, derived in various branches of the national economy, is determined in consideration of specific activities of enterprises and organizations in a specific branch. For instance, profits for transport are estimated outgoing from passanger or freight transportation, average rates of profit and costs. Profits of communications enterprises and organizations are accounted in terms of expenditures on services rendered

/and receipts

and receipts from all types of communications (letters, correspondence, money transfers, parcels, periodicals, trunk calls, etc.). Profits of state farms are estimated in terms of basic agricultural products (grains, cotton, meat, milk, wool, tealeave, etc.) at prime prices and at cost. However, at all events, profit must be coordinated with figures of the national economic plan, with regard to the volume of production and costs of the products.

We have indicated above that a share of the profit enters the State Budget, and the remaining part is appropriated by enterprises and economic organizations to be used in financing capital investments, growth of their own current assets, creation of a fund at the enterprise, a public consumption fund other expenses. The share of profit at the disposal of enterprises and organizations encourages them to reduce costs of the products, improve profitability of production, and gives an incentive in undertaking measures, aimed at effective and sound utilization of material, manpower and monetary resources.

Depreciation outlays are the monetary forms of fixed assets depreciation, reclaimed at the expense of receipts from sales of products. A portion of the depreciation reserve is allocated for overhauling fixed assets, while the other part is used for financing scheduled capital investments.

In drafting the aggregate financial plan, the depreciation reserve is determined by multiplying an average annual value of the operating fixed assets, subject to depreciation, by an average rate of depreciation outlays, characteristic of the national economy.

In estimating the average annual value of fixed assets, their cost at the beginning of the plan year is added up with an average value of funds, put into commission in the plan year, and the average annual cost of funds, falling out of operation within the plan year, is deducted from the total obtained.

Depreciation reserve estimates are illustrated by the following example. Assume, that:

a. The value of the fixed assets at the beginning of the plan period is 7,500,000 ubles;

/b. A

b. A 1,800,000-rubles worth of fixed assets is intended to commissioned in the plan period, yielding an annual average of 900,000 rubles.

c. a 400,000-rubles worth of fixed assets will be written off due to wear and obsolescence, yielding an annual average of 200,000 rubles.

Consequently, the value of fixed assets will amount to 8,200,000 rubles (7,500,000 + 900,000 - 200,000).

Hence, depreciation outlays, made at a 5 per cent rate, will equal 410,000 rubles.

An average rate of depreciation in the national economy may vary in response to changes in the structure of fixed assets. This fact should be given a due consideration in scheduled expenditures.

Income tax, levied on co-operative organizations, is estimated on real incomes received in the previous year on the basis of valid tax rates.

Two methods are applied in calculating the volume of income tax:

a. in dependence of total incomes of cooperative organizations;

b. in dependence of profit, gained by cooperative organizations.

It is understood that taxation rates vary with the base and methods, employed in income tax estimation.

Among other receipts from the state economy, the principal items are forestry income (payment for wood), amusements tax, receipts from sales of outgoing property, and from utilization of construction equipment, already delivered and paid up.

Receipts from the population comprise compulsory and voluntary installments. Compulsory payments include income tax and agriculture tax. Income tax is paid by factory and office workers, members of small producers' associations, handicraftsmen outside the cooperative scheme, and other people, having independent sources of income.

Income tax is levied on a progressive rate basis. As the income grows, the tax rate also increases. Low-paid factory and office workers are exempted from taxation. The tax is 30 per cent less for workers and employees supporting three people.

/Income tax

Income tax is planned in terms of the wages fund, proposed to the national economic plan, and an average tax rate with regard to the wages in the previous year. Aggregate calculation must also take into account the growth of wages.

Agricultural tax is paid by peasants and agricultural workers and employees from incomes raised in private homesteads.

Agricultural tax is levied in two ways: (a) on agricultural incomes, (b) on land.

Whenever agricultural tax is levied according to stable rates on land in private property, tax receipts are estimated on the basis of statistical data about the size of said land and an average tax rate. If agricultural tax is levied on incomes, then all incomes subject to taxation, should be evaluated.

Voluntary installments, made by the population and recorded on the financial plan, are taken in two main forms - as deposits made by the population in savings banks and purchases of loan bonds.

In view of growing money incomes, the population can make increased deposits in savings banks. This increase may be occasioned by an increase in the number of depositors or by an increase in the average size of deposit. A permanent remainder of savings bank deposits may be appropriated under the budget or by the State Bank. In both instances, the resources can be used to meet the needs of the national economy. The growth of savings bank deposits is planned in consideration of growing incomes of the population, expansion of the savings bank network and improvements in their operation.

Loans. At certain times the state may resort to home loans or obtain loans from abroad. The financial plan in these cases foresee the inflow of monetary resources, that can be utilized to the benefit of the society. A possible volume of home bonds, distributed among the population, is estimated in accordance with the balance of monetary incomes and expenditures of the population, and the country's demand for financial resources.

/Utilization of

Utilization of financial resources.

We have stated that the bulk of the state monetary resources is utilized in the USSR for further development of the national economy and, in the first instance, for expanding reproduction and renewal of fixed funds in the country. Continuous growth of fixed productive and non-productive funds is the basic prerequisite for expanded reproduction and steady rise in the living standards. To this end, financing capital investments is one of the principal expenditure items on the financial plan.

Expenditures on capital investments are entered into the financial plan in consideration of the estimated cost of construction. In that connexion, the plan reflects expenditures on the total volume of capital investments irrespective of the branches or targets, absorbing these investments. Savings, accruing from reduction in construction costs, are accounted as surplus over the financial plan resources.

Apart from expenditures under the state plan for capital investments, the country's finances are utilized for so-called extraordinary capital investments, or investments beyond the national economic plan, made by enterprises, organizations and institutions at the expense of special financial resources.

Expenditures on overhauling fixed funds of enterprises, economic organizations and institutions are planned in dependence of the share of the depreciation reserve, provided for this purpose; while budgetary institutions overhaul their funds at the expense of special allocations. The funds allocated for overhauls are, also, used for modernizing the equipment at enterprises.

Increment to current assets. Current assets of state-owned enterprises are composed by current funds and circulating funds. Current funds comprise resources, invested in production reserves (such as raw materials, basic and auxiliary materials, packing, fuel, spare parts for maintenance) and resources in process (or in-process inventory). Current funds also comprise prospective expenditures to be made and investments in cheap and rapidly wearing articles (for instance, tools, implements, etc.).

/Circulating funds

Circulating funds imply finished goods in stock or in transit, monetary resources used by enterprises for purchasing raw materials, fuel, for paying wages, etc.

For meeting constant requirements, enterprises and economic organizations are entitled to have individual current assets (a minimum reserve of raw materials, production and auxiliary materials, fuel, semi-finished goods, etc.). Demands for resources to run seasonal production (seasonal reserves of raw materials, fuel, production and auxiliary materials, etc.) are met by short-term bank credits.

The quota for current assets to be used in creating a required reserve minimum is planned in consideration of their total consumption and the established reserve quotas for these valuables in days. The quotas take into account the volume of goods and materials remaining in stores of the enterprise concerned and, also, unpaid raw materials and materials in transit.

For balancing distribution of financial and material resources under the national economic plan, the quotas applied in creating current assets should agree with the reserve quotas for the most important materials. The quota of current assets is calculated in the following manner (in 1,000 rubles):

	Expenditures per annum per day	Reserve quotas in days		Quota for current assets
Raw and basic materials	7,200	20	30	600
Auxiliary materials	540	1.5	80	120
Fuel in-process inventory	900	2.5	40	100
			5	200
Purchased semi-finished goods	360	1.0	20	20
Finished goods	14,400	40	7.5	300
Expenditures in the following years				60
		Total		1,400

The financial plan records an increment to the quota of individual current assets as a difference between the volume of required current assets at the end of the plan year and the quota at the beginning of the year.

/The increment

The increment to the current assets quota is obtained in the following manner:

Current assets quota at the year beginning	1,200,000 rubles
Current assets quota at the year end	1,400,000 rubles
Increment to the quota	200,000 rubles

Enterprises and economic organizations, engaged in seasonal activities, need additional current assets for the period, when they expand operation. Particularly sizable assets are required by enterprises and organizations, engaged in purchasing and processing agricultural products. If they were given individual current assets equivalent to the cost of total annual purchases, they would hold surplus assets throughout the greater part of the year. Therefore, seasonal purchasing, industrial and trade enterprises obtain subsidies from the State Bank and pay back the loan as they process and sell their products. These credits are based on balances for agricultural raw materials, balances for food stuffs, plans of government purchases and plans for seasonal productive industries.

The demand for additional current assets above the established quota may be raised by the fact that enterprises do not receive payments for goods sold immediately on delivery, but rather after a while, In the meantime, the enterprises have to use their monetary resources continuously. In order to undertake expenditures prior to receipt of money from the purchasers, these enterprises negotiate the State Bank of so-called "credits against payment documents in transit". Enterprises and economic organization resort to credits in the event of temporary needs (temporary difficulties of sales, overdue payments for goods delivered to buyers, etc.).

Planned and proportional development of the national economy is impossible without sufficient material and monetary reserves. These are subdivided into:

- Current reserves, generally used up within a year to ensure achievement of national economic target, and

- Long-run reserves, utilized in event of natural disasters or under other incidental circumstances.

In accordance with the above classification, a provision is made in the aggregate financial plan for monetary resources to create both reserves.

/Other expenditures.

Other expenditures. The largest expenditures under this item are made on typical designing and drafting technical and economic criteria of development in branches of national economy, on geological prospecting, land reclamation, irrigation, exports, improvement of cities and workers' settlements, weather forecast service, mapping and geodetic schemes, maintenance of roads, etc. Moreover, expenditure items of the aggregate financial plan comprise outlays to form a fund at the enterprises, a fund created by sales of consumer goods manufactured from wastes, an insurance fund at state farms, a fund for consolidating and expanding state farm economies, a fund to compensate losses suffered by trade establishments due to price-cuts.

Some of the abovementioned expenditures are estimated on the basis of respective figures of the national economic plan in terms of quotas established by existing legislature, other expenditures are estimated in view of expenditures on these items in the base year, but also in view of planned progress.

The Soviet State creates public consumption funds for satisfying material and cultural needs of the people. These funds are utilized on construction and maintenance of schools, medical centres, kindergartens and creches, higher and secondary schools, on pensions and allowances.

A distinctive feature of the socialist society is that education, medical service, pension scheme are covered by large and growing expenditures. Alongside wages and other incomes, the working people enjoy free education, free medical service, old-age pensions and disability benefits.

Expenditures on social and cultural facilities are among important items on the aggregate financial plan, which shows not only expenditures made out of budgetary allocations, but also expenditures undertaken by state-owned and cooperative enterprises and public organizations. However, the above item shows only current expenditures, because expenditures made on construction of schools, hospitals, sanatoria and other social and cultural institutions, are included in the total volume of capital investments.

In estimating expenditures on education and training of personnel, an account should be made of the national plan estimates of the number of students in all educational establishments (such as higher school, secondary

/technical schools,

technical schools, courses and general schools), the number of teaching staff and auxiliary personnel. The total expenditures are determined in accord with the established expenditure rates.

Expenditures on health service are based on planned figures, such as the number of hospitals' beds, the number of clinics and medical stations, the number of children in creches. These figures, together with valid expenditure rates for food, purchases of tools and administrative needs, typical staffs and the rates of wages, perform a decisive part in estimating total expenditures on health service.

It should be pointed out that differential calculations cannot be advantageously applied in estimating expenditures on education and health service, appearing on the aggregate financial plan. This handicap is overcome by enlarged calculations. For instance, the total expenditures on medical establishments are determined on the basis of the national economic plan showing the number of beds and average annual expenditures per one patient. Similar procedure can be applied in calculating expenditures for operating schools, kindergartens, creches, etc.

Expenditures under the pension plan depend on the number of pensioners and an average size of pensions. The number of pensioners is supplied by statistical data over several past years and data of the age composition.

Expenditures on science are estimated in dependence of the number and wages fund of people, employed by research centres, shown on the national economic plan draft, and other average expenditures per one research worker (excluding expenditures on capital investments).

Expenditures on general government and management are accounted in the aggregate financial plan, also, without capital investments, in view of the number and an average salary of the personnel, and measures aimed at improving management functions and reducing expenditures (such as on-business trips, administrative expenditures, etc.).

Military expenditures appear on the financial plan in view of defence commitments of the country.

/The aggregate

The aggregate financial plan shows resources, required by banks for granting additional credits to enterprises and economic organizations for purposes of expanding their production and financial activities. As a general rule, these resources are provided by the surplus of revenues over expenditures under State budget.

Balance of monetary incomes and expenditures of the population

The balance of monetary incomes and expenditures of the population describes the volume and sources of monetary incomes, received by the population, and, also, the volume and structure of monetary expenditures.

The balance of monetary incomes and expenditures of the population is chiefly aimed at establishing correct interrelations between the monetary incomes of the population on the one hand, and the volume of retail trade turnover and services bought by the population, on the other.

The observance of proportions in the balance of monetary incomes and expenditures of the population presents the principal pre-condition for the growth of demands for goods and services, and for continued consolidation of the money in circulation.

An enlarged table for the balance of monetary incomes and expenditures of the population is drawn up in terms of specific groups - such as factory and office workers, peasants - and comprises: 1. Money turnover between the population and state-owned, cooperative and public enterprises and institutions, and 2. Money turnover between the social group, selling products at the market and various services.

An abbreviated table for the balance of monetary incomes and expenditures of the population does not differentiate social groups, and describes the money turnover between the population on the one hand, and enterprises, institutions and organizations on the other. Revenue items of this balance show all money received by the population from governmental, co-operative and public enterprises, organizations and institutions, while expenditure items reveal all expenditures made by the population as payments to governmental, co-operative and public enterprises, organizations and institutions, as well as savings in the form of deposits, made in savings banks and the State Bank, and purchases of Government loan bonds.

/The balance

The balance of monetary incomes and expenditures of the population is based on figures of the national economic plan and the State Budget in view of the data supplied by balances for the previous period.

Hereinafter we present an examplary scheme for drawing up a balance of monetary incomes and expenditures of the population:

Incomes

1. Wages.
2. Money received from co-operative organizations.
3. Receipts from sales of agricultural products to state-owned and co-operative organizations.
4. Pensions and allowances.
5. Subsistences and scholarships.
6. Receipts from financial bodies (clearing off loan bonds, prizes drawn from state loans, prizes drawn from lotteries, interest on deposits, reclamation under the state insurance scheme, credits for private housing construction).
7. Other incomes (bonuses and remuneration for other labour, reimbursement of business trip expenses, receipts from goods sold on commission, and from sales of second-hand goods, etc.).

Expenditures

1. Purchases of goods.
2. Payment for services (apartment rent and communal facilities, installments in children institutions, sanatorium and rest house vouchers, expenses on cinema, theatre and other amusements, payment for services offered by railways, airlines, river, motor and other transports, post office and other services).
3. Compulsory payments and voluntary installments (purchase of loan bonds, installments in public and co-operative organizations, deposits in savings banks, purchase of lottery tickets).

The balance of incomes and expenditures of the population is closely interrelated with other financial balances, such as for instance the aggregate financial plan of the country, the State Budget, credit and cash plans of the State Bank, currency and exports-imports plan.

The close and immediate interrelation between the balance of monetary incomes and expenditures of the population and the national economic plan is conspicuous in two principal aspects - wages and purchases of goods.

/Wages incorporate

Wages incorporate all remuneration received for labour and included in the wages fund. The volume of wages should agree with the figure adapted in the national economic plan. Expenditures undertaken by the population on purchases of goods should agree with the volume of the retail trade turnover, established under the national economic plan.

PLANNING AND STATISTICS *

Under the conditions of the socialist system of social production all the necessary political and economic prerequisites are created for national economic planning and nationwide calculation. The planning of national economy, as one of the fields of economic policy of the Soviet state, is inseparably linked with statistics organization.

Statistics provide the necessary data for working out plans and ensuring statistical control and supervision as to their implementation.

Alongside of this, statistical data is worked out for the Soviet Union as a whole, for each Union Republic, large economic area, region, territory, and Autonomous Republic taken separately, and according to different branches of national economy and industry.

The USSR has a unified centralized system of statistic boards. Each administrative region has an Inspection Department of National Statistics, which collects and works out statistical data for the region concerned. The local inspection departments are subordinated to those of regions, territories, Autonomous Republics, and to the Inspection Departments of those Union Republics which have no regions. Statistical boards of regions, territories and Autonomous Republics are under the authority of the Central Statistical Boards of Union Republics.

The Central Statistical Board of the Council of Ministers of the USSR controls all the statistical work in the country. This work follows a single plan, a single methodology.

Statistical data are necessary for working out plans and controlling their implementation in all the units of economy management and planning. For example, in order to elaborate the plan of an enterprise one must have data concerning its capacities and their utilization, the volume of output and labour productivity that has been reached, the quotas of raw material consumption and material outlay necessary for production, etc. At the same time, enterprise managers must constantly have information on the implementation of the plan. This data is obtained from statistical

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/service at

service at the enterprises. Correspondingly, statistical data lays the foundation for production planning and controlling the realization of plans by Councils of national economy, by regional and Union Republic planning commissions and national planning boards.

While drafting the project of the State national economic plan, Gosplan (the State Planning Committee) of the USRR makes a detailed study of statistical data worked out by the Central Statistical Board of the Council of Ministers of the USRR. This includes data concerning the standard of output that has been reached, the technical and economic conditions of production, et al. The bodies of national statistical service satisfy the needs of the planning bodies by giving them data concerning the future increase in population, by making up physical and material cost balances, labour balances, etc. In order to make a study of the standard of the people's welfare and to work out measures for its upsurge, family budgets of different population groups are studied. The national statistical bodies keep all the units of economy management and the planning system regularly informed of the plan implementation by supplying them with necessary data.

The system of planning and statistical indices is worked out in three aspects: the industrial, territorial, and departmental aspects.

According to the industrial aspect the planning and statistical indices are worked out by compiling planned targets and actual indices as to the different industries of national economy (industry, agriculture, transport and communication, capital construction, etc.) and by making a point of their most important branches (for example, steel and iron industry, non-ferrous metal industry, fuel industry, machine-building and metal-working industries, etc.- in industry; farming, stock-raising, etc.- in agriculture). The indices for industries give a clear picture of the development of each particular branch irrespective of the territorial situation or subordination of each enterprise.

The planning and statistical indices, taken in their industrial aspect, determine the production connections and proportions of social production and are the basis for balancing the different industries inside the complex of national economy. Nevertheless, there remains much to be done in this sphere. The existing classification of industries is awaiting further improvement.

/The planning

The planning and statistical indices taken in the territorial aspect characterize the development of Union Republics, economic areas, territories and regions. They are based on the economic division of the country into areas with regard to their economic and natural features, the possibilities of their specialization (participation in the territorial division of labour), and the complex development of economy (combination of specialized industries with those producing goods for local consumption).

The departmental aspect of working out planning and statistical indices enables all the economic bodies, and the organizations and enterprises in their authority, to receive information on the economy-plan targets; ensures the concrete character of planned targets, and their destination, and helps to check up on their fulfilment by each production unit. Thus, the planning and statistical indices for the industry are worked out on the basis of data for the industry submitted by economic councils, State ministries and departments, Union Republic ministries and departments, local Soviets of Working People's Deputies, etc.

Indices are divided into four types: natural, cost, quantitative and qualitative.

Natural indices are determined in the definite physical units, cost indices, in moneys. Quantitative indices characterize the absolute or relative volume of output, construction, labour force, etc.; qualitative indices, social labour outlays and the extent of utilizing production resources (increase of labour productivity, reduction of cost prices of output, profitableness of enterprise, efficient utilization of equipment, expenditure of material resources per unit of output, etc.).

In the national economy planning the targets for development of industries and culture are set in the form of precisely fixed indices, showing: the growth of industrial and agricultural output and transportation; the volume of realization of the basic funds; increase of labour productivity; reduction of cost prices, the volume of merchandise turnover, development of culture and science, etc. The targets are set before the concrete enterprises and a for fixed period of time.

/The inseparable

The inseparable unity of national economic planning and national statistics can be checked by their unified index system and by the common methodology of their working out. This means that both economic planning and national statistics must operate with identical indices carrying identical meaning. Only under these circumstances can the comparability of reported data with planned indices be ensured.

The system of the basic indices used in planning and statistics turns out as follows:

1. The basic synthetic indices of economy development: basic funds; national income; funds of accumulation and consumption inside the national income; the gross national product; the production of means of production and consumer goods inside the gross national product; the division according to industries in the gross national product and national income; the real income of workers, employees and farmers; per capita consumption of foodstuffs; the balance of income and expenditure of population.

2. Indices showing the development of the basic industries and spheres of national economy:

a) Industry: gross output and commodity output, with the singling out of the production of means of production and the production of consumer goods; the basic items of production in units of measurement; the putting into production of articles and explotation of new enterprises; introduction of a new technology complex mechanization; automatization of production processes; production of new machinery, mechanisms, equipment, instruments and materials; the most important research, developments and designs; specialization and co-operation.

b) Agriculture: volume of purchases of agricultural products, delivery (sale) of machinery and fertilizers to state and collective farms, electrification of state and collective farms, soil irrigation and reclamation, irrigation of pastures, development of forestry.

c) Transport and communications: rail and motor transport freight turnover; volume and passenger turnover of air transportation; volume of pipeline transport; technical reconstruction and electrification of transport; construction and operation of railways and harbours; the volume of the communication service operations.

/d) Capital construction

d) Capital construction and the building trade: total volume of national capital investments, and construction mounting operations with the singling out of industrial enterprises, as well as housing and communal services; the title list of key construction projects; the putting into operation of industrial capacities as regards to the key items of production; the usage of the basic assets; commissioning of housing.

e) Geological prospecting: volume of prospecting, increase of the most important mineral resources.

f) Labour and vocational education labour productivity in industry and construction, at state farms and in railway transport; labour force; the wage fund; the training of skilled workers.

g) The costs of production and the distribution costs: the cost prices of industrial output, indices of cost-price reduction for agricultural produce (of state farms), freight, construction and mounting operations, and geological prospecting.

h) Commodity circulation: the volume of retail commodity circulation in state and co-operative trade, market funds of key foodstuffs and commodities.

i) Culture and public health: the training of specialists in specia- chools and institutes; the network of schools and their attendance, kindergarten attendance, number of hospital beds, radio, press, cinema.

Besides the above-mentioned indices, statistical data is worked out for the supplying of industries with raw materials, materials, fuel, power and equipment; as well as data of material, fuel and electricity outlay quotas for industry and construction. Technical-economic indices are worked out on a large scale for all the branches of economy. The system of financial indices gives us a clear picture of the financial returns of enterprises and industries.

National economic planning is a unified system of drafting, checking, and fulfilling of plan targets. All these stages are closely linked with calculation and statistics, which play the most important part in the management of this system.

/National economic

National economic planning does not only proceed from the requirements of objective laws, but it considers the reached level of economy development. Due to this fact the drawing up of a plan is naturally preceded by a detailed and all-round study of the initial level of economy development attained, and by summing up the practical experience accumulated during the realization of the plan for the previous period. This work includes the analysis of industrial capacity explotation, the productivity of labour and equipment, the standard reached in satisfying the requirements of national economy in material, labour and money resources; the revealing of changes which have taken place in the relations and proportions of economies; the development of projects for utilizing reserves in order to accelerate the development of production. All the required data for studying the initial level of economy development is worked out by the statistics bodies and submitted to the planning bodies not only on an all-Union scale but also according to territorial, industrial, and departmental aspects. Thus an initial statistical basis for working out plans is created.

An important and integral part of the statistical basis for the plan is constituted by the so-called time series - data, characterizing different aspects of economic activity for a fixed period of time. In this respect, statistical materials which give information concerning output according to the items produced and their value, the number of workers engaged in production; labour productivity, equipment utilization; rates of output per unit of raw materials, etc. are compiled. The time series analysis enables one to foresee the lawfulness of development of particular branches and industries.

The study of the maximal stable standards of production attained during the period under review is of high importance for the planning of targets for industry, construction and transport. This allows to determine what use was made of the possibilities for raising output during the period under review and how they can be used without additional capital investments.

/Inasmuch as

Inasmuch as plans are worked out and approved before the data concerning the realization of the plan for the previous period (basis period) is collected, the determination of the anticipated results of the plan fulfillment during the basis period becomes an integral part of the statistical foundation for plan drafting. In order to give a correct appraisal of the anticipated results of the plan implementation, a detailed study is made of the basic conditions under which production is carried on during the remaining part of the planned period: stock is taken of the remaining reserves and the perspectives for supplying production with raw materials, fuel and materials; quotas are worked out for the employment of new industrial capacities and the anticipated increase in the volume of production is estimated; a number of industries take into account the seasonal changes in production. The correct determination of the anticipated results of the plan realization is the obligatory condition for working out optimum targets for the planned period.

It must be noted that the analysis of the initial production level in plan drafting is not exhausted by the study of figures alone. Correct planning requires that utmost attention be devoted to determining the means of achieving the utmost success in all the units of national economy, and exposing the reasons for individual violations of planned targets.

The basic principle underlying the whole economy planning system is the attainment of the utmost growth of social production with a most rational utilization of resources. This is achieved, in particular, by establishing planned rates for regulating material, labour and financial outlays for production and commodity circulation. The system of rates enables to determine the requirements of national economy in the means of production and commodity goods. The initial data is worked out by the statistical bodies. It includes data as to the actual rates of raw material, fuel, material, and electricity power consumption; the actual efficiency of equipment determined by the current summing-up of the enterprise work; the consumption of the basic commodities and foodstuffs by the population which is determined by examining family budgets and taking account of the reports of shops, stores, etc.

/Co-ordination of

Co-ordination of the resources and requirements of national economy is effected with the aid of planning balances, physical balance sheets; labour balances and consolidated cost balance sheets.

Physical balance sheets worked out by statistical bodies are considered to be the basis for designing planning balances not only because they determine the initial proportions which have taken shape during the basis period but because they also show the quantitative changes which affect these proportions due to the influence of different factors such as: the scale of development of each particular branch of economy, a more effective utilization of capital investments in industry and construction, the increase in the solvent demands of the population, etc.

The interests of national economy development require that the targets of the national economy plan be fulfilled by all the enterprises, state farms, ministries and departments. This accounts for the organization of systematic control as to fulfillment of all planned tasks, according to all the planned indices, by all the units of economy production.

Each enterprise or organization which has been given a definite task submit to the state statistical bodies an account of its fulfillment according to the required indices and in a due time.

With this purpose special forms for current reports have been established for all the branches of national economy. For example, all the industrial enterprises submit a monthly report according to Form 1-II. This form contains data concerning the physical indices of output and the volume of industrial and commodity-goods output for the period under review. Inasmuch as this form contains planning indices as well, one can take stock of the degree to which the planned targets have been achieved. Or let us take another example concerning the construction industry. Construction organizations submit a monthly report according to Form 1-KC, which includes data concerning the approved plan and its actual fulfillment. Special statistical forms have been established for the annual reports of all enterprises, building projects and organizations. These forms give a large-scale picture of the work of enterprises and organizations during a fixed period.

/Of significant

Of significant importance is the question concerning the time in which the reports on plan fulfillment should be submitted. The earlier such data is received, the greater are the opportunities for undertaking timely measures to overcome the lag of different units and ensure the general fulfillment of planned targets.

A necessary condition for the correct development of national economy plans and control over their realization lies with working out the fullest and most precise statistical data and ensuring the correctness of this data for all the units of economy management.

Statistical control over plan realization is based on the data of annual reports made by enterprises and organizations, on the data of current reports and also on the materials of censuses, spot check-ups, and monographical investigations.

Current reports constitute the most important faculty of effective control over the realization of planned targets and timely exposure of any deviations from the plan. Current reports are divided into the following: five-day reports - concerning the production of the key items of industrial output (pig iron, steel, rolled metal, coal, oil, etc.), crop sowing and harvesting, deliveries state of grain, potatoes, vegetables, raw cotton, etc. (for the agricultural season); ten-day reports - concerning industrial output (iron ore, key items of output of the building industry, chemical industry, etc.) and agricultural production; monthly and quarterly reports dealing with a wide scale of natural and cost indices (volume of industrial output, labour force, labor productivity, cost prices of output, wages, etc.).

Annual reports of enterprises give an all-round picture of their economic activities (production, labour and wages, basic funds, power equipment, civil engineering, finance).

A number of items which are connected with the development of national economy but are not included into reports are accounted for in statistical censuses, selective and monographical investigations (census of equipment, the material and fuel surpluses, spot check-ups of the quality of goods used by consumers, methods of operation and of utilization equipment, etc.). In particular, the census of equipment account

/not only

not only for its number, but its condition, age, wear and some other factors. For example, in studying the conditions of labour at machine-building enterprises an analysis is made of the degree of utilization of equipment shifts, the working time losses during shift and some other indices.

The data of the current and annual reports made by enterprises are worked out according to the industrial, territorial, and departmental aspects, i.e. the same as for planning indices. This system guarantees a direct and detailed control as to the fulfillment of planned targets by all the economic units and creates an efficient opportunity for exposing the reasons for any plan violations and for taking the necessary measures to eliminate these shortcomings.

Bearing in mind that statistical data is the initial and basic point for all the stages of national economic planning - for development, checking-up and fulfillment of planned targets - the range of indices determined by state statistical bodies should be naturally wider than the range of those which are included in the economy development plan.

At the present time due to an increase of local planning initiative (at enterprises, in economic areas, Union Republics) the number of indices envisaged in economy-development plans is being somewhat reduced. That is why besides keeping control over the fulfillment of the national economy development plan of the USSR, it is becoming even more important to check the realization of planned targets for Union Republics, economic councils, ministries, and departments.

Statistical data is not only meant for the needs of the planning system. In a number of instances this data is used for the further development of the key problems of political economy, for studying new phenomena in the economic sphere. With this purpose wide use is made not only of the data of regular all-Union reports, but of the materials of single censuses, selected, and monographical investigations conducted by statistical organizations.

Gosplan of the USSR and the Central Statistical Board of the USSR are both independent organizations. But during all the stages of their work they maintain close contact with each other. When the Central Statistical Board is making out a programme of statistical data it discusses its programme with Gosplan. The latter, in its turn, discusses its own programmes and methodology with the General Statistical Board.

/At the

At the present time a statistical basis is being worked out for the new five-year plan for the 1966-1970 period. This basis will comprise data concerning the labour and material resources of our country, the attained volume of production in different economic branches, the state of public education and health services, the actual outlay quotas for production, the available equipment and its condition, etc. All this data will be submitted in the form of time series.

We must also note that the Central Statistical Board of the USSR issues regular data concerning the fulfillment of economy development plans. Every quarter we publish information regarding the realization of the plan for industry. Data based on reports of plan fulfillment for all the branches of economy and culture are published every six months and annually. These publications are usually made within 15-20 days after the closing of the period under review. Our statistical year-books give data for all the key aspects of economic and cultural life of the country for a low period. All these successes in the field of statistics can be accounted for by the high attention which is devoted in our country to the training of specialists in statistics, with a medium-levelled and high-levelled qualification. Secondary special educational establishments train statisticians of medium-levelled qualification. Higher educational establishments, the Moscow Institute of Economics and Statistics in particular, train statisticians of the highest qualification and specialists for work in the field of mechanization of the processes of calculation. The course of statistics is read in all the higher economic establishments. Different courses are organized to raise the qualification of specialists who have already had experience of statistical work. Many students from developing countries study statistics in our institutes and after graduation will most certainly promote the work of the statistical organizations of their countries.

/MODELS IN

MODELS IN NATIONAL ECONOMIC PLANNING
MODELLING OF ECONOMIC PROCESSES *

At the present time the main goal of Soviet economic science is to arm the builders of the material and technological basis of Communism with theoretically substantiated scientific information on regularities of the economic development which define both the structure and the dynamics of the systematically developing economic system of communism, the construction of which is now under-way.

Under the conditions of a large, ramified multi-branche and complex socialist national economy it is necessary to consider all the economic processes which form the national economy from a special aspect, or point of view. The singularities of this national economic aspect, first of all, consist in ensuring the unity of the qualitative and quantitative analysis of the economic processes and chiefly to develop a theoretical approach to the quantitative regularities of the developing economy.

The outstanding role played by the Marxist-Leninist thesis characterizing the historical inevitable qualitative social changes and the replacement of one type of economic formation by another is well known. However, presently the knowledge of qualitative changes alone, is insufficient for the practice of communist construction.

Communist construction expects that the economic sciences would provide it with theoretically substantiated thesis about the quantitative interrelations specifying interconnection and interaction, for example, among the rates of economic development, level of development of productive forces, branch and district levels of social labour productivity, the level of social requirements and a number of structural national economic proportions. These proportions define, in particular, the ratio between the aggregate social product and the national income; between necessary labour and surplus labour; between the consumption fund and the accumulation fund; between the share of production capital investments and the increase at the national income etc. All quantitative regularities of this kind require a strict mathematical

/formulation and

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formulation and that brings inevitably the introduction of modern mathematics into economics.

Another peculiarity of the modern aspect in the theoretical consideration of economic development processes is the system approach to analysis. Economic processes should be considered not only as a simple aggregation of certain economic elements of production, consumption, distribution, and exchange of stocks of materials and capital equipment which are the embodied results of social labour but as a certain interacting system of economic, production and consumption cells, which are capable of assuming a definite, more or less steady state in the process of their interconnections with other economic cells and the environment in general.

A certain cell structure is peculiar for a society. Cells of various types interacts with each other and with economic sub-systems and systems of a higher rank. Each given society, while being a unified economic system, at the same time breaks down into various branch and territorial sub-systems of different complexity (economic combines, economic regions) and also into primary economic units (production bodies building sites and housekeeping).

The management problem for such a complicated aggregate of economic systems, requires a special cybernetic approach to the study of their behaviour, the processes of their interaction including the processes of determining the content and form of their own organisation. And here lies the reason for the wide-scale penetration of the ideas and basic factors of economic cybernetics into economic science.

Besides, the utilization of mathematical methods and cybernetics in economic researches is also stimulated by the pressing need of mechanizing the collection, processing and transformation of the enormous flow of economic information and of the mass economic, drafting, and planning calculations that are imperative for adopting of the scientifically based economic, drafting, and planning decisions based on the automatic processing of the corresponding information flows by the electronic computer.

/Three new

Three new aspects of economic processes considerations are the following: quantitative (mathematical), systematic (cybernetical), and information and computer.

Under the overwhelming influence of these three new trends in the economic theory development, the method of modelling economic processes is gaining ever greater significance in economic science.

In the first place, it is necessary to mention that in the history of the development of science models have always played an extremely important role. It is well known that in the history of astronomy the planetarium model of the solar system was of the utmost importance, in biology - the model of a live cell, in physics - the electronic model of atom, in chemistry - the molecular model of the matter structure and so on. Of no less significance in the history of economic science were: the model of economic flows by Francois Quesnay (so-called "Economic Table" by Quesnay, 1758) the model of simple and expanded production by K.Marx and the model of the development home market by V.I.Lenin. Below we would return to these economic models.

All the above-mentioned models, as well as the models of the crystal, the electronic-magnetic field etc., were land-marks of great consequence in the development of science.

In what does the method of modelling economic processes consist, what are the singularities and aims of economic model construction?

In our everyday speech the term "model" has many different meanings. The scientific definition of the word differs greatly from its common use; as a sample, a representation of something that is to be made or a small-sized exact copy of some object. Scientifically, a "model" is a real or mental construction of some objective process or phenomenon reflecting the most important and typical features of the given objective reality and casting aside all irrelevant and collateral features and properties. In the scientific construction of any model excessive simplification as well as excessive detailing and complication must be avoided. An American mathematician, Bellman, very well expressed this thought by warning the researcher from "the trap of over-simplifications and the bog of extreme complications".

/A scientific

A scientific model must be adequate to objective reality, reflecting im the proper way both the most important features of similarity to the modelling real processes and phenomena and their main distinctions, which permit to distinguish qualitatively the given process or phenomenon from all others, even outwardly alike, processes and phenomena. The economic model reflects in a more simple and illustrative manner the material structure and character of passing development of the objective process to be modelled.

The economic model, while representing in some way the objective economic reality, must possess the same principal functions and the same kind of conduct as its real prototype. At the same time, it must expose the additional features of the prototype which are not obvious in the initial actual information introduced into the model. A well and correctly developed economic model would allow, on the one hand, to make concrete logical and mathematical conclusions about the principal properties, structure, and most important features in the conduct of the economic system reflected in the model, and on the other hand, to carry out the required economic calculations in determining the dynamics of the changes in the main quantitative parameters and the characteristics of the economic system.

While constructing an economic model, one would always remember the famous thesis of N.G.Chernishevsky that the subject of economic science "are quantities which must be counted and measured, and comprehensible only through calculation and measurement". 1/

In constructing an economic model, all the initial premises, the principal economic concepts and parameters are introduced into the model in a strict mathematical form. To this effect an economist would be able to use all tools of mathematics and know the nature and peculiarities of the economic phenomena and processes very well. Only in this case would the economic model be a visual support for the correct theoretical analysis of the studied economic process.

1/ N.G. Chernishevsky. Collected Works on Economics. Vol.III. Part I, page 81 Gospolitizdat, 1948.

Only then does man perceive a phenomenon when in one way or another he can recreate it. In conducting tests or experiments he can recreate this phenomenon or process in some definite direction, reproduce one of its aspects. But in constructing an economic model he can recreate a process or phenomenon as an integer revealing its most important features and singularities.

A phenomenon can be understood completely only after we have recreated it in an industrial specimen by means of modern technology.

In the field of economics the possibilities of experimentation are very limited. One is deprived of the possibility of reproducing an economic mechanism otherwise as in the form of some analogue model. Therefore, the method of simulation of economic processes has become more and more significant in the science of economics.

In order to understand the method of simulation of economic processes more clearly we shall attempt to illustrate in short the process of the economic model construction by examples: "The Economic Table" of F.Quesnay, "The expanded Reproduction Model" by K.Marx and "The Home-market Development Model" by V.I.Lenin.

Methods of model construction are various. They may have graphical, numerical, mathematical and analogous construction. Analogous models can be constructed in mechanical, pneumatic, hydraulic, electric, electronic and other such forms. The modern electronic computer can be used particularly, to imitate the conduct of an economic system (for example, provision of supplies and machinery or the flow of information necessary to control a complex technological process, e.g., steel converter process or the work of the soda-column on an up-to-date chemical plant).

The historically first economic models were of a graphical and numerical form;"The Economic Table" of the famous French economist, Francois Quesnay, who lived shortly before the Great French Revolution, was the first in history economic model. K.Marx had a high opinion of Quesnay's scientific merits. Quesnay's model is presented in two variants: a) in the form of the famous "zig-zag" of Doctor Quesnay 1758 ; b) in the form of a net of intersecting lines showing the direction of the material wealth flows 1766 . The geometric formula of a decreasing

/geometrical progression

geometrical progression forms the basis for the first model, while an arithmetical formula is the basis of the second one.

In spite of their marked difference in appearance, both models depict one and the same process of reproduction of the global social product and the social income.

The principal flows of material values in the French society of that period, defining the economic relations between the main classes (estates) are shown in "The Economic Table" - this first in the history of economic thought macroeconomic model.The table shows how the expenditures of the productive class of farmers reproduce the net income of society annually. This model gave F.Quesnay the possibility to reveal for the first time the most important social and economic fact, the existence of "an economic surplus" as the basis for the landowners. Later K.Marx named this economic surplus as the surplus product.

In spite of the exterior important differences between the models they characterize the same process of reproduction of the global social product and the net product income . This process is based on the equivalent exchange (purchases and sales) among the principal classes of the French society of that time and the misappropriation of the economic surplus without return by the landowners, church and the king. Alienation without return is the initial point of the whole exchange process. Both models show that the process of reproduction can proceed without hindrance if certain national economic proportions are observed; e.g., if every livre of expenditure reproduces 2.5 livres of production. In both Quesnay's models the amount of the net product plays the role of the strategic parameter. Two infinitely diminishing geometric progressions form the basis of the 1758 model: one has the coefficient r, the other has the coefficient (1-r). In that case when the coefficient of progression is equal to one half then both progressions have identical numerators and denominators. By the geometric progression F.Quesnay characterized a chain of branched interdependence of the time-sequenced reproductable quantities of the net product and the initial amounts of the aggregate and net product. In the construction on the basis of arithmetical progression (1766 model five inclines to define the flow of

/the stock

the stock of material and capital equipment and simultaneously money in form of refluxes), which take place in the process of exchange among the class of owner rentiers, the class of farmer-cultivators and the class of artisans, tradesmen and persons of free professions. The top ends of the inclines characterize purchasers and the lower ends characterize sellers. The farmers sell 60 per cent of their production.

Almost a hundred years later Karl Marx constructed (in place of Quesnay's model) his model of the simple and expanded reproduction. Here, he regarded the reproduction process both as a process of reimbursement cost and a process of compensation of the natural form of the social product (life-supporting means and means of production) simultaneously. At the same time K.Marx studied the problem, "how the value of capital, spent in the production process is reimbursed from the annual product and how the reimbursement process interlaces with the consumption of the surplus value by the capitalist and the wages by the workers" 1/.

This model reveals a very important fact, that for the uninterrupted reproduction process it is necessary to ensure the exchange of those parts of the social product for which the existence of dialectical contradiction between the material and value forms of this product existence is quite typical. In the conditions of simple reproduction, in particular, this requirement is determined by the equality of the material expenditure in the production of life-supporting means (C_2) with the amount of the income created in the subdivision of production of means of production ($V_1 + m_1$).

In both cases the value form does not coincide with the material form of the social product existence. The coincidence of these two forms is only characteristic for the income functioning in the form of life-supporting means/$V_2 + m_2$/ and for the material expenditures functioning in the material form of the means of production /C_1/.

For realization of the expanded reproduction it is necessary to observe the famous K.Marx's inequality, which postulates that income created in the subdivision of production of means of production must be greater than the material expenditures of the subdivision of production of life-supporting means /$V_1 + M_1 \geqslant C_2$/. This is the main conclusion

1/ K.Marx and F.Engels. Collected works, V.24, page 444.

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received by K.Marx on the basis of model of simple and expanded reproduction.

This inequality may be replaced by the equality of two masses of individual parts of the social product, whose value form and material forms exist in the mutual contradiction. In order to pass from inequality to equality it is necessary to allot that part of the surplus product should be chosen, for which the value and material forms will not coincide. In the production of means of production this will always be that part /P_1/ of the surplus product which is consumed by capitalists as income /P_1m_1/ and that part /Z_1/ of the surplus product which ensures an increment in wage payment /Z_1m_1/. But in the production of life-supporting means we would have discrepancy in that part /q_2/ of the surplus product existing in the material form of life-supporting means which goes for expansion of the fund of material expenditures /q_2m_2/.

In virtue of this the basic condition for expanded reproduction, according to K.Marx's model, is determined by the following equation: $V_1 + P_1m_1 + Z_1m_1 = C_2 + q_2m_2$.

Besides this, in Marx's model, a number of other significant parameters of reproduction were determined, e.g., the organic structure of capital /C:V/, the rate of surplus product /m:V/, the level of the social division of labour /$V_1:V_2$/, rates of growth /$\frac{V + \Delta V}{V}$/, increment of accumulation fund / C + V/, and increment of income /$\Delta V + \Delta m$/.

V.I. Lenin in his variant of model of expanded reproduction presented the case when the organic structure of capital /C : V/ grows up. This process, if it is not accompanied by a corresponding growth in the social productivity of labour, is connected with the growth of the capital capacity and the fund capacity of the social product and with a decrease in rates of growth of the global social product.

Besides this, V.I.Lenin has left us in heritage his famous diagram of the creation of home market. It was composed by him in the form of a graphic-numerical model. It considered two processes: specialization of commodity production and stratification of commodity producers

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connected with the separation of the means of production from the labour force. As a result of these two processes both the commodity market and the labour force market develop and the natural consumption in kind of the products of their own production declines sharply.

This model played a decisive role in determining the problem concerning the fate of capitalism in Russia (which was the subject for fervent discussions between marxists and narodniks at the end of the 19th century). V.I.Lenin showed in an illustrative manner, by constructing a graphic model consisting of six blocks (defining the stage of development of both processes) and containing six producers in each producing three different products in various quantities, that at the same volume of the global social product the commodity market grows incessantly, enveloping gradually at first 1/9, then 1/2, and finally 2/3 of the social product.

This model has not lost its principal significance today because the intensive process of subdivisional and territorial specialization of social production is continuing at the present time as well, particularly, in a direction of the article and detail specialization of industry. Such a model is necessary, for example, to characterize the process of the social division of labour among the socialist countries, the group and regional division of labour, and for the analysis of large-scale specialization of production in the Soviet Union.

The necessity of the economic model constructing became apparent as far back as the very first years of the Soviet power. On Lenin's recommendations and by the decision of the Government the Central Statistical Board started construction of the summary balance of the national economy for 1923/24. The component parts of this first balance were the national income balance, the social product balance and the inter-branch balance of production and product distribution. All its features were of a typical economic model. All modern models of planning the national economy origin from this first balance model.

In constructing economic models, of the utmost importance is the first stage of its construction consisting in the strict and exact formulation of the initial prerequisites and principal conceptions and

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categories that are to be introduced into the model. The second stage of its construction connected with the strict and exact mathematical and logical formulation of the corresponding economic problem, expressed in the form of an economic model is of no lesser importance.

In formulating the economic problem it is very essential not only to set the modelling problem correctly, but also to formulate terms of the problem, its parameters defining the dependent and independent variables, and also its various restrictions and constants with quantitative exactness. Besides, the specified function (e.g., in the form of a linear functional) to which the changes in the given economic system are subjected should be formulated. As a matter of fact in economic modelling one necessarily deals with purposeful economic processes. This purposefulness is expressed by the fact that the given economic system has regularly become adjusted to a quite different condition. In spite of all external disturbances and different obstacles, in a purposeful economic system a definite control mechanism or a feedback system steadily directing the given process to an entirely definite state has always functioned. Now and again, such a system strives to achieve a definite normal size of its parameters. Therefore, in modelling economic processes a target is expounded not as outwardly imposed, but as internal definiteness of the given economic system.

The immutable law of economic construction requires the receiving of a maximum economic result with the least possible expenditure of material, labour, production, monetary and natural resources and this purposefulness characterizes the economic processes as their internal definiteness.

The principle of maximum rules is supreme in the economic sphere. In this connection, in constructing any economic model the corresponding economic criteria is always formulated in the form of a specified function (or functional) reaching in the process of solving of the given economic problem its maximum or minimum value.

It is very characteristic that in constructing economic models (dynamic, in particular) one deals with the various kinds of differential quantities defining the increment of economic quantities in time or

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due to the corresponding increase of resources and some restrictions. The coefficients of economic efficiency of capital investments, for example, by nature are differential quantities. Objective estimations of the utilization of resources (for example, equipment rentals, the rental values of natural resources) are also the differential quantities.

In constructing economic models extremal quantities that reach in certain conditions their extremal(maximum or minimum) value are used in addition to the differential quantities.

The modelling method cannot be limited to the use of absolute, average, and relative quantities. The use of the differential and extremal quantities is also inevitable.

Economic model peculiarity is a whole definite structure equivalent to the nature of economic system. The cell structure of economy inevitably leads to the emergence of different blocks in economic models. In the blocks the intersection of vector-line and vector-columns, forms various matrices of economic coefficients. For example, the production and distribution model of the social product has four blocks (quadrants):1) intermediate product; 2) final product (national income); 3) resources or elements of branch income; 4) redistribution of income.

The first and the second blocks form a subsystem defining the summary physical balance (the distribution of the social product), and the first and the third blocks define another subsystem, reflecting the value structure of the production process.

In constructing a system of models of the planning for the economy, additional blocks are usually introduced. The block of the fixed and working capital, the vector-lines of which show the distribution of the given material form of the fixed and working capitals in those branches of national economy in which they function is introduced first of all. The vector-columns of this block show the material structure of the fixed and working capitals functioning in the given branch of national economy. In view of the fact that the planning of capital investments is of particular significance, the models of the planning of the economy envisage as a rule, a special block of the capital investment distribution. In this block the types of capital investment

/(e.g.material

(e.g., material kinds of equipment, types of construction) are shown in the lines whereas the branches of national economy are shown in the columns.

Usually, the system of models of the planning for the economy also envisages an additional block, "the labour force". In the lines of this block we can see the categories of the labour force and in the columns are the branches in which it is occupied. In some cases these blocks envisage the distribution of the average annual labour force, in others the distribution of worked out working time.

For study of the economic interdependences between different economic regions of the country, the blocks "import", and "export" for a given economic region are rather important. They are usually constructed in the form of a matrix with the lines defining the material kinds of exported and imported goods and the columns show the export and import regions.

In all economic models, the intermediate product block always plays an important role. The matrix of this block includes the technological consumption coefficients that define the specific consumption of fuel, power, raw materials, and completing articles per unit of output. This block has a sub-block, where a matrix for expenditure imported goods is placed and also a sub-block with a matrix of depreciation coefficients (fund capacity, divided by the working life of fixed capitals of a given material kind). The matrix of technological consumption coefficients is extensively used to determine the so-called complete (direct and indirect) expenditure coefficients of fuel, power, raw materials, auxiliary materials, labour, etc.

The block of technological consumption coefficients and the fund capacity block permit the determination of the volume of necessary investments and the volume of the necessary gross product which must be at the disposal when the problem to raise the population consumption fund or the export volume to a definite directive value and structure is set. These models, therefore, permit to begin planning by determining the desired volume and structure of the population consumption fund, and afterwards on this basis, determine the volume of the planned

gross product. If such economic model is absent, it is usually necessary to determine the task for gross output, then substract the material consumption (intermediate product), determine the final product (national income) and substract the accumulation fund and the capital investment, and finally, estimate the possible population consumption fund.

The method of modelling economic processes, obviously, permit to carry out the necessary economic and planning calculations on a scientifically based foundation.

The significance of economic models, however, is not limited by the fact that each given economic model permits to bring certain flows of economic information together into a purposeful system, and therefore, regularize it. It is very important that the economic models permit not only the transformation of initial economic information into a new system of indexes and characteristics, but also give the possibility of discovering new properties of the modelling objects. Therefore, the modelling method in economics is not only a method of mathematical and numerical description of economic processes, but also a method of their scientific knowledge.

With a view to scientific cognition, the economist usually utilizes a whole system of economic models, beginning with small-sized single-product models and finishing with a branched system of big-sized inter-branch and inter-regional models of national economy.

The process of acquiring of knowledge of economic reality usually begins with the investigation of enlarged macro-economic models, depicting the whole national economy, in consolidated indexes. Thus, the global social product is considered as a unified whole. Simultaneously, its principal components can be distinguished, for example, the indemnity fund of the expenditures on goods and materials (the intermediate product) and the national income (the final national product) and within the latter, the consumption and accumulation funds can be separated.

Mathematical time analysis of the development of the global social product and mutual relation among its component parts would permit to establish the relationship between the rates of growth of the gross

/product and

product and its parts, and the structural economic proportions defining, for example, the correlation between the global product and the national income, between the consumption fund and the accumulation fund. Here, a specific property of economic parameters becomes apparent, that is their elasticity measured by the ratio of increment of two economic quantities.

By introducing some of economic criteria into the analysis, for example, envisaging provision of a sufficiently high and steady rate of growth of the national income in time, it would be possible to determine the optimum, the most advantageous interrelation between the accumulation fund and the consumption fund.

To solve an extremal problem another economic criterion can be chosen, for example, it is possible to request an attainment growth of the given level of per capita national income for a definite period of time. Then the optimum economic proportions would be different.

It is very characteristic, that the use of economic models as a method of scientific knowledge and not only as a method of a simple description of economic systems, necessitates the introduction of various differential and extremal quantities into economic analysis. Therefore, if in a single-product small-sized model to distinguish several technological methods of production, there arises the necessity of a special system for estimating the economic efficiency of some selected technological methods of production or a chosen combination of such methods. These estimations are also typical of differential and extreme quantities.

The necessity of detailing and concretising both description and knowledge of economic reality assumes transition from the small-sized to multi-sized models, for example, the construction of complicated big-sized inter-branch and inter-regional models.

The use of the mathematical description means, for example, the use of vectors and matrices, permits an easy transition to the big-sized economic models instead of the small-sized ones. Here, however, many complicated methodological problems have arisen comparatively underdeveloped as yet. The main difficulties consist on creation of a

/scientifically-based

scientifically-based classification of products, enterprises, types of economic activity, and also the branches of national economy.

This problem interweaves with the problems of aggregating and disaggregating of the economic systems and processes. In the process of such classification and subdivision, it is important to retain the most natural, logical order in the sequential subdivision of the whole national economy into its principal, naturally distinguishable and distinct component parts and elements. In doing so the invariance principle must be followed, so that it always would be possible to receive a single-valued result in the process of subdivision and the enlargement of economic systems. But observation of such requirement is far from easy. In any case, the results of scientific knowledge and the results of economic calculations, should not change depending on the adopted classification system and the adopted system of aggregation and disaggregation.

In transition from the small-sized to the big-sized economic models, the complicated problem of correct reproduction of the process of inter-action between macroeconomic and microeconomic systems of various ranks also arises. In this case we must distinguish three kinds of interaction: a) the interaction of macroeconomic systems. Such, for example, are the interactions of various macro-economic national systems, the interaction of the global social product system with the subsystem of the national income; b) the interaction of macroeconomic systems with individual subsystems and micro-economic systems. Such are, for example, the interactions of the national economy with the regional and branch economic subsystems and with the system of separate enterprises; c) the interaction of economic subsystems and the micro-economic systems.

All the forms of interaction can be reduced to two-way iterative mutual adaptation of all macro-economic and micro-economic systems and subsystems. Here, practically, we have the additional modelling of a continually varying economic situation comprising, as a result of an incessant interaction between macro-economic and micro-economic systems of different levels and ranks. Such interaction takes place on the basis

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of the interaction of the input and output elements of each system and subsystem, and on the basis of the system of the inverse economic relationships.

The inverse relationship system controls the interaction of the input and output elements of the various economic systems and subsystems. To describe and study such interaction, one would construct a specific system of economic models based on the model of individual enterprises and building projects, and which ends above in the big-sized and small-sized macro-economic models. As an example we can consider the system of models of the planning for the economy. This system of models is based on the so-called matrix technical, output and financial plans of enterprises and is completed by the macro-economic model of the input - output table and the model of the inter-branch and inter-regional transaction table. Those interested in the details, may find a description of the system of the matrix models of technical, output and financial plans in the journal "Voprosy Economiki", articles of A.A Modin No.1, 1964 , A.Kudukis No.3,1963 , and also in a booklet by M.M.Fedorovitch, "Mathematical Model of the Technical, Output and Financial Plan", Znanie, 1962.

The most characteristic feature of this model is the complete and consecutive utilization of the economic quantity and technological standard matrices during its construction for description and analysis of the planning process on the economic and local levels.

A matrix technical, output and financial plan of an enterprise consists of four blocks (quadrants). The first block reflects the intra-plant connections in the process of production and consumption of product at the plant. It describes the intra-plant consumption of the articles of its own production.

The second block describes the final production of the enterprise including the commodity output, sales of remnants of raw materials and also transfer of the product of its own production to the non-productive offices of the enterprise.

The third block describes the expenditure of the existing manpower, material, monetary (financial) resources of the enterprise on the production

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of the principal items of products and on ensuring the functioning subsidiary production process and auxiliary offices of the enterprise. This block consists in the aggregate of the columns containing the main elements of expenditure costing for each type of production or the expenditure estimate on the functioning of subordinate shops and auxiliary offices of the enterprise (in this block a separate column is set for each kind of basic output and for subordinate shops and auxiliary offices).

The third block is divided into two sub-blocks: a) expenditures for brought-in outside resources in the form of the purchased fuel, power semi-finished products, raw materials and auxiliary materials, b) expenditures of own resources (amortization, wages, extra-charges on wages, remuneration for scientific research, managerial staff maintenance and financial accounting).

An important supplement to the third block is a special additional sub-block, that defines in physical and value terms, the outside deliveries of fuel, raw materials, auxiliary materials and their distribution for the production of the main items of product and for the needs of subordinate shops and auxiliary offices of the enterprise.

The fourth block (quadrant) describes the transfer of the present basic resources of the enterprise to satisfy the needs of the non-productive offices of the enterprise, and also includes sales of the purchased raw materials and other materials.

The matrix model of technical, output and financial plans, therefore, is a unified model of economic information necessary for intra-plant planning and economic estimates.

As the experience of the Economic-mathematical laboratory of the Lithuanian Sovnarkhez has proved, a shop model of the intra-plant planning can be built in the form of a matrix model. This model consists of six blocks forming matrix constructions: 1) the block of production capacities, including the main groups of equipment and the operations and kinds of manual labour on the lines, while the columns include the names of the workpieces, assemblies and articles. This block includes the matrix of processing labour-intensiveness in norm-hours and the equipment maintenance matrix; 2) the block of material expenditures. The elements

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of this block are the norms of expenditure of corresponding material resources per unit of output of workpieces, assemblies and articles in physical terms of measurement; 3) the block of labour expenditure, the elements of which characterize the expenditures of basic wage of the basic workers (by professions) for processing of unit of workpieces, assemblies and articles; 4) the completeness block defining the completness of j-th workpiece in s-th article; 5) the route block describing the technical instructions for processing of a work piece; 6) the block of dynamics indicator, the elements of which in matrix form characterize the degree of expenditure variation in the form of the natural and cost coefficients measurement for processing of j-th workpiece, assembly, article according to i-th costing item or in the form of the material and labour resources. Such information model of shops and plant permits performance of a varied economic and planning calculations. In particular, it permits: 1) to calculate the need in technological equipment; 2) to calculate the labour plan; 3) to estimate the basic wage fund of piece-rate workers; 4) to calculate the plan for provision of supplies and machinery; 5) to renew the normative base for a plant in labour-intensiveness, the material capacity, the liabilities of production capacity; 6) to determine the planned works and shop cost of workpieces, assemblies and articles; 7) to determine the surpluses of incomplete production; 8) to determine the estimates expenditure on production for the whole enterprise. All these economic and planning calculations are based on rather simple algorithms.

The matrix technical, output and financial plans are not only the main instruments for the intra-plant and shop planning but also the main source for constructing of the production branch models and the inter-branch balance models of production and distribution of output for any economic region.

Special branch variant models can be constructed as an authomatized summary of the low-level technical output and financial plans. The individual enterprises of a given branch are the elements of such model. These enterprises can be preliminarily formed into sub-groups of enterprises with the similar production technology or with the same technical

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standard of production (for example, with the same power available per worker or fund available per worker). Branch variant models can be summarized into inter-branch models of an economic region with the isolation of the production technology for the most important branches of national economy.

Such is basically the system of the informative economic models, so necessary for realization of the automatized processing system of collecting, processing and transformation of economic information.

This system may be widely used for large-scale economic and planning calculations, and for well-based taking of the design and planning decisions both in the centre and the localities.

In this report we have considered the method of modelling economic processes only on the example of the special information model construction. The system of the so-called analogue economic-cybernetic models, defining the mechanism of regulating the purposeful economic systems, was left without consideration. Models of such type, must represent not only the mechanism of the planned control the purposeful behaviour conduct of the economic system, when the control is performed by the control unit of the system.

These analogue economic-cybernetic models must also provide for self-organization, self-regulation and self-adjusting for each given economic system. The construction of such models is a very complicated matter. Some of these problems were examined in an article "Socialist Economy and Production Planning" by the author ("Communist", N° 5, 1964).

Any economic system requires at least two control mechanisms: 1) a purposeful mechanism of the economic management and control; 2) a decentralised feed back mechanism for self-adjusting and self-regulation of an economic system.

The proper decision is to choose such system, which would optimally combine both control mechanisms. The French system of so-called individual planning is mainly based on the mechanism of the second type and uses chiefly the indirect control methods (for example, credit and finance means).

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During the cult of personality our regulation system was based on the administrative (authorisative) planning methods and on an excessive centralisation of a whole economic administration. It is incorrect to seek ways of improving such regulation system only by creating an automatized system of collecting and processing economic information. It is insufficient to provide the centre and localities with an automatized system of a large-scale economic and planning calculations necessary for well-based taking of the design and planning decisions. Though this is also of importance, but it is still more important to adjust the mechanism of self-adjusting and self-regulation of our economic system. It is also erroneous to assume that the basis of the process of self-adjusting and self-regulation can be only the market mechanism.

In an article "The Socialist Management and Production Planning" I tried to show that in our conditions the functions of the self-adjusting and self-regulation mechanism might be based on a contractual profit-and-loss system and on a special system of purposive cost public funds, the replenishment and expenditure of which would be regulated by a system of lasting quotas established by the economic legislation.

The soviet economic science, arming itself with the method of the economic processes modelling, must concentrate its efforts not only on construction of a system of information models necessary for scientifically-based taking of the design and planning decisions both in the centre and in the localities, but as simultaneously a special consideration must be given to the process of an arrangement of the mechanism of the economic self-adjusting and self-regulation in our country.

In the nearest future our economic science will fulfill the assignment of the Party and the Government to create an automatized system of accounting, planning and management in the national economy.

Its fulfillment by no means could be limited only by the construction of information models ensuring a system of the large-scale economic and planning calculation. It is more significant to concentrate our efforts on the construction of analogue economic-cybernetic models imitating the very process of socialist management, based on the principle of democratic centralism.

/Democratic centralism

Democratic centralism, unconditionally, envisages the joint use of both the principle of planned economic development, as well as the principle of the profit and loss accounting and the system of the social contractual relations. There is no doubt that in order to satisfy the pressing needs of our economic life, our economic science would also give our economy a system of scientific regulations ensuring an optimum combination of the principles of a centralized mechanism of planned economic development and a decentralized mechanism of self-adjustment and self-regulation, based on the contractual system of the profit and loss accounting and on an adequately regulated system of functioning of purposeful, value public funds.

USE OF MATHEMATICAL METHODS IN SOLVING PROBLEMS OF INTRAREGIONAL AND INTERINDUSTRIAL PLANNING *

The development of Soviet economy, the increasing scale of production and the extension of interindustrial and interregional relations require an improved management of the economy and more perfect methods of organising and planning production.

Mathematical methods and electronic computers are now used on an increasing scale in economical research investigations and in planning since they permit solving economic problems most rapidly and effectively.

In principle mathematical methods and electronic computers may be used in solving local as well as national economy problems. It should be noted, however, that not all questions in this field have been settled both from the standpoint of the mathematical problems and from the point of view of economical theory since we are dealing with complex, multiplefactorial interrelations and processes.

Successful use of mathematical methods in economical research studies and in planning largely depends on a clear and correct formulation of the problems, on the level of development of the electronic computers, on the availability of effective algorithms and on the quality of statistics information.

The transportation problem of linear programming (its various modifications) is most widely used today in solving a great range of problems (1) and the use of mathematical methods in solving it offers the following essential advantages:

(a) in the process of solving the problem we obtain an evaluation of the indices which underlie the calculations and with the existing defects in initial information are very important;

(b) after correction of the original data and several calculations the resultant solution is economically more sound.

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* By L. Y. Mints and J. J. Finkelstein

/The most

The most accessible form of studying interregional relations is to investigate the commercial traffic from producer to consumer, the present practice showing that here the shortest distances, lowest tariffs and the most advantageous type of transport are not always used.

Experience shows that the solution of this problem by mathematical methods makes it possible to save 10 - 13 per cent of transportation costs and to choose the most concentrated directions of traffic, thus doing away with the situation when the loads are shipped in small batches from one point of production to many points of consumption. The use of mathematical methods for the solution of such problems has completely justified itself in practice in the transportation scheme for round wood and many other materials.

The cartograms 1 and 2 clearly show the advantages of rational planning of round wood transportation compared with the actual transportation scheme.

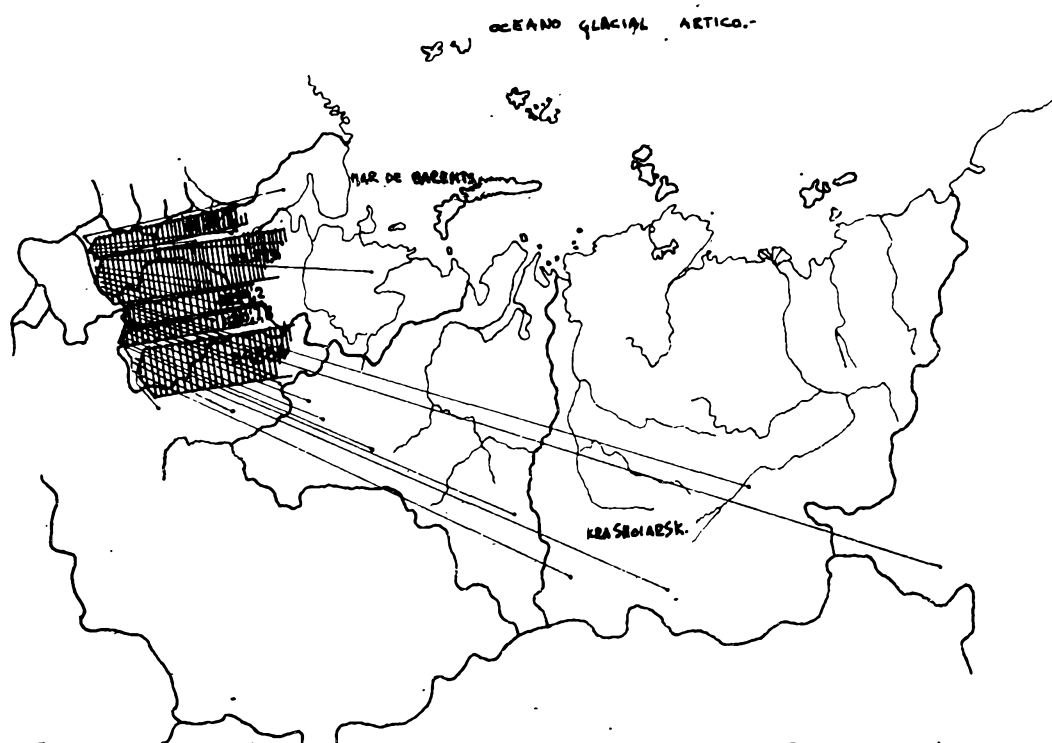
We solved the problem of transporting pulp wood for self-contained paper mills (from the point of shipment to the destination) for part of the territory of our country containing a considerable number of interconnected suppliers and consumers. If we donsider a plan of rational transportation over a small area embracing an insignificant part of suppliers and consumers, the resultant local optimum will not coincide with the general optimum for a large territory. This indicates the necessity for drawing up a plan of transportation either over the entire country or at least a large territory pronounced and with important internal economic links.

The problem on pulp wood transportation was solved for several areas of the North-Western part of the USSR. The results showed that the use of the optimum variant yielded 8.6 per cent savings (per t/km). But perhaps the most important was the conclusion of the necessity for modifying the character of the transportation scheme. It turned out that the supply of the self-contained paper mills with pulp wood from the resources of various regions and republics did not yield an optimum for the entire North-Western part of the country.

/The practice

THE CARTOGRAM 1.

Export of round timber to Ukrain SSR from the regions and republices of the USSR (thousand tons) According to data of the rail statistics, 1958.

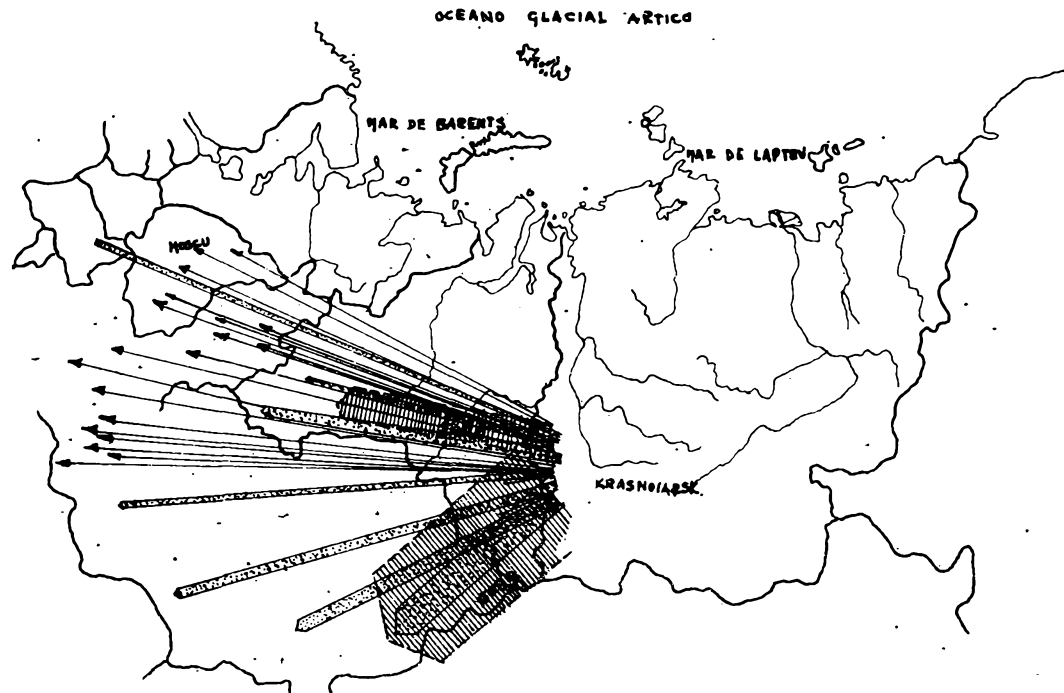


→ The actual transportation that are showed by the non-scale arrowes

1207,8 The rational transportation.

THE CARTOGRAM 2.

Export of round timber from Krasnoyarsk territory to the region and republics of the USSR, 1958 (thousand tons) According to data of rail statistics, 1958



→ The actual transportation less than 60 thousand tons

76,6 The actual transportation more than 60 thousand tons

508,1 the rational transportation

The practice of each republic's (or region's) planning its own supply of pulp wood to mills entails the fact that the resultant total balancing of the demands with the available resources is sound only with respect to an individual republic or district. In optimum calculations for the entire complex as a whole it is more expedient to complicate the interrepublican and interregional relations, which produces a considerable effect and, strange as it may seem, eliminates cross-hauls. For example, the Latvian SSR actually met all its requirements in pulp wood by its own resources; the Estonian SSR has utilised all its available resources and imported the lacking part of pulp wood. According to optimum calculation Latvia must export 98.2 per cent of its own resources to Kaliningrad Region and get the timber for itself from other north-western areas. Estonia must export 77.2 per cent of the total volume of pulp wood.

Calculations have shown that from the standpoint of the general economy of resources over the entire North-Western region it is rational to supply mills in the North of Estonia with pulp wood from the Karelian ASSR and from the Arkhangelsk, Vologda and Leningrad regions, and to direct the available Estonian resources to mills situated in the North of Latvia. At the same time it is expedient to send the resources from the South of the Latvian SSR to the Lithuanian SSR and Kaliningrad Region.

Cartograms 3, 4 and 5 clearly show the way the direction of the traffic routes are changed and what changes in optimal calculations result in economy.

Thus the problem of attaching consumers to producers may be correctly solved on the basis of calculations for the country as a whole or for large regional complexes.

The transportation problem of linear programming is the most elaborated part of the mathematical methods and has been practically proved in planning transportation. Application of the transportation problem to the solution of economic problems of allocation of industry and other branches over various districts of the country is more complicated.

/The concept

The concept of optimum is not simple; it depends on whether the branch problem is solved for an individual area for the country as a whole or in aggregate with other branches. Everything depends on the number of factors underlaying the calculations and their interdependence (linear of non-linear dependences, etc.). Thus the optimum will vary with extension of the territory and the increase in the number of factors to be included in the mathematical model.

A special part in the solution of economic problems by the use of mathematical methods is played by the preparation of initial data and the determination of a number of fundamental propositions which are important for economic calculations (prices, and methods of calculating expenditures of social labour, calculation of capital investments per unit of output, etc.). Depending on the precision of the initial data we may, as a result of using machine mathematics, get various optimums which must then be subjected to a profound economic analysis. The branch and regional model must also specify the indices connected with the organizational structure of industrial enterprises, which requires preparation of appropriate data.

In locating enterprises the costs per unit of production must be calculated at each individual point and for various production capacities. This is very important because costs may depend on the sizes of the enterprises. It is also important to consider the expenses connected with the cultural and welfare needs of the workers hired from the outside, and a number of other factors.

In solving the problem of optimum location of various branches of industry in the country's economic areas by mathematical methods we are laying aside the questions connected with scattering the various enterprises or their parts (separate shops, auxiliary production units) within the economic area. As criterion for solving this type of problem serves the location of enterprises within an area with due regard for the best utilization of the available labour and material resources.

The optimum solution of a problem of rational location of industry must envisage elimination of excessive density of the population in large cities and further equalization of the economic development of the country's areas.

/Only if

Only if all the aforesaid factors have been taken into consideration may we expect our mathematical model of locating the branch to answer the purpose.

We have the experience of solving by mathematical methods (open model of a transportation problem) the problem of optimal location of the cement industry in the country's economic areas. The calculations were based on the following data:

(a) variants of long-term development of production;

(b) calculation of the needs according to economic areas;

(c) available production capacities and their possible growth in the extant enterprises (by reconstruction) or in newly built enterprises at points adjacent to raw material resources;

(d) cost calculations;

(e) calculations of distances and transportation costs from the possible points of production to the consumers.

The problem may be solved with respect to individual branches for the country as a whole and individually for large economic areas; the latter case will require additional data on import and export, and a correction of the results with the aid of the solution obtained for the branch as a whole. As the indices mentioned above are to a certain degree limited indices (inadequate estimate of the development of other branches of industry at the same points, lack of connections with the indices of the available labour resources and living conditions) they don't guarantee a completely optimum solution. It must be emphasised that the optimum of location - the best variant of locating the enterprises of any branch - should be considered from the national economy point of view, because only in this case is it also possible to get the solution for locating the enterprises according to economic areas. This does not exclude finding an optimum for individual economic areas, but such elaboration cannot be considered final since our calculations must be based on a minimum of social labour.

The solution of such a problem as optimal location of a branch is based on elicitation of the long-term demand for the given product, according to each point of consumption, and on drawing up variants for

/locating the

locating the enterprises in various of the countries where there are raw materials and other conditions for organising the given production. In its turn each point of construction may have different variants as to capacities of the enterprises, costs, production, capital investments per unit of output and other characteristics.

The main difficulties in constructing a model for locating the enterprises of some branch consist in obtaining the necessary initial data of adequate quality for the long-term period.

The problem of locating the cement industry was solved on an electronic computer; matrix - dimension was 136 (areas) x 125 (points of potential production). It was necessary to ensure complete satisfaction of the cement requirements of all the consumers, complete utilization of all of the cement produced at minimum costs (considering all expenses, including those for transport). As a result of solving the problem we found that the requirements could be satisfied by 66 plants, with a considerable decrease in the transportation distances, great economy of means and reduced costs of production. The problem was solved in several stages because the initial information was ascertained and different variants of calculations were used. The calculations yielded extensive material for economic analysis and acceptance of the most rational plan for allocating of the given industry.

Drawing up interdependent interindustrial balances of the national economy for individual economic areas of the country is a more complicated economico-mathematical problem. Elaboration of the problem of specialization of areas and their overall development requires the solution of numerous economic problems connected with the national economy plan for the entire country and determination of the role of each area within this plan from the standpoint of maximum effective expenditure of social labour. The existence of numerous interacting factors, which have to be taken into account, engenders considerable difficulties both in the field of economic theory and practice of locating productive forces, and in elaboration of mathematical model for an economic area.

/It must

It must be admitted that at the present stage of development of economico-mathematical methods the richest information for the solution of the problem of overall development of an economic area, its specialization and ensurance of the necessary proportions is furnished by the regional reporting and planning balance of production and distribution of the products drawn up according to a most complete programme (import and expert according to branches and areas, available and prospective natural resources, labour resources, etc.). However, the model of an individual area cannot as yet furnish a final plan for its specialization and all-round development. For this the model must be coordinated with models of all other areas and with the plan for development of the national economy as a whole.

The advantage of the territorial balance model is that it furnishes not uncoordinated indices for individual branches, but rather a characteristic of the national economy of the area as a whole. In this balance we get information not only on the work of enterprises, but also on their production which is used to satisfy the requirements of both the given area and the entire country, data on direct and total expenditures on each type of production, i.e. the technological coefficients which serve as the basis for planning, etc. (26, 27, 28, 29).

The drawing-up of a planned territorial balance model leads us to the solution of the general of the national economy problem. But it is very difficult economically, as well as mathematically, and is still far from final solution.

We shall now describe several mathematical models and corresponding algorithms for the solution of the aforementioned economic problems.

1. Model for Establishing Optimal Transport Connections

Given:

1. points of production of the given product Ai (i = 1.2 ..... m);
2. volume of production at point Ai equals Ai;
3. points of consumption of the given product Bj (j = 1.2 .... n);
4. extent of requirement of the given product at point Bj equals b_j;

/5. transport

5. transport costs C_{ij} (transportation expenses per unit of production from A_i to b_j).

It is assumed that the production and the requirements are balanced, i.e.

$$\sum_{i=1}^{m} A_i = \sum_{j=1}^{n} b_j \qquad (1)$$

There is an optimal transportation plan, i.e. a plan entailing a minimum of transportation costs. We shall mark the unknown object of deliveries from A_i to B_j as X_{ij}.

We must now find a system of numbers (X_{ij}) $(i = 1.2 \ldots m;$ $j = 1.2 \ldots n)$ in which

$X_{ij} \geq 0$ (value of the deliveries from Ai to Bj is not negative) (2)

$\sum_{j=1}^{n} X_{ij} = A_i$ (volume of production at point Ai equals Ai) (3)

$\sum_{i=1}^{m} X_{ij} = b_j$ (volume of consumption at point B_j equals b_j) (4)

$\sum_{i=1}^{m} \sum_{j=1}^{n} C_{ij} X_{ij} = \min$ (sum of transportation costs is minimal) (5)

This is a classic transportation problem of linear programming. It is quite natural that, both in its "pure" form and in the form of various modifications, the transportation model has found the widest application in the solution of various problems connected with optimal location of production, establishment of interregional relations, etc. (especially for one product or nearly "one-product" branches). It should be noted that even the simplest model that we just described may be interpreted in various ways. For example, points A_i may be considered not points of production, but points of location of warehouses.

Algorithms of precise solution of the transport problem of linear programming were repeatedly described in literature (1, 2, 3).

/However, in

However, in solving great problems by means of precise algorithms it is necessary to use modern computers. To extend the field of the possible use of manual calculations (which is essential in the absence of enough electronic computers and when approximative calculations are needed) approximative methods have been proposed. Generally speaking these methods do not furnish an optimal solution, but make it possible to obtain a rather good approximate solution. For example, for approximate calculation Vogel's approximative method (2) was used; some Soviet and Czechoslovak economists very optimistically appraise the possibilities of this method. However, this method does not always ensure a good approximation.

One modification is possible within the "purely" transportation model; from the purely economic point of view this modification does not introduce much that is new, but leads to considerable computation difficulties. Let us assume that the transportation costs of the product in the amount of Xij from Ai to Bi is measured not by the value $C_{ij} X_{ij}$, as was done above, but as follows:

$$C_{ij}(X_{ij}) = \begin{cases} 0 \text{ if } X_{ij} = 0 \\ a_{ij} + b_{ij}x_{ij} \text{ if } x_{ij} > 0 \end{cases} \qquad (6)$$

where Aij and Bij are positive constants.

This problem may be reduced to an integer problem of linear programming, but with sufficiently large dimensions its solution will be difficult. Certain economic models corresponding to the given problem are known and approximative methods of its solution have been suggested (4, 5), but there is still little practical experience in this field.

The calculation of transportation costs by the formula (6) may be interpreted, for example, as follows. A new area rich in a certain type of mineral is being developed. The fields to be worked are to be the future suppliers (the fields were established by geologists and the planned outputs are also indicated), and the transport nodes through which the product will be exported are to be the future "consumers".

/Most of

Most of the future suppliers and consumers are not connected by roads. In this case the value Aij in the formula (6) may be interpreted as expenses (per unit of production) for building a road from A to B.

2. Linear One-Branch Location Models Based on a Generalization of the Transportation Model

We shall show how the transport model (2) - (5) under condition (1) can be transformed into a model of location.

Given:

1. points of production of the given product A_i ($i = 1.2 \ldots m$),
2. limitations in the volume of production at each of the points A_i:

$$0 \leqslant A_i \leqslant \sum_{j=1}^{n} X_{ij} \leqslant \bar{A}_i$$

3. points of consumption of the given product B_j ($j = 1.2 \ldots n$),
4. volume of consumption at point B_j equals b_j,
5. costs of production F.O.B. consumer C_{ij} (costs of production of the product at A_i plus transportation costs from A_i to B_i).

It is assumed that

$$\sum_{i=1}^{m} A_i \quad \sum_{j=1}^{n} b_j \quad \sum_{i=1}^{m} \bar{A}_i \tag{1'}$$

(it is possible that at some points of production the limitation from below is absent. i.e. $A_i = 0$, or the limitation from above is absent. i.e., $A_i = +\infty$, or both limitations are absent simultaneously).

An optimal production and delivery plan is sought. i.e., such a system of numbers $[X_{ij}]$ ($i = 1.2 \ldots m$; $j = 1.2 \ldots n$) which meets the conditions:

$$X_{ij} \geqslant 0 \tag{2'}$$

$$A_i \leqslant \sum_{j=1}^{n} X_{ij} \leqslant A_i \tag{3'}$$

$$\sum_{i=1}^{m} X_{ij} = b_j \tag{4'}$$

/$\sum_{i=1}^{m}$

$$\sum_{n=1}^{m} \sum_{j=1}^{n} C_{ij} X_{ij} = \min \qquad (5')$$

This is the so-called open transportation problem (with lower limits A_i).

If all $A_i = 0$, the problem is directly solved by the usual algorithm of the transportation problem. Suffice it to introduce a dummy consumer Bn + 1 (Ci, n + 1 = 0 for all i; $bn + 1 = \sum_{i=1}^{m} A_i - \sum_{j=1}^{n} b_j$) to reduce the problem to the usual transportation problem. But even, if not all $A_i = 0$, its solution is easily reduced to that of the usual transportation problem (25).

The open transportation model was used to solve the problem of locating production (See, for example, 20; 30; 31;), particularly production of cement on the territory of the USSR. (This was mentioned in the first part of the report.) True, in the latter case certain changes were introduced into the model, which made it possible to consider the approximately dependence of cement costs on the volume of production.

The transportation problem may be further complicated by introduction of one or several additional limitations. For example, we may introduce an additional limitation in the extent of the necessary capital investments

$$\sum_{i-1}^{m} K_i \sum_{j-1}^{n} X_{ij} \leqslant K \qquad (7)$$

where K_i is the extent of capital investments at the point of production A_i (i = 1.2 ..... m); K - limit of capital investments.

There may also be other additional limitation (amount of power consumed, labour resources, etc.), but their formulation might be, except the limitation in capital investments, more natural within the framework of an all-round, but not a one-branch model. Usually there are relatively few additional limitations with respect to the basic problem. Moreover, with a more fractional classification (with more points A_i and B_j considered) the basic problem expands, while the

/number of

number of additional limitations does not change. It is therefore natural to try to combine the calculation of the additional limitations with preservation of the specific advantages of the algorithm of the transportation problem. For one additional limitation the appropriate methods are given in (7 and 8), whereas for several limitations the well-known decomposition method (9) may be used.

So far we have successively complicated and modified the location model (2^1)-(5^1) with condition (1^1) built on the basis of a one-stage transportation model (2)-(5) with condition (1) - "suppliers"-"consumers". Of course, even within a one-branch approach most systems of production and consumption have more stages, with obligatory going through some stages (processing enterprises) and not obligatory through other stages (marketing warehouses). If it is a question of a purely transportation problem (in which all stages are obligatory and the summary volume of the possible volumes of production for each of the stages is exactly equal to the summary volume of the requirements), the difference between the multi-stage problem and the two-stage problem is not essential. As a matter of fact, for a pure transportation problem the solution of Q - stage problem (Q>2) is trivially reduced to the solution of (Q - 1) two-stage transportation problems. However, if a location problem is considered, the multi-stage problem does not directly break up into two-stage problems. But in this case, too, simple methods of solution may be pointed out; in the end these methods are reduced to utilization of the transportation algorithm (6, 10).

We shall show by a simple numerical example how it is possible to reduce a multi-stage model (in this case a three-stage model) to a two-stage model for whose solution the algorithm is well known (the literary reference is given above). Say, there are three points of raw material output - A_1, A_2, A_3, three points of processing - B_1, B_2, B_3, and three points at which the consumers are concentrated - C_1, C_2, C_3. The expenses for raw material output, processing and transportation are known (the latter are known for both the raw materials and the finished product - See Tables 1 and 2).

/Table 1

Table 1

EXPENSES FOR UNIT OF RAW MATERIALS (F.O.B. POINT OF PROCESSING)

		B_1	B_2	B_3
	Processing capacities	15	15	20
	Raw material output capacities			
A_1	10	12	14	18
A_2	30	10	13	20
A_3	20	8	6	5

Table 2

EXPENSES FOR PROCESSING IN TERMS OF UNIT IF RAW MATERIAL (F.O.B. POINT OF CONSUMPTION)

		C_1	C_2	C_3
	Requirements	10	14	16
	Processing capacities			
B_1	15	14	15	10
B_2	15	10	18	16
B_3	20	15	8	12

It turns out that the data of a three-stage problem may be expressed as a matrix of a special type two-stage problem (See Table 3).

/Table 3

Table 3

MATRIX OF A THREE-STAGE PROBLEM

		B_1	B_2	B_3	C_1	C_2	C_3	C_f
	Consumers	15	15	20	10	14	16	20
	Suppliers							
A_1	10	12	14	18	M	M	M	0
A_2	30	10	13	20	M	M	M	0
A_3	20	8	6	5	M	M	M	0
B_1	15	0	M	M	14	15	10	M
B_2	15	M	0	M	10	18	16	M
B_3	20	M	M	0	15	8	12	M

Here M is a very large number (i.e., in the squares where there is an M deliveries are forbidden). The surplus capacities of the raw material output points A_1, A_2 and A_3 are used for dummy "deliveries" to a dummy "consumer" C_f, the extent of whose requirements equals the surplus of the sum of the capacities of raw material output points over the sum of the requirements, i.e., the value (10+30+20)-(10+14+16) = 20. The surplus capacities of the processing points B_1, B_2 and B_3 are used for dummy "deliveries" "to themselves", finding themselves in the squares along the diagonal filled with zeroes (according to V.A. Mash's terminology. "dummy diagonal" (See 6)).

Owing to a certain cumbersomeness of the designations we will not write out the multi-stage model in its general view (See (6)-(10)).

/It should

It should be noted that the initial data in location problems may be for various reasons insufficiently precise. It therefore appears appropriate in some cases to use methods of stochastic programming (see, for example, corresponding reports in (11), some ways of calculating the initial data being elaborated especially for transportation-type problems both the usual (12) and multi-stage (13)).

3. Non-linear One-Branch Location Model

This model differs from model (2^1)-(5^1) with the condition (1^1) in that here the production costs at each of the possible production points depend on the volume of production (usually the dependence of the costs on the volume of production for one enterprise is expressed in a hyperbola-type curve). In this case the production costs F.O.B consumer may be expressed as

$$C_{ij} = C_{ij}\left(\sum_{j=1}^{n} X_{ij}\right)$$

This is a much more complex problem. Here the usual methods of non-linear programming (14) will not do. The main difficulty is that in this problem the local extremum may not coincide with the global extremum, and since there may be a good many such local extremums the search for the global extremum becomes very difficult. However, the works of Gelfand and Tsetlin (15, 16) warrant the hope of certain progress in the solution of this very difficult problem. The method of statistical tests (17) can apparently be used in its solution (18, 19). Approximative methods have also been suggested, but some of them may produce results rather far removed from the optimum, although much better than those obtained without the use of mathematical methods (See the articles of I.V. Girsanov and B.T. Polyak in (31), I.S. Kaganovich in (30), and also (6) and (20). Lastly, a non-linear problem may be approximately reduced to an integer problem (21), but we thereby (at least for problems of considerable dimensions) only replace one difficult problem by another and also very difficult one.

/We shall

We shall cite two examples of practically solved non-linear problems (32 and 30). In both cases it is a question of locating enterprises of the butter and cheese-producing industry. N.G. Shilin and T.A. Kosenko (32) offer brief methodological instructions for various types of areas and carry out experimental calculations for a comparatively small example (for one of the districts of Altai Territory) by I.V. Girsanov and B.T. Polyak's algorithm (31). The example envisaged 10 milk suppliers (state and collective farms) and 5 possible points of locating cheese-making plants.

I.Z. Kaganovich (30) is considering the problem of locating the dairy industry applicably to the conditions of the Estonian SSR, taking into account 310 amalgamated centres of agricultural production and 125 possible points of locating the enterprises. The author elaborated an algorithm which enabled him to get an approximate solution of this problem.

In both cases the dependence of the expenses per unit of production on the volume of production is taken in the form of a hyperbola

$$P(y) = a + \frac{B}{y}$$

where: P/(y) is the expenses per unit of production

y is the volume of production

a and b are positive constants

The same values of the constants were used for the same type of enterprises.

The algorithm built by I.Z. Kaganovich (30) essentially utilizes the specific character of the dependence of P(y) on y. Moreover, in both cases, to facilitate the calculations, he makes use of the fact that the initial raw material (milk) can be transported over limited distances and also that in the given calculations it is a question of complete replacement of the existing enterprises by new ones.

4. Variant Problem of Locating One Branch

In all the models examined above, the volume of production at each of the enterprises may assume any value within certain limits. However,

/when it

when it is a question of designing a new enterprise at some possible point of production, the designs are made in several variants, each corresponding to its own volume of production.

Compared with those examined above, the problem in this case becomes very difficult because the volume of production at each of the production points may assume only a finite number of values (and not any value within definite limits, as was assumed in the foregoing models). The difficulties arising in this case are typical of an integer problem of linear programming. There is an exact method of solving this problem (22). However, with the practically dimensions of the problems it is far from always feasible to get a solution by this method even by using modern electronic computers.

5. Multi-Branch Location Problem

The multi-branch problem of locating production in complete form borders on the problem of finding a national economy optimum with all the ensuing difficulties (fundamental, statistical, mathematical and computing). Nevertheless certain steps in this direction are being taken.

A review of the models built on the basis of a joint consideration of interindustrial and interregional connections is given in Chapter 12 of H.B. Chenery and P.G. Clark's book (23). An interesting model based on the same ideas was published by Moses (24); the author proposes an algorithm which, he believes, makes it possible to solve rather great problems.

Finally, there is a widespread opinion that to solve big problems consisting of a number of subproblems united by a certain number of limitations it is almost always possible to apply the decomposition method (9). The multi-branch location problem is a problem of the aforementioned type, but no corresponding models using the decomposition method are as yet known.

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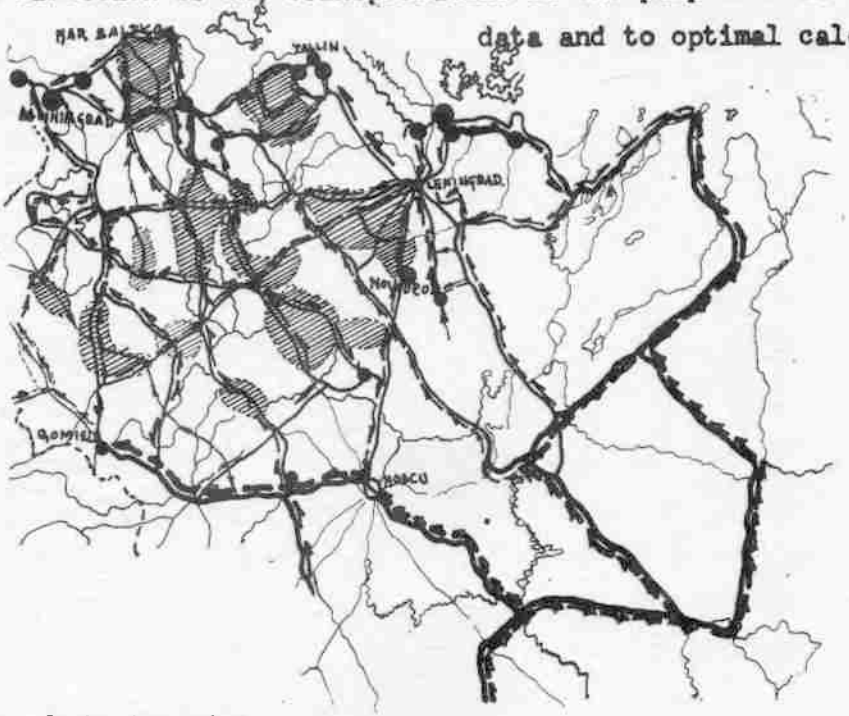
HE CARTOGRAM 3

he scheme of the direction of the transportation of the pulp wood in 1960 according to actua

data and to optimal calculation



The conditional designations

According the actual data

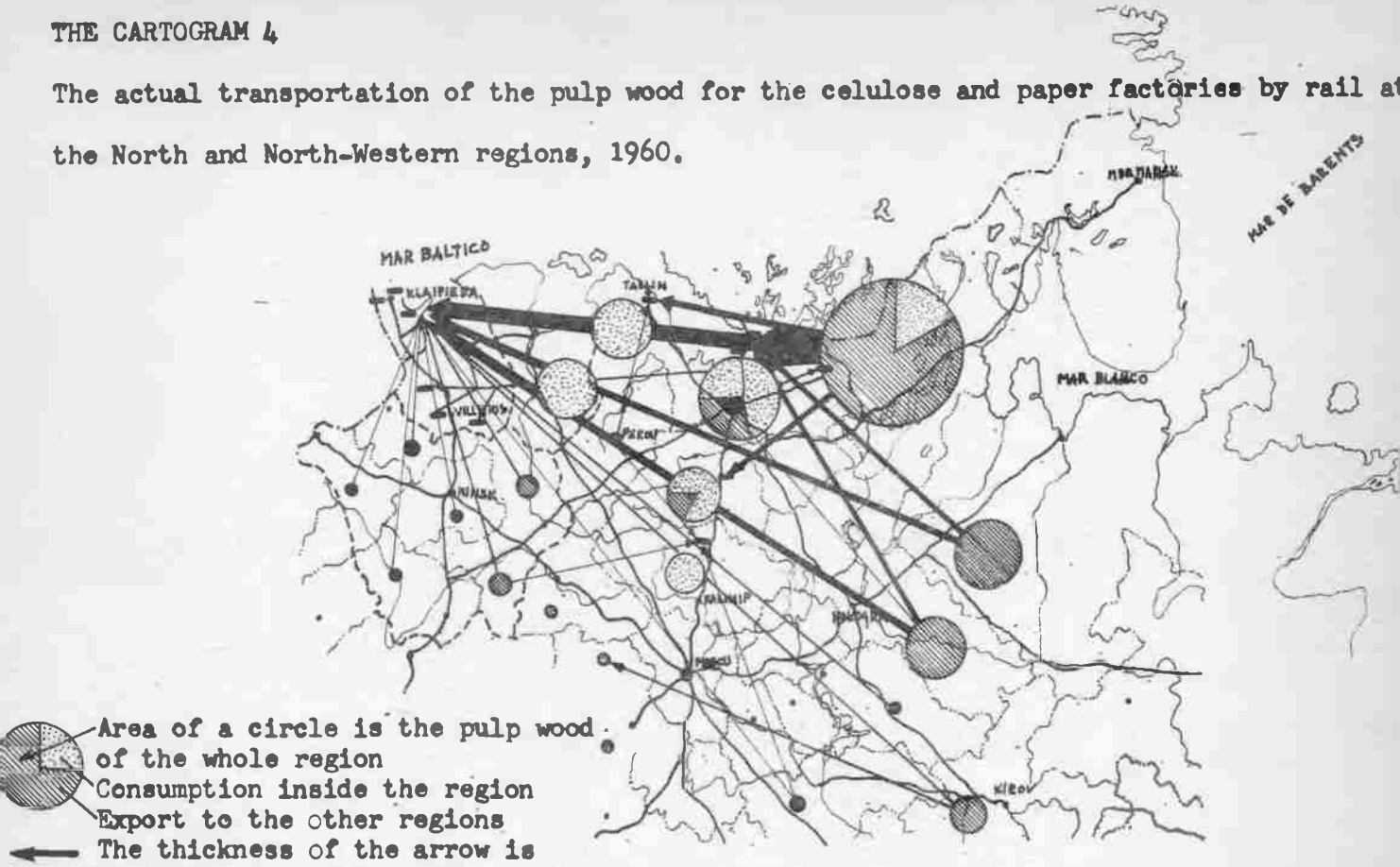
According to optimal calculation

The regions where the directio determined by the optimal calculation is opposite to the actual one

- From 1 million to 500 thousand
- From 500 to 100 thousand
- From 100 to 10 thousand
- Bellow 10 thousand

THE CARTOGRAM 4

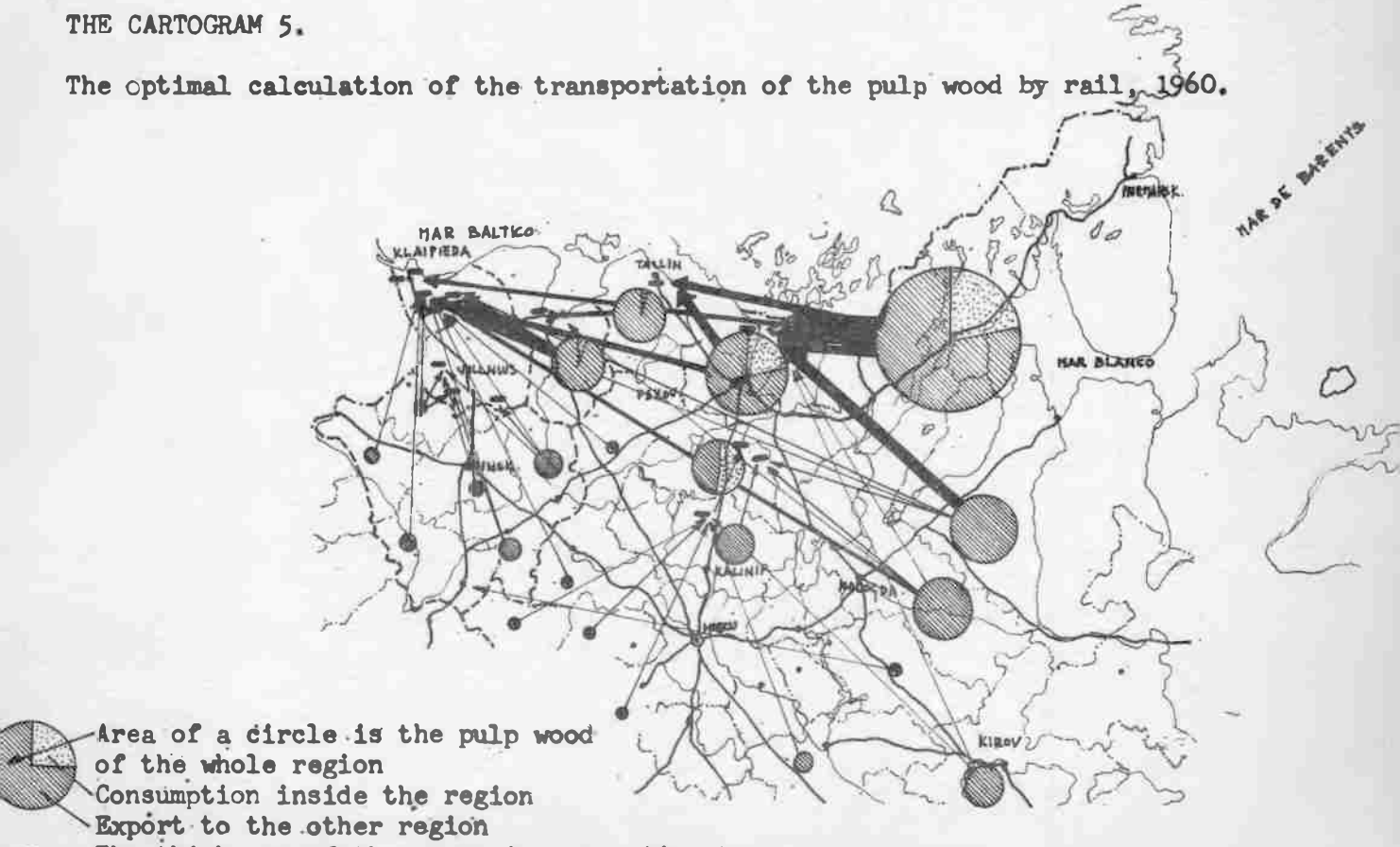
The actual transportation of the pulp wood for the celulose and paper factories by rail at the North and North-Western regions, 1960.



Area of a circle is the pulp wood of the whole region
Consumption inside the region
Export to the other regions
The thickness of the arrow is proportionate to the volume of transportation
The celulose and paper factories existed

THE CARTOGRAM 5.

The optimal calculation of the transportation of the pulp wood by rail, 1960.



Area of a circle is the pulp wood of the whole region
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