

# SOVIET PLANNING

PRINCIPLES  
AND  
TECHNIQUES



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**SOVIET PLANNING:  
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AND  
TECHNIQUES**



**PROGRESS PUBLISHERS  
MOSCOW**

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## CONTENTS

	<i>Page</i>
CHAPTER I. PLANNING AS A FACTOR OF ECONOMIC GROWTH . . . . .	7
1. Planning, a New Form of Economic Management . . . . .	8
2. Economic Planning in Developing Countries . . . . .	15
3. Development of Planning in the USSR . . . . .	20
CHAPTER II. ECONOMIC SUBSTANTIATION OF THE PLAN . . . . .	32
1. Social Needs as the Initial Point of Economic Planning in the USSR . . . . .	33
2. Overall Indicators of Social Needs . . . . .	39
3. Valuation of Productive Resources . . . . .	41
4. Efficiency of Planning Decisions . . . . .	53
CHAPTER III. PLANNING ECONOMIC GROWTH RATES . . . . .	58
1. Principles of Planning Economic Growth Rates. Concept of the Growth Rates of Production . . . . .	59
2. Factors of Growth of the National Income . . . . .	63
3. Planning Growth Rates of the National Income on the Basis of the Dynamics of Living Labour . . . . .	65
4. Substantiation of the Growth Rates of the National Income by the Dynamics of Fixed Productive Assets, Investments and Accumulation . . . . .	68
5. Interconnection of Living Labour with the Means of Labour and Planning the Growth Rates of the National Income . . . . .	74
CHAPTER IV. BALANCE CALCULATIONS AND METHODS OF OPTIMISING PROJECTIONS . . . . .	82
1. Essence of the Balance Method . . . . .	85
2. Static Model of the Inter-Sector Balance . . . . .	93
3. Dynamic and Optimal Models . . . . .	102
CHAPTER V. PLANNING INVESTMENTS IN THE ECONOMY . . . . .	115
1. Investment Programme of a Country . . . . .	116
2. Planning Investments of Sectors . . . . .	126
3. Investments in the Development of Export Sectors . . . . .	132

CHAPTER VI. PLANNING OF LABOUR . . . . .	139
1. Content of the Labour Plan . . . . .	140
2. Basic Principles of Planning Labour . . . . .	142
3. Methodology of Calculating Labour Productivity . . . . .	145
4. Shaping an Efficient Structure of Employment in the Economy . . . . .	147
5. Ascertainment of the Need in Skilled Personnel and Planning Their Training . . . . .	154
CHAPTER VII. ECONOMIC INSTRUMENTS OF PLAN IMPLEMENTATION . . . . .	162
1. Direct and Indirect Regulation . . . . .	162
2. Distinctions in the Development of the Forms of Management . . . . .	166
3. The Present Economic Reform . . . . .	171
4. Price as a Regulating Factor . . . . .	175
5. State Regulation of the Use and Distribution of Manpower . . . . .	179
CHAPTER VIII. ORGANISATION OF PLANNING AND CONTROL OF PLAN FULFILMENT . . . . .	182
1. Structure of Planning Agencies . . . . .	182
2. Types of Plans and Their Interconnection . . . . .	184
3. Sequences of Plan Formulation . . . . .	186
4. Plan Indicators . . . . .	189
5. Control Over Plan Fulfilment . . . . .	191

Constant, deliberately maintained proportion would, indeed, signify the existence of planning.

*Lenin*

*Chapter I*  
**PLANNING AS A FACTOR OF ECONOMIC  
GROWTH**

National economic planning has arisen and developed in socialist countries. Today its elements in one or another form are being applied in countries with different social systems. The necessity of planning the economy, which has been generally recognised, reflects the need for scientifically-based guidance of a country's economic growth. Planning engenders big possibilities for the purposeful and rational use of the resources of nations and entire regions. However, special conditions are required for the planned, balanced development of a country's economy and the full use of the advantages of national economic planning.

In contrast to all other forms of economic growth planned, balanced development implies consciously maintained proportionality of all elements of the economy designed to attain definite aims. Such development offers the possibility of and requires scientific guidance of economic growth.

The term "planning" is popular now and widely utilised in different contexts. The last ten years have witnessed the spread of the ideas of planning national economic development throughout the world, in countries with different socio-economic systems. This shows that the present-day level of the productive forces and the nature of social production demand proportional and purposeful growth of the economy. At the same time there is a differing degree of readiness of the social conditions in various countries for the efficient use of the instruments of national economic planning. This gives rise to intricate theoretical and practical

problems. Economists of the most diverse political views and concepts, reflecting the interests of different classes and strata of society, participate in solving these problems. The governments of some states are exerting much effort to plan economic development. International organisations have also greatly stepped up their activities in this sphere in recent years.

## 1. Planning, a New Form of Economic Management

Planned operation of the economy on a countrywide scale is a fundamentally new phenomenon in human history. It is inseparably linked with the rise and development of the socialist mode of production. Alongside the latest discoveries in the natural sciences and the present-day scientific and technological revolution, planning of economic growth is one of the most outstanding scientific and practical achievements of our age.

The principles of planned development of the economy are dictated by the objective conditions of contemporary society. Large-scale machine-based industry, and the deep-going division of labour which produces thousands of interconnections persistently dictate proportional development and planned regulation of production. Large-scale profit-oriented capitalist industry could not create conditions for planned economic growth. The capitalist economy developed spontaneously with all its intrinsic consequences — crises, unemployment and idle capacity.

Socialist changes in the USSR have eliminated obstacles to the planned, balanced development of the economy. Private ownership of the means of production was the biggest of them. Guidance of economic growth on the basis of study and utilisation of objective economic laws has become a primary function of the socialist state. Nationalisation of large industrial enterprises, transport and communication facilities and banks has led to the rise and development of an economy of a new type. The Soviet state has set general national development tasks and rallied all the working people to achieve them.

The purpose of economic development in socialist countries is the utmost satisfaction of the ever growing requirements of the entire society and its individual citizens. Various intermediate tasks arise on the way to achieving this common aim. The nature of these tasks is determined by the development level of the productive forces at each given stage and the objective economic conditions. But all these tasks promote the accomplishment of the principal goal — improvement in the people's living standard and growth of society's productive forces.

Elaboration of the basic principles of economic planning, now utilised in different forms in a number of countries, began in a country which greatly lagged behind the advanced capitalist states. Industrial output in Russia prior to the First World War was only one-eighth of that in the United States and only about one-fourteenth if calculated per capita. Russia's industry held fifth place in the world and was backward and poorly equipped. The country's needs in machinery and equipment were covered mainly by imports from developed capitalist countries.

The First World War and the Civil War in Russia greatly undermined the country's economy. In 1920 when the first long-term development plan was compiled, Soviet Russia's industrial output was only about one-seventh of that in 1913. At that time the vast country produced 110,000 tons of pig iron as against 4,200,000 tons in 1913 and extracted 160,000 and 9,200,000 tons of iron ore respectively. Coal extraction dropped by 66 per cent, oil production by 60 per cent and the generation of electricity by almost 75 per cent. Agricultural production was reduced by one-third. In 1921 the per capita national income<sup>1</sup> amounted to about \$23 (in 1958 prices).<sup>2</sup>

These figures show that the heritage received by the new state was poorer than the economic potential

<sup>1</sup> The national income is the newly-created value for a definite period, usually a year. In the material form it represents all the consumer goods and the means of production which are utilised for expanding output and increasing reserves, i. e., is the net product of society created in sectors of material production.

<sup>2</sup> Here and elsewhere the figures are given in US dollars.

possessed now by some big developing countries. Thus, in 1967-1969 the per capita national income in Brazil amounted to \$270, the Arab Republic of Egypt \$166, Pakistan \$130, India \$72 and the Federal Republic of Nigeria \$67.<sup>1</sup>

Only special measures, radically differing from what had been done in the economic life of pre-revolutionary Russia, could lead the country out of its dire straits. It was necessary to mobilise all the available resources, concentrate them on restoration and then on the accelerated change of the economy's pattern and ensure their efficient use. For these purposes a system of centralised planning and management was set up which, as the economy developed, encompassed ever greater resources and ever more spheres of economic life.

The first long-term economic plan in the world was adopted in 1920. It was the plan for the electrification of Russia (known as the GOELRO Plan for short) designated for 10-15 years. Since then planned management of the economy has developed and improved.

Planning in the USSR has a history of 50-odd years. Today the country's economic life is determined and guided by the state national economic plan, which provides for the steady growth of the productive forces, increase of the national wealth, advance of the material and cultural standards of the people and consolidation of the country's defence capability. State national economic plans are designated for long periods (long-term plans) and also for short periods (current annual plans) and are primary instruments for guiding all the sectors and spheres of the national economy.

Here are some results of the planned economic development of the USSR over a long period. Between the end of the restoration period in 1927 and 1970 actually eight five-year plans were carried out. From 1928 to 1970, i. e., in 42 years which included the Second World War and the period of restoring the war-

<sup>1</sup> *Narodnoye khozyaistvo SSSR v 1970 godu* (National Economy of the USSR in 1970), Statistika Publishers, 1971, pp. 86-87. The estimate of the national incomes is made in accordance with the methodology accepted in these countries.

wrecked economy, national income rose 42 times and gross industrial output 97 times. In 1970, the per capita national income reached \$1,325 according to the official rate of exchange and \$1,568 according to the relationship of prices. The Soviet Union's national income in 1970 was 65 per cent of that in the United States<sup>1</sup> and industrial output was about 75 per cent of the US level.<sup>2</sup>

Successes registered in the planned economic development of the USSR demonstrate what decisive influence state planning exerts on growth rates, the building up of an independent economy and improvement in the living standard. The sweeping criticism of planned development levelled by bourgeois economists and statesmen has gradually subsided and an ever greater interest has been shown in planning and, subsequently, attempts have been made to utilise planning in different social conditions. At present almost all developed capitalist countries employ elements of planning on a national economic scale. This new phenomenon in the life of capitalist countries has been named economic programming.

Prior to the 1929-1933 world economic crisis, the capitalists were full of faith in the principle of free enterprise, "free" play and self-regulation of the market economy. But the crisis sapped this faith, and state interference in the economy increased. Economic programming has been widely developed since the Second World War (especially in recent years). Economic development programmes have been drawn up in France, Italy and Japan.

Economic programming may be considered a method of formulating and applying an economic policy in conditions of contemporary capitalism aimed at finding the most efficient ways for achieving the collective interest of the capitalist class or its individual groups. The capitalist state tries to chart an economic policy which expresses the interests of the ruling classes.

<sup>1</sup> For purposes of comparison the indicators of the US national income have been calculated in accordance with the methodology accepted in the USSR.

<sup>2</sup> *Narodnoye khozyaistvo SSSR v 1970 godu*, pp. 85, 82.

Economic programming of the national economy bears a state nature and is drawn up by government agencies.

Corporation programming arose in capitalist countries much earlier than state programming of the economy. This type of programming originated at the time when the process of production concentration began. Further concentration, which increasingly intensifies the basic contradictions of the market economy, brings into being palliatives to mitigate these contradictions. In this context state economic programming represents a practical attempt to attain a "compromise" between social production and private property.

While national economic planning in socialist countries is a direct consequence of social ownership of the main means of production, programming in capitalist countries is determined by a number of contradictory phenomena. First comes the growth of a sufficiently large public sector. The public sector presupposes management by the state. But if it does not dominate, the market subordinates it to its interests, the interests of private entrepreneurs, and, consequently, also subordinates the state management of the nationalised industries to these interests.

Second, the need for huge investments to promote technological progress presupposes a high degree of capital concentration and co-ordination of research programmes. At present capitalist states increasingly assume functions linked with technological progress, i.e., the financing of technological research, reconstruction of old and development of new industries, space exploration, financing of education, state investments into the infrastructure (power, transport, communications and science). This is one of the main trends in the activities of the capitalist state today. But under private property the ultimate fruits of these activities largely accrue to the ruling classes.

Third, military-industrial complexes have arisen in big capitalist countries. The arms race is conducted on the basis of state investments and state purchases of armaments. This policy demands co-ordinated measures on a countrywide scale, centralisation and regulation.

Fourth, the existence and consolidation of the socialist system compels the capitalist countries in their economic competition with the socialist countries to strive for high and stable growth rates, demands intervention by the state in the economy and the development of programming methods. That is why in a number of countries the main purpose of economic programming is to maintain definite growth rates. In other words, the economic competition of capitalism and socialism has stimulated programming methods in capitalist countries.

The different social basis of socialist planning and capitalist programming makes for the difference both in content and in the aims and forms of planning and programming and the means for carrying them out. In contrast to socialist planning, capitalist programming is essentially indicative.

The tasks put forward in the programmes bear the nature of recommendations and do not always provide the resources and means for accomplishing them. That is why economic forecasts make up the central part of development programmes. The essence of forecasting is to predict the possible state of the entire national economy or separate sectors for the plan period, if the economy develops in accordance with the emergent tendencies, considering the influence of definite factors and certain future government measures.

It is such forecasts that are often called national programmes and economic growth plans. Since in capitalist countries a development programme is always closely linked with the market, economic programming in most cases resolves to attempts to predict the future state of the economy which operates under the impact of market forces.

Economic forecasts are drawn up in socialist countries too. Here they present a preliminary stage in the formulation of any economic plan. The experience of the USSR shows that forecasts can be a component element of a plan only when plan formulation begins with them. But a long-term forecast cannot take the place of a plan.

Proponents of different socio-economic concepts engage in theoretical arguments as to what produces

a bigger effect — a market economy with elements of state programming or centrally planned economy? But life is the best arbiter. The last 20 years have been a period when planning has undergone practical tests not in one but in several socialist countries, just as programming has in a number of developed capitalist countries. A comparison of growth rates of the per capita national income in socialist countries and in developed capitalist states demonstrates the advantages of the planned socialist economy in efficiently using national resources.

**Per Capita National Income**  
(1970 in per cent of 1950)<sup>1</sup>

USSR	392	United States	146
German Democratic Republic	430	Federal Republic of Germany	266
Czechoslovakia	271	Britain	147
Poland	286	France	215
Rumania	483	Italy	251

A comparison of data on the pace of building up the economic potential of the USSR and other countries in the recent period, including 1970, makes possible the following conclusion: it took the United States 20 years to double its national income, Britain over 30 years, the Federal Republic of Germany nearly 15 years, and the Soviet Union, with its vast scale of social production, 10 years. It took the United States 18 years to double its industrial output, Britain 22 years, the Federal Republic of Germany over 11 years, and the Soviet Union 8.5 years.<sup>2</sup>

It should be stressed that high growth rates are registered in socialist countries which already have a sufficiently big economic potential. Thus, in the USSR production of electric power in 1970 was 43 per cent of that in the United States and 117 per cent of that in Britain, France and West Germany combined;

<sup>1</sup> *Narodnoye khozyaistvo SSSR v 1970 godu*, p. 84.

<sup>2</sup> *Directives of the 24th Congress of the CPSU for the Five-Year Economic Development Plan for 1971-1975*. Report by A. N. Kosygin, Moscow, 1971, p. 29.

the production of steel, 95 and 120 per cent respectively, and the output of cotton fabrics, 109 and 238 per cent and of woollens, 254 and 126 per cent.<sup>1</sup>

## 2. Economic Planning in Developing Countries

Developing countries rightly place big hopes in the use of planning for accelerating economic growth. As far back as the 1930s the drawing up and carrying out of the First Five-Year Plan in the USSR aroused great interest in colonies and developing countries.

In 1928 Calles, the President of Mexico, proposed the formulation of a plan based on strict accounting. At the beginning of 1933 Shri M. Vishveshvaraya of India put forward a plan for doubling the national income. Five years later a National Planning Committee was set up by the Indian National Congress for the first time in the country's history. The committee was headed by Jawaharlal Nehru. In 1960, development plans were in the process of formulation or implementation in 14 Asian, 7 African and 2 Latin American countries. Six years later, in 1966, such plans were already drawn up in 18 Asian, 26 African and 20 Latin American states. Today almost all developing countries, without exception, are drawing up, in one or another form, long-term economic development programmes.

Economic planning and programming has spread in developing countries for a number of reasons. In most of them the productive forces are at a low level, especially where a semi-subsistence economy prevails. The need to eliminate this low level of production as compared with that of developed countries<sup>2</sup> is the reason for the exploration of "powerful instruments" for changing the economic position of the newly free countries.

The increased volume of information about the standard of living and economic development, furnished by modern means of communication, provides these

<sup>1</sup> *Narodnoye khozyaistvo SSSR v 1970 godu*, pp. 102-04.

<sup>2</sup> Per Capita National Income (in US dollars) (Estimated according to the methodology adopted in these countries and

countries with extensive material for the exploration of ways to accelerating growth. The possibility of planned development is particularly attractive for them. The extremely limited resources result in that capital-intensive sectors (including the infrastructure) are built up with the participation of the state or fully on account of state finances.

The public sector arising in many newly free countries is the objective basis for the development of state programming. The extremely disadvantageous position of these countries in the world market also makes imperative state control over home and foreign trade and the use of available resources. These processes are opposed by tendencies of spontaneous growth engendered by a definite stage in the development of capitalist and other social relations in the newly independent countries. This gives rise to the intricate intertwining of different tendencies which inevitably lay their imprint on the nature of economic planning.

What is generally called planning in newly free countries of Asia, Africa and Latin America is a policy of planned influence exerted by the state on economic development in the form of forecasting economic growth; planning of the public sector at different levels—inter-industry, intra-industry and separate projects; state regulation of the private sector; socio-economic reforms. A wide range of combinations of these forms is possible depending on the level of a country's economy, its political structure, property relations, and so on.

On the whole the influence exerted by the state in

in brackets according to the methodology adopted in the USSR)

1970			
United States	3,900 (2,819)	Algeria (1966)	200 (180)
Sweden	2,720 (1,820)	Brazil (1968)	276 (195)
Canada	2,654 (1,780)	Syria (1965)	214 (160)
France	2,180 (1,550)	Arab Republic of Egypt (1968)	166 (120)
Federal Republic of Germany	2,380 (1,736)	Thailand (1969)	125 (99)
Britain	1,620 (1,100)	Pakistan (1969)	130 (110)
Holland	1,925 (1,510)	India (1968)	72 (61)
Italy	1,860 (940)	Tanzania (1968)	62 (51)

(Source: Narodnoye khozyaistvo SSSR v 1970 godu, pp. 85-87.)

newly free countries on economic development processes may be regarded as partial economic planning. This type of planning exists in the overwhelming majority of young national states with a low level of production, diverse property relations and an archaic pattern of the economy. These countries utilise in the main only separate elements of the enumerated planning measures. These are attempts either at rationalising the work of the administrative and financial apparatus and allocation of capital investments or economic forecasting.

Such partial planning reflects the present stage of development in a considerable number of these states. Improvement of partial planning takes place within the framework of the socio-economic development of each country. The evolution of this form of planning proceeds either in the direction of capitalist programming or of socialist planning. The latter makes it possible to go over from partial to general planning. The prerequisites for transition to general national economic planning are connected with deep-going socio-economic reforms and, what is most important, with changes in property relations.

Socio-economic reforms in countries following the non-capitalist path enable them to employ many planning measures, moreover planning of the public sector can turn into the dominating element of the complex of these measures. Such an advance opens up a definite possibility for applying in newly free countries the planning methods which have proved their merit in the USSR and other socialist countries.

In countries which follow the capitalist path elements of forecasting, regulation and planning of the public sector are utilised by the state for influencing economic growth, while less emphasis is laid on socio-economic reforms.

A sign of equation must not be drawn between economic programming in capitalist countries and the elements of planning in developing countries. Economic programming in developed countries is determined by the high level of socialisation of the productive forces, the multi-faceted coalescence of the state and monopoly associations, the impact of the economic

competition of the socialist and capitalist systems which imperatively faces the principal capitalist countries with the necessity of securing stable growth rates. In developing countries economic planning is dictated by the need swiftly to accelerate the advance of the productive forces, by the further exacerbation of contradictions with imperialist states and the impact of the successes of the planned economy in socialist countries. That is why in newly free countries which utilise basically the selfsame instruments of credit and market regulation and indicative planning as in capitalist countries, there appear essential supplementary features, namely, elements of national economic planning and socio-economic reforms.

Young national states are making their first steps in planning in intricate economic and political conditions. In most newly free countries which are implementing economic development plans the annual growth rate of the GNP was envisaged to range from 5 to 9 per cent, which implied an increase in pace of from 50 to 100 per cent.<sup>1</sup> Actually the average annual growth rate in most countries did not exceed 5 per cent between 1955 and 1965.<sup>2</sup> The average figure for all developing countries was 4.4 per cent annually from 1960 to 1965 and per capita, 1.9 per cent, with the annual increase of the per capita GNP being \$3.<sup>3</sup>

The high economic growth rates of the USSR and other socialist countries during the entire period of their development attests to the big possibilities which can be utilised by newly free countries in applying the entire range of socio-economic measures, including planning techniques.

The implementing of plans in young national states keenly raises many economic and social development problems. These are the sources of financing (above

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<sup>1</sup> UN Department of Economic and Social Affairs. *Economic Survey 1964, Part 1, Development Plans: Appraisal of Targets and Progress in Developing Countries*, New York, 1965, pp. 24-25.

<sup>2</sup> UN Department of Economic and Social Affairs. *World Economic Survey 1967, Part 1, The Problems and Policies of Economic Development: An Appraisal of Recent Experience*, New York, 1968, p. 18.

<sup>3</sup> *Ibid.*, p. 17.

all their composition — the size of the tax on the profits of entrepreneurs, taxes on incomes of peasants and workers, external loans and internal accumulations); whether to aim at proportional development and a balance of financial and material resources or at inflationary investing which depresses the standard of living. What is needed is to organise control over the use of the country's resources, establish agencies for managing production, determine the scale of the public sector and secure its efficient operation, define the attitude towards private enterprise, and so on.

In solving such development problems, it is possible in a number of cases to draw on the experience of planning in socialist countries, particularly the USSR. There is no need to stress that the conditions in which planning crystallised in socialist countries differed from the conditions obtaining now in most developing countries. The most important, fundamental difference lies in the socio-economic pattern of social production, distribution and consumption and also the economic and social institutions determined by this pattern. But, notwithstanding these essential differences, some general tasks of economic development and planning in newly free states can be accomplished by drawing on the know-how of socialist countries. Among them is the elimination or reduction of the gap in economic levels between developed and developing countries. It can be accomplished by accelerating the general growth rates, substantially increasing the scale of accumulation, and also restructuring the swiftly industrialising economy.

The economic policy of socialist states, above all, the policy of industrialisation, focusses attention on the problem of accumulation and its sources. In the USSR this problem was the object of thorough study and debate and was reflected in a number of government decisions during the prewar five-year plans. To set the growth rates and proportions of the national economy in the five-year plans it was necessary to study the interconnections and interdependences between accumulation and consumption in the national income and to ascertain the influence of the efficiency of accumulation on their relationships, on the growth rates of the national economy and the structural

shifts in it. Thereby problems of inter-sector relations and factors of economic growth have always been examined in one or another form in drawing up national economic plans. At definite stages in the history of the USSR the concrete conditions demanded an increase in the share of accumulations in the national income. Thus, at the end of the First Five-Year Plan it equalled 26.9 per cent (including reserves) and at the end of the Second Five-Year Plan, 27.1 per cent.

The need for deep structural changes impels not only developing countries but also the developed capitalist states to interfere in the economy on a substantial scale. This has brought into being a special form of programming, structural planning, which seeks to devise economic measures to ensure the building up of new, most progressive industries.

Developing countries can utilise modern and most efficient techniques for accomplishing the tasks of economic advance. This largely depends on mobilising their own efforts for the introduction of advanced methods, technology and organisation of production. The experience of planning work in socialist countries can be of considerable help in this respect.

### 3. Development of Planning in the USSR

From its very first steps the Soviet state undertook to gain control of the country's economy. The scale of influence exerted by the state on economic development steadily grew. Correspondingly, the concrete content of both the tasks of management and also the forms of planning changed. Planning agencies have always faced the task of scientific plan formulation, i. e., development targets had to take into account the possibility of accomplishing them, and they had to be reinforced by decisions needed for implementing the plans.

The resolute measures of the Soviet Government, aimed at accomplishing tasks of strategic importance, greatly influenced the development of planning. A case in point is the introduction of workers' control: workers' control councils were set up with a single central

body and workers' committees were elected at all large enterprises. The main task of these committees was to control production, the purchase and sale of goods and raw materials, the working conditions and the financial position of an enterprise or industry. It was pointed out in the Regulations Governing Workers' Control, adopted in November 1917, that all these functions were to be exercised to combat the sabotage of the factory owners and for the purpose of the planned regulation of the national economy.

Workers' control facilitated the organisational reconstruction of the national economy necessitated by the winning of political power by the working class and the peasantry and subsequent nationalisation. With the main sectors of the economy becoming social property, the need arose to organise their centralised management. This created the possibility of drawing up a plan for the restoration and development of industry and transport. The country had no developed system of statistical accounting at that time and in the initial period great attention was paid to its organisation to provide the necessary economic information for the drawing up of plans.

In the first Soviet years great attention was paid to framing and fulfilling current programmes, similar to those which are now called "partial plans" in Western economic literature. Plan projections for the production of coal, steel, farm machinery, grain procurements and capital construction in separate industries were drawn up in the first half of 1918. In the same year plan formulation began for the economic development of the country's principal industrial centres (plan for the development of the metal-working industry of Petrograd, now Leningrad, and also of the iron and steel industry in the Urals and in the eastern regions). In the second half of 1918 most of the large enterprises already operated in accordance with plans approved by government agencies.

Much attention was given to current programmes for pooling the efforts of several industries in coping with development problems. This made it possible subsequently to set and accomplish the task of working out a single long-term plan which could serve as

a guideline for current annual plans, ensuring their continuity.

The comprehensive approach was increasingly utilised in elaborating current plans for the Soviet economy. This approach was ensured in two ways. *First*, by elaborating a long-term development programme. The first long-term economic programme in the world was the 15-year plan for the electrification of Russia (the GOELRO Plan) adopted in 1920. It set long-range targets in the development of the economy and assigned resources for their attainment. This programme served as the guidepost for current planning. In choosing the tasks of the current plan they were assessed above all from the viewpoint of the general aims set in the long-term programme. *Second*, by achieving closer co-ordination of sectoral and regional plans. Experience soon showed that economic management and planning agencies must not confine themselves to a simple summing up of the plans of trusts and autonomous enterprises.

In 1924, planning agencies, together with enterprises and trusts, worked out the preliminary contours of a national economic plan, taking into account the capacity of the market and other economic conditions. The control figures (as the targets were called) of every sector were co-ordinated with those of allied sectors and as a result control figures of national economic development were drawn up. This was a major achievement for socialist planning. At the same time the control figures had their weak points too. The absence of a precise balance of the results of national economic development lessened the directive nature of the control figures; they encompassed only the sphere of production. The methodology of calculating the control figures was still imperfect. It was based on an extrapolation of the economic growth rates of pre-revolutionary Russia.

The limited nature of plans oriented solely on the current requirements of the market consisted in that they reproduced in the main the selfsame proportions which had emerged in the national economy. But to accelerate development it was necessary to change proportions in the economy, radically to reconstruct it

through industrialisation and the transition of agriculture to collective machine-based production.

The control figures for 1926/27 were drawn up with the participation of the Union Republics and economic departments. The balance method was the main one and this was a considerable step forward in the methodology of planning. The control figures contained assignments for the economic development of the republics and economic areas and also for socio-cultural progress.

In December 1927, the directives for the formulation of the First Five-Year Plan were approved. This was an all-embracing programme of social changes signifying the transition to a new stage of economic construction in the USSR. After the approval of the directives extensive work was launched to draw up the First Five-Year Plan in which not only the central but also republican planning and economic agencies took part.

The basic methodological principles of national economic planning were hammered out in compiling the First Five-Year Plan, and they have not lost their significance to this day. An integrated system of targets and indicators encompassing all the main sectors, Union Republics and economic areas was built up. The balance method was greatly developed. Material balances were drawn up for about 50 main types of industrial goods and also for major agricultural raw materials. These balances covered the main material proportions of the national economy.

For the first time main balances in terms of value were compiled in accordance with a wide programme. Among them were the overall financial plan for the country as a whole and for major sectors, the state and local budgets, balance of the fixed assets<sup>1</sup> of the

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<sup>1</sup> *Fixed assets* of the national economy are classified into productive and non-productive.

*Productive* fixed assets are the instruments and means of labour of enterprises, i. e., the part of the means of production which serve for a long period, transferring their value to new products in part as they are worn out; they do not change their material form in the production process. These assets consist of industrial buildings and installations, transmissions, power and working machines and

national economy, balance of the production of the national income, its allocation and use, balance of the money incomes and expenditures of the population, calculation of the effective demand and balance of the demand for, and supply of, consumer goods.

All the main balance calculations for the First Five-Year Plan were also made in the social aspect (state, co-operative and private sectors). This furnished a detailed characteristic of the process of socialisation of production and the development and strengthening of the socialist sector in the national economy.

A system of balances of labour resources was evolved during the first five-year period. This was linked with the acute need to provide the economy with manpower, especially skilled personnel, and also gradually to abolish unemployment and reduce the agrarian surplus population. Alongside the overall balance of labour resources, the need in specialists and skilled workers for industry, agriculture, construction and transport was estimated. These calculations made it possible to draw up a programme of training personnel on the job and at factory vocational schools and a plan for the development of the network of secondary and higher educational establishments.

Expansion of the scale of socialised production made it possible to extend state planning to agriculture, small-scale industry and trade and go over from control figures to annual (within the bounds of the five-

equipment, measuring and controlling instruments and devices and laboratory equipment, transport facilities, roads, perennial plants, all investments in land and forests to make them suitable for exploitation and draught and productive livestock.

*Non-productive* fixed assets are the property of enterprises, institutions and organisations which serve non-productive consumption for a long period. These include buildings, installations and equipment of enterprises and institutions of non-productive designation—houses, schools, hospitals, sanatoria, holiday homes, sport installations, cultural establishments, and so on.

*Circulating assets*, in contrast to fixed assets, are part of the productive assets of enterprises which are fully consumed in each production cycle, change in the process of production their material form and whose value is fully carried over to the finished product in one cycle. These assets include raw and other materials, purchased semi-manufactures, spare parts for current repairs, fuel and uncompleted production.

year period) national economic plans. The first annual plan was drawn up for 1931.

The transition from control figures to state plans signified that planning and regulation of the multi-structural economy was replaced by planning of the socialist economy which became dominant; recommendations and proposals were replaced by directives, and guideline assignments gave way to a plan which carried the force of law. Subsequently long-term plans with a breakdown by years were formulated in the USSR, except for the war years when annual plans were in operation.

Planning in the USSR at present ranges over the entire complex of economic and cultural development. Planning and managerial agencies are handling the intricate task of co-ordinating the activity of hundreds of thousands of industrial, agricultural, transport and other production enterprises, and the vast network of trading, cultural and service establishments.

A distinctive feature of Soviet economic planning, which sets it apart from economic programming and partial planning, is that the state economic development plans encompass the operation of all enterprises in the country. The state plan covers the supply of all enterprises with raw and other materials, fuel, power, industrial goods, manpower and financial resources. It also establishes the main channels of distribution and the range of consumers.

At present the objects of planning and management in the USSR include all the sectors of material production (industry, agriculture, communications, transport, and so on), the circulation and service spheres, finances, education, culture and science. Planning and management cover all stages of social reproduction—production, circulation and consumption. This opens up big possibilities for mobilising the country's resources and utilising them for accelerating economic growth and advancing the standard of living. This all-embracing system of planning now firmly established in the USSR continues to develop.

The history of Soviet planning furnishes a wealth of material for studying the logic of the process of planning and its principles dependent on the social

conditions and stages in the development of the economy. It may be asserted that the extensive spread of planned guidance of the economy, which was the case during the period of deep-going social changes, has been gradually replaced by exploration of intensive ways for improving the all-embracing planning system.

The experience of national economic planning in the USSR shows that the framing of the general scheme of a plan should be preceded by a detailed analysis of economic growth in the pre-plan period, valuation of the achieved level, the volume of the reproduced resources and forecasting the future of the existing and the new, incipient tendencies in the economy. A comparison of the attained level and the principal development tendencies with the long-term socio-economic tasks enables planners to set concrete aims for the next plan period.

Establishment of priorities in carrying out the various tasks makes it possible to determine the sequence of separate stages in planning work and calculation. The planning process thus depends on the level of development of production and social relations and also on the nature of the tasks of economic growth.

Three concepts of formulating a general economic plan can be singled out. First, planning on the basis of sectoral projections; second, comprehensive planning and, third, optimal planning. Formulation of plans on the basis of sectoral projections has been applied on the biggest scale. The second concept has been introduced experimentally in preparing materials for drawing up current and mid-term plans in the last decade. The third concept is in the stage of research but the application of its elements is already yielding certain positive results in coping with local tasks.

After the October Revolution Soviet Russia, as stated earlier, had a low economic potential. This made it impossible to solve simultaneously the entire complex of tremendous socio-economic problems: to attain economic independence, build up a modern industrial basis for re-equipping all the industries and sectors of the economy and to advance the cultural

and material standards of the people. Since the standards of living and culture are above all a result of the development of material production, the first two of the problems enumerated above were regarded not only as the aims of development plans, but also as the means for accomplishing the principal tasks facing the economy. From this followed the need for allotting first of all the resources required for the development of the key sectors of the economy.

The drawing up of general economic plans on the basis of planning the growth of separate sectors and even separate sub-sectors was applied at the end of the 1920s and was continued until the modern complex of interconnected sectors of the Soviet economy was built up. This concept of plan formulation presupposes that the initial point for calculating the entire national economic plan is growth in the volume of output of the heavy industries — the increase in the production of fuel, metal, electric power, and so on. An estimate of the possible increment of this output was based on a maximum concentration of all available resources. Other sectors were allotted resources to the extent to which they ensured the expansion of the heavy industries.

What makes such a sequence in the formulation of the national economic plan difficult is that in ascertaining the volume of production of the heavy industries it is necessary to know the requirements of the entire economy in their output and also the magnitude of the resources for the development of all sectors which supply heavy industry.

Thus, to cope with a "partial task" it is necessary to have a general scheme of the plan which in itself is the ultimate aim of plan calculations. This contradiction was eliminated by covering more and more industries and sectors in plan calculations and making repeated adjustments of the initial projections as the original unbalanced variant of the plan was specified. Moreover, not only an ever bigger number of sectors, but also of all kinds of resources were drawn into the sphere of calculation, namely, material, manpower and financial resources and the efficiency of their use were established more precisely.

The results of calculations made it possible to determine the balanced scale of investments backed up by material resources and manpower, to co-ordinate the increase in wages with bigger output of consumer goods produced by the light and food industries, and also by agriculture. Thus, the single system of the state plan determined the scale of production, the volume of investments, their provision with material and financial resources, rise in the nominal and real incomes of the population and also indicated the efficiency in the use of all available resources.

This approach to planning ensured radical changes in the pattern of the national economy. Even when binding tasks were confined to individual industries or sectors, their accomplishment largely influenced the development of the economy as a whole.

Thus, the first long-term plan adopted in the Soviet Union in 1920 originally was limited to the development of the electric power industry and was designed for 15 years. But even this plan was not examined in isolation from the advance of the entire economy. From the very start it was considered the principal guideline for determining the other tasks. First of all, targets were set for producing goods which required extension of the electric power network and then a more general plan for the economy as a whole was prepared.

These specific features of planning on the basis of sectoral projections reflected the possibilities and corresponded to the tasks of the periods when the industrial basis of the Soviet Union was being laid and the economy was restored after the war.

Industrialisation of all the sectors of the economy makes it possible now in formulating a plan to proceed from a complex of aims covering the satisfaction of society's current and long-term needs. This is determined not only by the built-up economic potential but also by the interdependence of industries and sectors, which is closer than ever before. The intricacy of these interconnections makes it difficult to draw up a plan on the basis of sectoral projections. That is why in designing a detailed national economic plan it is not enough to proceed from a valuation of the development prospects of only the key heavy industries. The main structural

relationships and the scale of growth of the entire national economy in the forthcoming plan period have to be ascertained at the preliminary stage.

The general parameters of a draft plan provide the basis for detailed plan calculations by industries and sectors, and by the separate types of resources in the territorial and temporal aspects. Detailed projections are compared with the concrete conditions for plan fulfilment. This makes it possible to assess not only how well these projections are grounded, but also to bring out additional resources and thereby take into account the entire diversity of concrete conditions in the subsequent integration of all the partial projections into a single plan.

The sequence in preparing a comprehensive plan — from general indicators to detailed and concrete, and then, on the basis of the latter, to overall indicators and targets — makes it possible to avoid one-sidedness in designing the plan. This scheme reflects the conditions created by the greater scale of socialist property; it is dictated by the high degree of interdependence of all elements of the economy and presupposes that the basic interconnected contours of the plan are calculated with the help of macro-economic models and balances, and the sectoral and regional parts of the national economic plan, with the help of sectoral and territorial models.

In comprehensive planning the increase in the volume of the gross product, national income, final product and their use for the needs of productive and non-productive consumption, i. e., accumulation for expanding productive capacity and for improving the living conditions and opportunities for development of members of society, are determined above all on the basis of macro-economic models. Detailed macro-economic models in the form of various modifications of the intersector balance are based on three elements. The first includes macro-economic indicators received on the basis of aggregated calculations. They act as general control characteristics for subsequent, more detailed calculations. The second element consists of indicators of the dynamics of the final needs of society in the form of indicators of the final product. The third element is a

group of indicators characterising the **technico-economic** structure of production. This characteristic is given as coefficients of unit inputs of raw and other materials, fuel, assets and labour.

Multi-sector models can be efficiently employed in comprehensive planning because they enable planners to obtain several alternative decisions. This feature follows both from the possibility of calculating several variants of the composition of the final product and of valuating different variants resulting from technological development in the given sector. The latter can be expressed in inter-sector models in technical coefficients of current inputs and of investments. These circumstances determine the attention which will be paid to improving inter-sector planning during the operation of the Ninth Five-Year Plan (1971-1975).

Combinations of different variants of the two groups of indicators make it possible to increase the number of alternative decisions and thereby valuate and choose the best ones. Moreover, planners are able to establish not only the interconnection of the final needs of society with the structure and scale of production, but also to calculate the influence of technological progress on future production and consumption. In comprehensive planning full consideration of the latter factor is possible only when the draft plan is specified in detail for each sector and area.

Sectoral projections obtained on the basis of multi-sector macro-economic calculations make it possible to avoid a limited local approach in assessing the efficiency of the development of sectors. At the same time this extends the possibility of the independent elaboration of a plan within the bounds of each sector and area. Such a scheme of the comprehensive formulation of a plan also extends to the lowest link, the enterprise. The latter, on the basis of detailed sectoral projections, is able to estimate the demand for its output, determine the possible supply of resources and investments for carrying out the production programme.

Comprehensive planning greatly increases the number of plan variants and raises the level of the plan's balancing. Nevertheless this system does not finally solve the problem of optimal economic growth with the

most efficient use of all the available resources at all levels of planning and management.

In accordance with the main principles of optimal planning, the national economy should develop under the most advantageous proportions and the highest level of efficiency. Moreover, the efficiency indicators at all levels must conform to the single principle of national economic optimality and ensure the choice of the best way for economic growth. Local interests should be co-ordinated with the aims of developing the entire economy, taking into account the limited nature of the natural, productive and labour resources and scientific and technological know-how.

Only modern automated systems of obtaining information and mathematical modelling of economic processes on electronic computers can serve as the technical facilities for designing such optimal programmes. Because of this the scheme of optimal planning represents a hierarchical system of calculations corresponding to the structure of the national economy and its management agencies. Under the Ninth Five-Year Plan extensive use will be made of economico-mathematical methods, electronic computers, business machines and means of communication. This will provide the material basis for the introduction of elements of optimal planning.

These stages in the development of Soviet planning by far do not reflect the entire complexity of the path traversed by the Soviet Union in this sphere. The development of each country has its specific features and they frequently affect the crystallisation of planning and its efficiency. Analysing the experience of planning in the USSR, it is important to note both the dialectical nature of the development of planning and the constant striving of planners to take into account the whole range of conditions and real potentialities of the economy.

## Chapter II

### ECONOMIC SUBSTANTIATION OF THE PLAN

A scientifically-based national economic plan reflects the operation of objective economic laws and sets the tasks of society's development for the plan period. The aims of a plan cannot be chosen arbitrarily. They are set depending on the attained development level, the social orientation of the plan and the available resources. Therefore the multi-stage process of plan design begins with an analysis of the achieved level of production and the tendencies of economic growth displayed in the pre-plan period which are of significance for the future period. The main trends in the development of production and related spheres of social life and in the forecasting of scientific and technological progress are brought out at the next stage. The results of analysis at these pre-plan stages make it possible to choose and define the aims of socio-economic development for a certain period.

This is followed by the stage of plan formulation proper: elaboration of a system of definite economic measures for the most efficient achievement of the designated aims, setting the main indicators of development of social production and the more concrete assignments for the development of separate sectors, economic spheres and economic areas. Last but not least, comes the stage of the general planning process such as control of the implementation of the plan and its adjustment, taking into account the actual result of operation and the newly emerging factors and conditions of a technico-economic and political nature.

At all stages of planning work attention is focussed on the tasks of a) ascertainment of the social needs

the satisfaction of which must be the aim of economic development; b) valuation of the resources which can be utilised for satisfying the needs; c) choice of methods for the real co-ordination of resources and needs and for assessment of the efficiency of the adopted decisions.

#### 1. Social Needs as the Initial Point of Economic Planning in the USSR

Production is developed ultimately for satisfying society's needs. Under private ownership of the means of production and the consequent disunity of separate links of the economy, the interests of the owner of means of production, the entrepreneur, is the direct motive of production. These interests may not coincide with, and frequently are directly opposed to, the interests of society as a whole. In these conditions the connection between production and society's needs is established as a result of the competitive struggle of the producers and the spontaneous fluctuations of production.

In conditions of social ownership when production develops under the control of the entire society, the dependence of production on social needs, on the tasks and aims of the development of society as a whole, is displayed directly: the means of production and the natural resources belong to the working people, to society as a whole, and it directs the development of production, co-ordinating it with its own needs.

In the USSR the national economic plan is the requisite instrument for guiding production and each element of it in accordance with the aims of satisfying social needs. Regulation of production in conformity with social needs is a primary function of the national economic plan. The formulation of a national economic plan is called upon to ensure the satisfaction of social needs in the most efficient way, with the least inputs of material, manpower and financial resources.

The degree and rates of satisfying social needs which can be attained as a result of planned economic development are major criteria of the progressive nature of the chosen ways of economic advance, of the adopted plan decisions. The degree of satisfaction of

social needs is also a major index of the economic development level. From this viewpoint the absolute scale of production and even per capita output do not yet fully characterise the results of economic growth. The ability of production flexibly to react in conformity with the changes in social needs is also a major index of the economic maturity of a country.

Ascertainment of the degree to which social needs are satisfied is also required for assessing the proportionality, the balance of the economy. Production is proportional and balanced if its volume and structure maximally conform to the volume and structure of the social needs.

The concept of social needs which have to be considered in planning economic growth is a very intricate, socio-economic category. The most general classification of social needs can be given by their subdivision into productive (needs for the development of production itself) and non-productive (the needs of people and society as a whole as consumers). In the USSR productive and non-productive consumption are correspondingly differentiated. Productive consumption is the use of means of labour,<sup>1</sup> power, raw materials and semi-manufactures in the process of producing the necessary goods (for example, the expenditure of metal at an engineering works for the manufacture of machine tools, electrical equipment, tools and other articles). Non-productive consumption is consumption of various goods and services by the population, and also by institutions which do not produce material goods.

<sup>1</sup> *Means of labour* are the sum total of things with the help of which man acts on objects of labour (see below). Means of labour are divided into several types, namely: equipment, machines, motors, tools, fixtures, and so on; production buildings and installations, railways, highways and other roads, pipelines, electric transmission lines, canals, and so on; facilities for conveying goods (goods wagons, trucks, trolleys, carts, and so on) and also various storage capacities (bunkers, tanks, barrels, boxes, vessels, cylinders, and so on).

*Objects of labour* are things or complexes of things subjected to treatment by man in the process of production. They are divided into two types: a) materials obtained directly from nature and turned into a product (e. g., coal and ores or fish); b) raw and other materials subjected to preliminary treatment (e. g., yarn in the textile industry, metals or plastics at an engineering works).

In productive consumption as such planners single out current consumption, effected within the given production cycle (usually a year). For example, for the operation of an iron and steel works, it is necessary to produce and supply it with ore, fuel and electric power. Such consumption, satisfying current production needs, is characterised by the fact that the product of a given year is also consumed in the same year.

But current productive consumption (or, as it is also called, intermediate consumption) cannot be an aim in itself for production. The latter is developed for satisfying aims and requirements outside production itself, and outside the bounds of only the given year.

Indeed, in the given year coal is mined not only to enable coke-oven batteries, blast furnaces and electric power stations to operate, but also ultimately to satisfy the requirements of people, expand production and satisfy social needs to an ever greater degree.

Therefore, when social needs are mentioned concretely in the context of planning problems, what are meant are the final requirements or the needs of final social consumption, i. e., the needs which are either outside the sphere of material production as such (non-productive needs) or outside the chronological bounds of the given current production period, of the given year (material prerequisites for the long-term development of production).

The range of final social needs includes above all the requirements of the population in material goods (food, clothing, housing) and services which ensure personal consumption. These also include the obtaining of a general and vocational education, satisfying quite a wide range of cultural requirements, ensuring the health and the necessary physical development of every member of society.

Society is a constantly developing organism and the needs of its members are also systematically changing and growing. Therefore, the aims of developing social production cannot be confined to satisfying the daily needs of society. It is necessary to ensure ever more fully the satisfaction of requirements in the future, the immediate and more remote, i. e., to ensure the further development of production over and above.

the given current needs. In other words, the requirements of society as a single entity also include the need in means of production both for maintaining the achieved level of production and for its further expansion.

Thus the final social needs (and correspondingly final consumption) consist in that society must have material resources, ensuring the personal consumption of the population, consumption in the non-productive sphere; replacement of the part of the means of production consumed during the given period and accumulation of means of production for future periods.

The composition of social needs depends on many technical, economic and social factors and also on natural and demographic factors. But it is above all determined by the structure of, and changes in, production itself. A mass demand for certain goods, as a rule, arises only when their production begins. The development of production represents the material basis for changes in social needs. The needs and effective demand of the population are shaped by a very intricate combination of factors. Therefore study of shifts in the scale and pattern of the population's demand presupposes a study of each of these factors and, what is particularly difficult, of their interaction.

The scale and pattern of the people's requirements which can be considered in planning depend on population dynamics, changes in the age and sex composition, national and regional distinctions, the composition, dynamics and migration of the able-bodied population, and so on. An increase or decrease in the share of separate age groups noted for specific features in consumption and services also affects the general pattern of needs. For example, a bigger share of children in the total population implies greater need in the services of relevant institutions and dictates expansion of the network of the respective medical establishments.

A change in incomes and level of prices of consumer goods and services decisively affects the pattern of the population's effective demand. Quite stable laws operate in this respect: as family incomes rise to a definite level the consumption of foodstuffs increases, the composition of the diet improves qualitatively with a resultant growth in the average price of the foodstuffs.

As incomes further rise the scale and share of the consumption of non-food goods and then all kinds of services gradually expands. But an idea of the main trends of changes in consumption with the growth of population incomes is insufficient for solving concrete planning problems. More detailed studies and planning calculations are utilised. The change in the level of prices and its effect on demand is dictated by a number of economic laws. Coefficients of the elasticity of demand depending on the real price index are calculated.

Changes in the level of education, in the vocational composition of the persons employed in the economy and in the very nature of labour act as an essential factor in altering population needs because those of different vocational groups are not the same. The food requirements of a worker operating mechanised equipment and a worker engaged in arduous manual labour clearly differ. Study of the shifts in the distribution of the population is important for ascertaining the needs of the population in countries with noticeable climatic differences over their territory. Account should also be taken of certain national distinctions in consumption and the traditions of different population groups.

Study of changes in the scale and composition of needs and the effective demand requires systematic work and the application of different methods and forms of organising relevant researches. Several main forms of studying population requirements and the effective demand have been crystallised in the USSR. Thus, systematic surveys of family budgets are conducted which reflect all the main types of incomes and the main trends of family expenditure, including expenditure for the main types of goods and services. More than 50,000 families are systematically surveyed; these are families of workers and office employees of different vocations and of peasants. An analysis of the systematic studies of family budgets offers grounds for conclusions about changes in the composition of the demand of families grouped by level of income, social group and vocation.

Balances of population incomes and expenditures, systematically drawn up by planning and financial agencies, are an important source of information for

studying and forecasting shifts in consumption by the population.

Economico-mathematical models of population demand are constructed on the basis of data of the population composition by groups depending on their income. These models are of practical significance. Data about the expected growth of population incomes form the basis of forecasts of changes in the distribution of population by income groups and forecasts of changes in the composition of the demand owing to shifts of the population from one group into another.

Trade statistics offers extensive material for studying changes in consumption. It contains data on marketable resources designated for sale in state and cooperative trade in a quite detailed nomenclature of goods, the volume of sales and prices, the stocks of goods in the wholesale and retail trading links and a number of other indices. Polling, questionnaires, different forms of discussing the quality of goods and the organisation of trade are also widely utilised.

Sociological studies are conducted and polls of separate groups of the population are arranged. They are especially important for ascertaining questions linked with consumption in the case of which it is impossible to obtain information from the usual data on incomes and expenditures.

Study of tendencies of technological progress in industries producing consumer goods is highly important for determining the trend of change in population demand. The appearance in future of goods essentially new or changed will inevitably lead to considerable shifts in the pattern of consumption which it is impossible to foresee only on the basis of statistics of consumption in the past and the present.

What is known as the normative approach is also utilised for analysing and forecasting shifts in consumption. Its essence consists in that data characterising the most rational scale and pattern of man's consumption are ascertained on the basis of modern medico-biological studies which consider a number of socio-economic factors (vocational composition of the population, the nature of work, and so on). This is how the necessary volume of nutrition in calories and its

composition for the main types of foodstuffs, chief nutritive substances and elements are determined. This serves as the basis for drawing up recommendations as regards rational consumption norms differentiated by sex, age, main climatic zones, basic types of activity (mental labour, mechanised labour, predominantly manual labour, and so on). The elaboration of such rational norms makes it possible to assess the existing pattern of consumption from the viewpoint of the demands of medical science and to suggest measures for bringing the pattern of consumption closer to the requirements of science.

The development of science and technology and improvement of production methods are decisive elements in ascertaining the composition of society's productive needs. Changes in the composition and quality of instruments of labour, the use of power sources, new types of raw and other materials in production and also their unit inputs depend mainly on scientific and technological progress.

Requirements of productive consumption are determined chiefly through the normative method. Norms of production inputs are worked out on the basis of a statistical analysis and the employment of methods of technological substantiation which consider the future state of technology and production methods. These are norms of investment per unit of accretion of capacity or production, norms of the inputs of fuel, raw and other materials.

## 2. Overall Indicators of Social Needs

The various elements of social needs are expressed in an aggregated form in indicators of the national income and the final social product. In the USSR the national income means the newly created value for a definite period (usually a year). It is created in all sectors which produce the material product and at the stage of use is represented by the sum of the funds of personal and social non-productive consumption and of productive accumulation. The final social product is somewhat broader for its composition: besides goods for current non-productive consumption and an increase

in non-productive and productive fixed and circulating assets, it also includes a definite amount of material goods, needed for replacing the consumed means of labour, i. e., the expenditure for replacing the retired and thoroughly repairing the fixed productive assets.

Depending on the concrete tasks of plan calculations, and the properties of the employed models, magnitudes either of the national income or the final social product in different modifications can be utilised. Planning of the national economy with due regard for the final social needs presupposes above all ascertainment of the volume and composition of the national income and the final social product, inasmuch as it is they that represent the material source for satisfying society's needs.

The principle of planning, of formulating a plan, proceeding from social needs is most consistently applied when the sum total of final needs (final consumption) is taken as the starting point of the plan.

The system and sequence of plan designing, starting with final consumption, demand a number of prerequisites. To begin with, a definite level of a country's economic development is presupposed. When prerequisites for the accelerated industrial development have already been created, the most rational structure of sectors producing means of production and consumer goods is shaped. This creates conditions for the harmonious development of the economy and the employment of the productive apparatus for the ever fuller satisfaction of society's diverse needs.

To apply the principle of formulating a national economic development plan starting from final social needs, it is necessary to accumulate experience in planning and using a definite set of planning instruments. The degree of precision in determining the interconnections in the economy, the interconnections between consuming and producing sectors and between the producing sectors themselves can be taken as a criterion for valuating the available experience. An important part in this respect is played by the construction of an inter-sector balance of production and consumption of the social product.

In certain conditions the initial point for designing the national economic plan can be not the entire totality of final needs, but the need in definite goods or group of goods. Such an approach to formulating the plan, practically implies that it is drawn up on the basis of separate sectoral projections.

The practical drawing up of a plan, proceeding from sectoral projections, may also be necessary in conditions of a narrowly specialised economy when several sectors and at times even one sector play the decisive part in a country's economy. In that case satisfaction of a country's internal needs is determined by the development of this sector and the export of a definite range of products and articles. Naturally the planning parameters for the development of such sectors play the part of the main guidelines for other targets of economic growth.

But even in this case determination of the range of social needs of such a country and the sequence and degree of their satisfaction at each stage of economic development remains an important task of planning.

### 3. Valuation of Productive Resources

Valuation of the resources which society can utilise for the development of production in the plan period and, consequently, for satisfying the current and expected future social needs is a major problem of national economic planning, alongside the task of ascertaining the scale and composition of the social needs.

These productive resources include the natural wealth needed for production, manpower resources, the accumulated productive assets and the stocks of circulating assets (objects of labour), raw and other materials, semi-manufactures, etc.; and also means for replacing the consumed assets and further extending these assets — the investment resources.

Natural resources are the primary source of the material content of everything produced by man. But the production of the entire diversity of material goods society and every member need is possible only with the help of human labour. Only labour can transform a natural substance into a use value. In turn, labour power

can function only when equipped with means of labour, productive assets; the efficiency, productivity of living labour decisively depends on its provision with the means of production. Thus, the main types of resources are closely interdependent.

It should be added that the degree of participation of each of these resources in production and its efficiency depend on the level and development rates of science and technology. The results of scientific and technological progress are accumulated in fixed assets, in the efficacy and productivity of the means of labour, in the methods and organisation of production. Scientific and technological progress thereby opens up new ways and possibilities for man's mastery of the natural resources, creates material prerequisites for the further rise in labour productivity.

The need for valuating the productive resources as a major prerequisite for planning and managing production is dictated by the fact that the magnitude of these resources is limited for every plan period.

For some types of resources their limited magnitude is absolute. This applies, for example, to irreplaceable natural subterranean wealth. This limitation can be overcome only through technological progress, by replacing a natural substance by a product artificially created from another natural substance.

For other types of resources which are reproducible (manpower resources, productive assets, some types of renewable natural resources — soil fertility, forests, and other types of plant and animal resources) their limited nature is relative, above all in point of time. During a definite period it is possible to reproduce the given resources only up to a definite magnitude, but the increase of the resources on a still bigger scale requires time which exceeds the plan period.

The degree of enlistment of potential productive resources in economic circulation, the nature of their use and restoration decisively depend on the socio-economic conditions.

In the Soviet Union nationalisation of the main part of the means of production and the transition to the planned organisation of production under state control made it possible to place tremendous, hitherto

poorly utilised resources of economic growth at the service of society. An agrarian surplus population as a form of the actual unemployment of the peasantry was usual and there was also a considerable army of unemployed in the cities of pre-revolutionary Russia in conditions of private enterprise weighted down by survivals of feudalism. Accelerated economic development of the USSR on the basis of national economic plans fully drew into production the manpower resources, thus abolishing mass unemployment, and ensuring full employment. Ten years after the revolution unemployment in the USSR still stood approximately at the level of one-seventh of the employed labour force. But already in 1931 unemployment was fully abolished by industrialisation and the social and technical reconstruction of agriculture. At present employment of the population in the Soviet national economy increased by half as compared with 1928.

The experience of the USSR and other countries also speaks of difficulties in fully utilising the manpower resources at the initial stages of developing a planned economy. Countries which are beginning to plan the development of their economy in conditions of low growth rates are faced with the dilemma: either to ensure full employment at a low level of the workers' skills and to extend labour-intensive industries or build the most up-to-date enterprises with a small number of employed and high labour productivity.

Under capitalism, private ownership of the land, its high and almost constantly rising prices and the substantial rental payments considerably restrict the efficient use of the land and its natural resources and offer an impetus to the rapacious use of natural wealth. Progressive agrarian changes carried out in the USSR resulted in that the land and its mineral wealth became the property of the whole people, and this created new, highly favourable conditions for the more efficient use of natural resources in the interests of the entire society.

In conditions of the nationalised economy in the USSR, one of the most difficult problems of economic growth — mobilisation of accumulation resources for extending production — has been solved on a different socio-economic basis and more successfully than under

capitalism. An essential part in this respect has been played by the confiscation of private capitalist and feudal property in the means of production, the nationalisation of the banks and the establishment of the monopoly of foreign trade. All this provided the basis for abolishing the parasitic consumption of the exploiting classes and their retinue and stopping the export of profits by foreign capital. The resultant resources were largely used for national economic development, for extending and raising the share of the accumulation fund in the national income.

The organisation of financial control and financial planning, changes in the price-formation system and the exercise of thrift in all links of production and the managerial apparatus also helped to mobilise resources for accumulation.

The increase in the scale and growth in the rate of accumulation enabled the Soviet state from its first steps in economic development essentially to expand the resources for investments. Their systematic growth served as the basis for the technical re-equipment of all sectors of the national economy, tapping natural resources, saving the inputs of living labour and raising its productivity.

Thus, valuation of the resources of production presupposes an analysis of the socio-economic factors of a country's economic growth. National economic planning can successfully cope with the task of providing resources for production only if there are favourable socio-economic conditions.

*Ascertainment of Provision with Natural Resources.* Valuation of natural resources has to encompass all the main types of natural power resources, all kinds of fuel and also iron ore and non-ferrous and rare metal ores, non-metallic raw materials (for example, potassium salts, apatites, lime, building materials and so on), vegetation resources, especially forests, and in the long-term future, also sea plants and animal resources on the ground and in rivers and seas. It is also necessary to ascertain the provision with agricultural lands and fresh water reserves.

Valuation of natural resources includes: a) assessment of the volume of the given type of resources,

b) ascertainment of the expenditure necessary for their industrial working, and in some cases also for their renewal, c) relative (comparative) economic valuation of natural resources.

Planned, balanced development of production requires ascertainment of the provision of the economy with natural resources for the long-term future. Moreover, it is necessary to consider that, for example, in the case of mineral raw materials a considerable period passes from the time a deposit is discovered to its industrial working and that the reserves should make it possible to continue production for a period not less than the full depreciation of fixed assets in the extractive industry. In assessing the provision with natural resources, special account should be taken of the tendency for an essential increase in the volume of extraction of minerals and acceleration of growth rates in this sector. World statistics of the extraction of the main minerals (in money terms) show that in the 18th century production doubled in more than half a century, while in the second half of our century it doubles in 11-12 years. Mankind so far utilised approximately 80,000-85,000 million tons of standard fuel, and half of this quantity was consumed in the last 25 years. During this period the extraction of minerals was much bigger than during the entire preceding history of mankind.

Data concerning the provision of the national economy with natural resources are not given once and for all. They change, first of all depending on the scale and results of geological surveys. Thus, pre-revolutionary Russia was considered a country insufficiently provided with mineral reserves. But the extensive geological prospecting by the state in Soviet times has fully refuted these notions. Thousands of new mineral deposits have been discovered, and the volume of surveyed reserves has risen manifold as compared with the pre-revolutionary period.

The mineral raw-material resources are systematically surveyed and prospected in the USSR. Work is under way to ascertain the possible reserves and study the development of geological prospecting and of the

mineral raw-material reserves for a period up to 1980-1985 and further up to year 2000.

In assessing the prospects of the mineral raw-material reserves, the cost and main trends of geological prospecting, of prime importance is the study of the prospects for the types of resources in which the surveyed reserves do not satisfy the requirements of the respective industries.

But a long-term estimate is also needed for mineral and other resources in the case of which it is considered that the long-range needs of the national economy will be satisfied on the whole. For these resources there should be no "excess prospecting" above that required for the long-term period so as not to spend funds and efforts which it is more expedient to use for prospecting resources which are especially scarce.

Thus, the organisation of the geological prospecting service, the allotment of material and financial resources for it and the establishment of control over the proper use of all natural wealth is an important element in the system of measures for the transition to planned operation of the economy, a requisite for accomplishing the task of providing the natural resources needed for economic development and raising the efficiency of social production.

It is necessary to consider that our notions of the scale of natural resources and the expenditure needed for their tapping, as pointed out earlier, also directly depend on the progress of science and technology. Natural resources of production are understood to mean not the sum total of natural objects and forces surrounding man in general, but only those which are accessible to the influence of social production and which under the given level of technology can directly serve, and do serve, as a source of natural substances for material production. Scientific and technological progress extends the range of the natural resources of production.

Indeed, it is the progress of technology and economically efficient production methods that determine the further penetration into the subterranean treasure troves, the tapping of wealth from the ocean bottom and the underlying strata, utilisation of thermal

springs, the energy of tides, large-scale use of installations for the obtaining of fresh water both for technical purposes and drinking, and so on.

Thus, acceleration of technological progress and the use of world scientific and technological know-how are a prerequisite for solving the problem of providing economic development with natural resources.

*Valuation of Labour Resources.* The labour force is one of the decisive factors of economic growth. The scale of production, and to some extent also the possibility of complicating its structure (sectoral composition) directly depend on the size of labour resources.

The state of the labour resources largely influences the content of economic policy in the plan period. If there are abundant labour resources and a limited number of work places preference is given to a labour-intensive and relatively less capital-intensive variant of economic growth under which a low cost of each additional work place would be ensured. But when the labour resources are exhausted and there is a relative shortage of labour power, the labour-intensive variant of production growth is unacceptable. Additional capital investments are needed for raising labour productivity on the basis of growing assets per worker and the release of part of the manpower at operating enterprises for employment in the newly developing factories and industries.

Many countries are faced with the task of mobilising the labour resources and ensuring conditions for their most rational use. It should be noted that the most expedient use of labour resources on the scale of the entire society is possible only on the basis of planning.

Assessment of the possibilities of drawing labour into production rests on an analysis of the demographic situation in a country. Planning in socialist countries proceeds from the principle that the laws of population dynamics depend on the nature of production relations and the attained level of the productive forces. Population dynamics are determined by the relationship between the birth rate and mortality.

An analysis of the demographic situation should furnish an answer to the question, What laws govern

the process of population growth in a country in present conditions and will govern it in the plan period? This furnishes a general basis for assessing the possibilities of drawing additional manpower into the national economy. In this context decisive significance attaches to a valuation of the age composition of the population. This is necessary to determine the numerical strength and share of the population of working age. In Soviet statistics and planning it is customary to regard as able-bodied men from 16 to 59 and women from 16 to 54 years of age (except invalids). It is these age groups that make up the main part of the labour resources, to which are added persons beyond the working age (men 60 years and older, women 55 years and older and juveniles under 16) who are actually engaged in the social economy.

The higher the share of the population of working age, the bigger the possibilities for drawing manpower into the national economy. The actual possibilities also depend on how the population of working age is distributed by age groups. For example, an increase in the share of the younger ages means an increase in the proportion of persons of whom a considerable number will study.

An estimate of the sex composition of the population is important in assessing the labour resources. The percentage of women who can be drawn into social production naturally is lower than that of men.

If society is interested in extending the employment of women in the economy, a number of additional conditions have to be created: these are above all measures for extending the social forms of child upbringing (nurseries and kindergartens, boarding schools and the like) and also measures for protecting the health and for the social maintenance of working women in general and especially mothers.

The share of women working in the national economy is quite high in the Soviet Union. More than three-fourths of all the able-bodied women are engaged in social production or study. They make up half of all the people engaged in the national economy. This is a result of the big demand for labour presented by the swiftly developing production and the creation of the

necessary social conditions: ensuring equal rights with men to a general and specialised education and vocational training, the right of women to paid maternity leave, the establishment of the system of special free mother and child welfare institutions, a system of institutions for the public upbringing of children (for example, two-fifths of all children under the age of six in cities are accommodated in pre-school institutions and this share is systematically rising both in town and country).

The territorial aspect is quite important in analysing the provision of the national economy with labour resources. The surplus of labour resources in some areas is often accompanied by an acute shortage in other regions. That is why data on labour resources are of real value for planning if they are concretised by an estimate of the provision of different economic areas with manpower. Of great interest in this context is the study of inter-region migration, the objective ascertainment of its causes, intensity and effect on economic development.

Thus the general quantitative valuation and planning of labour resources in a country presuppose the existence of organised statistical accounting of the dynamics and changes in the structure of the population (systematic population censuses, current statistics, selective surveys) and a system of demographic forecasts.

The problem of assessing the labour resources of the economy calls not only for their general quantitative characteristic but also a characteristic of the qualitative composition of these resources. The most general index characterising the qualitative composition of the employed and the potential labour resources is the level of their education (the number and share of persons who have a general, specialised secondary and higher education). A detailed qualitative valuation demands an analysis of the vocational composition of the labour force and ascertainment of the degree of coverage of the production needs in skilled personnel. Such an analysis creates the prerequisites for substantiating the needs for organisational measures and the allocation of material resources to train personnel for the national economy.

### *Valuation of Productive and Non-Productive Assets.*

Economic development of each new period has as its material basis the results of growth in the past. At the beginning of each new economic period these results are expressed in the accumulated productive and non-productive assets. The accumulated stocks of fixed and circulating productive and non-productive assets which a society has at every given moment are part of its national (social) wealth.

National wealth embodies the labour of the people over many years; these assets serve as a material prerequisite for the further development of the economy both in the immediate and in the subsequent periods.

The accumulated productive assets include: a) fixed assets represented by production buildings and installations, working machines, equipment, means of transport, and so on; b) stocks of material circulating assets which consist of stocks of raw and other materials, fuel, and finished goods for production purposes in possession of enterprises, of uncompleted construction; c) social reserves of the means of production.

Stocks of non-productive assets at the beginning of every plan period are represented by: a) fixed assets (buildings, installations, equipment) of non-productive designation — medical, cultural, education and sports facilities, houses and public utilities; b) finished goods designated for consumers kept at warehouses of enterprises and in the sphere of circulation (en route, at warehouses of trading establishments); c) personal property (durable consumer goods) in the households of the people; d) social reserves of consumer goods set up in the event of natural calamities and other emergencies. Non-productive assets also include the assets of state administration institutions, political and mass organisations, military installations and stocks of material.

Valuation of the scale and structure of national wealth, naturally, is very important for ascertaining the possibilities of long-term economic growth and formulating the tasks of economic policy both as regards further increasing the production potential and raising the living standard of the people. National wealth, particularly productive assets, characterises a

country's economic potential. Per capita national wealth and also some indices of its structure characterise the level of a country's economic development.

In its non-productive part national wealth is an index of the population's standard of living, which is determined not only by the volume of goods going into consumption from current output but also the volume of consumer goods accumulated earlier, i. e., the non-productive assets of national wealth. Moreover, the role of stocks of durable consumer goods as a factor of well-being rises as society develops.

Valuation of national wealth (usually in the value form) and its material structure (productive and non-productive assets, fixed and circulating assets, buildings and installations, machinery and equipment, household property) can be done both by direct accounting methods and indirect calculation methods.

Direct accounting methods are represented by inventorytaking (census) of the main elements of national wealth and also by the systematic statistical and book-keeping reports of enterprises and institutions. The employment of such methods in the USSR is greatly facilitated by the social ownership of the main means of production, the abolition of commercial secrecy, and the operation of enterprises and institutions under the control of the state.

At the same time it is possible to employ indirect methods: with regard to consumer durables in use calculation of the changes in the volume and composition can be made on the basis of data on purchases of durable consumer goods, taking into account their service span depending on their wear and change of price indexes; with regard to fixed assets, by summing up investments during the studied period, taking into account the service span of separate elements of the fixed assets with an adjustment for depreciation and price changes.

In the process of production and consumption the magnitude of productive and non-productive assets changes. These assets are worn out and retired, renewed and further extended. The compensation fund of the social product and national income created during this period represent the source for the reproduction

of assets at the disposal of society at the beginning of the examined economic period.

The magnitude of the compensation fund is determined depending on the size of the assets and their service span. Resources of the national income used for the accumulation of national wealth depend on the scale of production, growth rates of the national income and its division into the fund of current non-productive consumption and the accumulation fund. The problem of determining the resources of the national income for accumulation is largely identical to the problem of planning the rates and proportions of reproduction, which will be examined in the next chapter.

Ascertainment of the volume and structure of social needs and valuation of the productive resources which society can utilise for their satisfaction creates the initial basis for further plan calculations.

The essence of these calculations consists in establishing the most rational trends in utilising resources for the possibly fuller satisfaction of social requirements. For this purpose a balanced model of the national economy is constructed in which needs (consumption) are co-ordinated with resources (production).

The system of economic substantiation of targets of the national economic plan, proceeding from the social needs and co-ordinated, through the balance method, with the existing and foreseeable resources, presupposes the application of the following system and sequence of calculations.

First, aggregated, macro-economic calculations of the main indicators of extended reproduction are needed, which at the first stage approximately delineate the real possibilities for the development of social production. These are calculations of the dynamics of the national income and the final social product, the volume of the consumption funds, and resources for investments.

Such calculations are made with the help of macro-economic models which incorporate the volume and economic role of the main productive factors (fixed and circulating assets, manpower) and also the assumptions concerning the efficiency of their use. The main

balance relations in the national economy are determined in a preliminary way already at this stage.

Second, the material content of the final product and its material structure in physical terms are calculated. These computations, in effect, provide a quantitative determination of the composition of the social needs, the main trends of satisfying them, considering the available resources and the possibilities of expanding output. Economico-mathematical models of forecasting non-productive consumption and a number of normative indicators are utilised in these computations.

Third, the scale of production, inter-sector relations and the sectoral structure of production required for securing the contemplated volume of the final product are calculated. Done with the help of multi-sectoral (inter-sectoral) planning models, these calculations make it possible to balance social needs and social production and to provide the necessary guidelines for the full-scale computation of sectoral development plans.

Fourth, development plans of sectors and their location over the country's territory are drawn up. At this stage numerous and highly concrete plan calculations are made. The results of the full-scale sectoral projections, which most fully reflect their production potentialities, provide the necessary adjustments for all the earlier stages of plan calculation, up to specifying the overall indicators — national income, non-productive consumption fund, the scale of investments, and so on.

The main indicators of the national economic plan are finally worked out through the adjustment, balancing and co-ordination of the results of this entire system of plan calculations. Economic substantiation of the targets of the national economic plan also includes a valuation of the efficiency of planning decisions.

#### 4. Efficiency of Planning Decisions

Rise in the efficiency of social production is a pivotal problem of socialist economic planning and management, the main way for ensuring stable, high growth rates and a systematic and swift improvement of the people's standard of living.

Valuation of the efficiency of planning decisions and the actually achieved economic growth is made at different levels — national economic, sectoral and enterprise — and consists in comparing the obtained results with the expenditures.

Elaboration of the methodology of such comparisons is quite difficult and there is a considerable number of problems in this sphere which economic science continues to study.

Indicators of the national income and the final social product (value added at the sectoral level) are used in Soviet planning for characterising the results of production development. The indicator of gross output is used in some calculations. The indicator of the net income (profit) is of great importance for computations at the sectoral and especially the enterprise level.

Valuation of the expenditure (input) presents the biggest methodological and practical difficulties. Included here are the inputs of labour and means of production (fixed and circulating assets) and investments. These inputs are quite diverse and for a number of reasons cannot be directly compared. The inputs of living labour (time worked) are not directly comparable with the inputs of the means of production. The current inputs of the given production cycle (raw and other materials and depreciation) are not directly comparable with investments in fixed productive assets which could have been made earlier and will serve production for many years after the examined production cycle. These difficulties do not arise as long as the use of separate factors is analysed, but in constructing general indicators of the efficiency of the entire social production it becomes necessary to give a uniform, overall expression of all inputs.

Among the indicators characterising efficiency in the use of separate factors are data on labour productivity, material-intensity of output, asset-intensity and investment-intensity of social production. These indicators are utilised both in the case of the entire national economy and also at the sectoral and enterprise levels, but the definitions of these indicators given below refer mainly to the national economic level.

Labour productivity is measured by the ratio of the volume of the national income to the number of persons employed in producing it (or to the time worked). The labour productivity indicator characterises efficiency in the use of living labour.

Asset-intensity as an indicator of efficiency in the use of the functioning fixed productive assets is measured by the ratio of their value to the value of the national income.

Material-intensity of output is measured by the magnitude of the current unit material inputs (raw and other materials, depreciation allotments).

Use of the inter-sector balance for analysis and planning makes it possible to enrich the characteristic of the material-intensity indicators. Calculations of the inter-sector balance enable economists to ascertain not only the direct inputs (unit material inputs of a sector) but also all the indirect inputs, along the entire chain of technological interconnections, needed for the production of every unit of the final product. These are known as coefficients of the full material inputs. With their help it is possible to calculate what part of the gross social product is connected with the creation of separate elements of the final product (personal consumption, accumulations of fixed and circulating assets). The complete inputs of labour and assets per unit of the final product can be computed in a similar way.

Investment-intensity and the period for the recoupment of investments are utilised as indicators of the efficiency of investments in planning practices today. Investment-intensity is the ratio of the sum of the investments to the increment of the national income obtained as a result of these investments. The recoupment period is the duration of the time in the course of which the additional profit will compensate the investments needed for its increase. The recoupment period is the ratio of the sum of investments to the resultant annual increase in profit.

The use of this system of efficiency indicators cannot fully solve the problem of assessing the efficiency of social production. In these calculations the expenditures

of one factor are compared with a result which actually is produced by the influence of a number of factors of production.

This raises the problem of an overall indicator of national economic efficiency in which the general results (for example, the national income), presented as the result of the influence exerted by all the factors of production, could be compared with an overall valuation of the expenditure of all factors.

Exploration of ways for solving this problem is carried on along several lines.

One of them is the elaboration of a method of presenting the current inputs and investments in money terms. For this purpose it is necessary to find a method with the help of which it would be possible to ascertain the part of the investments designated for servicing production over many years which could be credited to the analysed year. Then the annual input equivalent could be obtained by summing up the material inputs, the expenditure for labour remuneration and the part of the investments which is to be recouped in the given year.

The latter is determined depending on the recoupment period and is a result of dividing the sum of investments by the recoupment period (in practice a magnitude reverse to the recoupment period and called the efficiency coefficient is utilised in calculations). Such computations are widely utilised in the economic valuation of different variants of investments and, by way of experiment, are employed with some modifications for determining the efficiency of social production as a whole.

The possibility of expressing the inputs of labour and assets in a single labour measurement is studied as a possible approach to constructing an overall indicator of production efficiency. The practical calculations are made with the use of the inter-sector balance in which the coefficients of the full unit labour inputs are established and then each sectoral element of the utilised productive assets is valued in accordance with the obtained labour input coefficients. The result is a sum of the inputs of living and materialised la-

bour in the production of goods expressed in labour units.

Use of the multi-factor production function is another trend in analysing the economic efficiency of social production. This function makes it possible to bring out the degree of increase in the national income depending on the change in the magnitude of inputs of labour and fixed assets.

### *Chapter III*

## **PLANNING ECONOMIC GROWTH RATES**

An analysis of the aims of developing a country's economy and their comparison with the available resources enable planners to go over to estimating the general contours of a plan which ultimately can be expressed by targets of the rates of economic development.

Attainment of maximally high and stable economic growth rates is one of the cardinal tasks of both developed and developing countries, particularly if it is a matter of eliminating backwardness, wiping out poverty and winning economic independence. The resources which can be utilised for the development of a country's production potential and non-productive sphere depend on the growth rates of the national economy. Naturally, many political, economic and social problems are concentrated round the planning of rates of growth.

The promotion of high rates of economic development must not be divorced from the actual possibilities, from a sober valuation of the material, labour and financial resources. That is why the techniques of determining future growth rates must be scientifically based and objective and guarantee planning agencies from the adoption of subjective decisions.

The techniques of planning economic growth rates, examined in this chapter, are utilised in Soviet planning practices. These techniques can also be adapted to the conditions and possibilities of developing countries. They are fully applicable and feasible at the existing level of national statistics in most newly free countries.

The techniques of planning economic growth rates were shaped as practical experience was accumulated and generalised in the USSR and they became a major element of the entire system of national economic

planning. At present the sequence in the formulation of national economic plans is so arranged that the long-term growth rates are ascertained both at the initial stage of plan designing and at its consummating stage.

At the initial stage an aggregated model of the plan is constructed, which forms the basis for the further detailed projections by sectors, economic areas, in the sphere of construction, labour and wages, the standard of living, finances and prices. At this point economic growth rates characterise the dynamics of the resources which can be channeled for expanding production and improving the standard of living.

At the final stage the balance of the national economy compiled for planning purposes enables planners to achieve the reciprocal dovetailing of the projections by sectors and economic areas, to co-ordinate requirements and resources and to aggregate detailed plan calculations into macro-economic magnitudes, including economic growth rates.

The macro-economic indicators may differ at the initial and final stages of plan formulation because in the interval between them a full-scale national economic plan is drawn up. That is why plan formulation is an iterative process where the rates of economic development are simultaneously the first and the last link of the chain.

The methods for determining economic growth rates at the final stage of plan formulation, i. e., at the stage of what is known as summary work, were devised long ago in Soviet planning and are adequately covered in economic literature. The present chapter will deal with a less elucidated side of planning work — ascertainment of the rates and some proportions of economic development at the initial stage of plan formulation. The outlined techniques may be of definite interest for developing countries, inasmuch as their application is possible in the absence of full-scale, detailed national economic planning.

### **1. Principles of Planning Economic Growth Rates. Concept of the Growth Rates of Production**

A primary task of national economic planning, alongside substantiating the quantitative characteristics of

the future plan, is to fill its targets with definite economic content so that they should reflect economic realities. The theory and practices of Soviet planning have produced a number of important principles, from the position of which the substantiation of economic growth rates is examined.

First, the attainment of high rates is regarded as a primary task of planning because growth rates of production are the basis for both advancing the people's living standard and increasing the production potential, which is the foundation of further development. Moreover, the task of achieving high growth rates is tackled not for separate years or brief periods, but for the entire foreseeable period, i. e., it is a matter of maintaining stable growth rates without sharp recessions and advances which are beyond the control of society.

Second, high and stable rates of economic development must be secured not at any price, but through the most efficient use of the available natural and labour resources, fixed assets, stocks and reserves, imports and foreign-exchange resources. That is why in planning economic growth rates one of the main problems is to search for such an allocation of the limited resources as would yield maximum results per unit of inputs.

Third, since maximum satisfaction of society's requirements is the criterion of economic development, the setting of growth rates presupposes the production of goods in a composition and of a quality which maximally conform to society's needs.

The general principles of planning economic growth rates are specified for each plan period. The combination of factors of growth, the volume and possible trends in the use of resources, and the composition of social needs are concrete for each stage of economic development and differ in separate countries. That is why economic growth rates must not be appraised only from the viewpoint of quantitative increase but it is necessary to see their real economic content in combination with other socio-economic processes.

The annual volume of the national income or final social product is the overall indicator of a country's

economic development. In the Soviet Union and other socialist countries material production (industry, agriculture, construction, the transport and communications systems, trade, procurements, marketing, supply and public catering) is regarded as the source of the national income or the final social product.

When dealing with the dynamics of production, the national income or final product is measured in constant prices, most expediently in the prices of a base year. In such a case the economic growth rate is the relative (in per cent) increase in the volume of the national income or the final social product calculated in constant prices.

To systematise the subsequent exposition we introduce the following symbols:

$Y'$  — final social product;

$Y$  — national income;

$C$  — consumption fund, including social consumption (state expenditure);

$I$  — investments in fixed assets ( $I_h$ ) and circulating assets ( $I_s$ );

$A$  — accumulation, i. e. net investments;

$R$  — replacement of retired fixed productive assets;

$t$  — time.

Using these symbols, it is possible to characterise the connection of indicators expressing the results of the production process (final product and national income) with their structural elements:

$$Y = C + A;$$

$$Y' = C + A + R = C + I, \quad \text{where } I = A + R.$$

Denoting the annual growth rate of the national income as  $1 + y = \frac{Y_{t+1}}{Y_t}$  and the rate of annual increment as  $y = \frac{\Delta Y_{t+1}}{Y_t}$  the volume of the national income at the end of the period can be expressed as follows<sup>1</sup>:

$$Y_t = Y_0(1 + y)^t. \quad (1)$$

<sup>1</sup> The exposition hereafter is given in indicators of the national income.

In examining growth rates of the national income it is expedient to begin with conditions of even development, i.e., uniform rates of increase in separate years. But the use of mean geometrical incremental rates (this is a condition of even development) must be supplemented by an account of the total volume of the national income for the given period.

The process of economic growth is not a straight and uniform increase in the volume of production. Technological progress, renewal of fixed assets, big economic reforms, qualitative changes in the general conditions of reproduction — all this leads to periodicity in economic growth rates. That is why they must be analysed and planned by separate periods.

Emergence beyond the bounds of the annual period is of special significance in characterising growth rates in long-term planning. With the same increase in the annual volumes of the national income during the entire plan period (five years, for example), but with changing annual growth rates within this period, the total volume of the national income for the whole period may be different, depending on whether the growth rates above the annual average were at the beginning or the end of the period. Let us illustrate this point by the following hypothetical example:

Years	Growth rates, per cent of preceding year		Volume in hypothetical units	
	First variant	Second variant	First variant	Second variant
Base	100	100	100	100
Plan:				
First	110	106	110	106
Second	109	107	119.9	113.4
Third	108	108	129.5	122.5
Fourth	107	109	138.6	133.5
Fifth	106	110	146.9	146.9
Total for plan period	146.9	146.9	644.9	622.3

This example shows that with equal increases of the indicator for the period as a whole (146.9 per cent in both variants) and with the same level in the last year (146.9 units) the volumes for the entire period differ (644.9 and 622.3 units) and, consequently, the real scale of production in five years differs. From this follows the conclusion that the average annual growth rate (in this case 8 per cent), does not characterise precisely the process of growth, the real increase of the national income or industrial output. Therefore a more precise analysis and planning of the process of extended reproduction demands a comparison of the summary volumes of the two periods. This comparison characterises more exactly the process of growth.

The growth rates of social production are characterised by an increase not only in the volume of the national income, but also in the rise of its per capita magnitude. Growth rates of the per capita national income reflect more fully the advance of a country's economy than the dynamics of the volume of the national income.

## 2. Factors of Growth of the National Income

The rates of economic development for a plan period can properly be determined only by considering the factors which influence these rates: technological progress, labour resources and the level of their skill, productivity of labour, productive assets and efficiency of their use, natural resources, the sectoral structure and location of production. Economic policy, the level of organisation and planning of the economy also greatly influence the rates of extended reproduction. Material incentives and the population's standard of living likewise affect the rates of social production. The task of planning is to establish the influence of each factor and their interaction and, on this basis, to influence the rates of economic growth with the object of achieving a high level.

Basic among the factors which determine economic growth rates are the material and labour elements of the productive forces which directly participate in the production process converting the totality of the condi-

tions of reproduction into its material result — output.

Plan calculations of economic growth rates must be based both on an ascertainment of the effect of each factor of extended reproduction and on an analysis of their aggregate influence. The factor method of substantiating economic growth rates is the general technique employed in these calculations. It allows different approaches:

determination of the dynamics of the national income on the basis of a change in the number of persons employed in material production and the productivity of their labour;

substantiation of the growth rates of social production by an increase in fixed productive assets, productive investments and change in their efficiency;

determination of the dynamics of the national income on the basis of an increase in total inputs of assets and living labour and change in their overall efficiency.

The first two are in effect one-factor approaches (the first proceeds from labour inputs, the second, from fixed productive assets), while the third is a multi-factor approach.

It must be stressed that these calculations have to be made parallelly so as to be correlated and further specified. Extrapolations and temporary hypotheses are inevitable in the process of calculation; subsequently in the course of further projections they are specified or rejected. One and the same indicator is calculated at different stages from different aspects: now from the angle of the need to ensure a given level of some other indicator, now from the angle of the economic possibilities of accomplishing this task. As a result of gradual approximation resources and needs are co-ordinated.

The sequence of calculations may change depending on the duration of the plan period. For example, in planning long-term targets of reproduction, indicators of the standard of living which it is desirable to achieve at the end of the period may be chosen as initial data. But final results can be obtained only by combining the enumerated ways and aspects of plan calculations into a single system.

### 3. Planning Growth Rates of the National Income on the Basis of the Dynamics of Living Labour

Dynamics of population, the volume of labour resources and above all the number of persons engaged in material production are among the primary factors influencing economic growth rates. Man is the principal productive force of society. A country which has many able-bodied people possesses the main source, the potentiality for increasing its wealth. The scale and level of a country's development largely depend on the volume of its labour resources. For example, only given a definite total population and labour resources is it possible to organise a fully developed ramified engineering industry. At the same time the level of economic development (i. e., the indicators of per capita production and consumption), the expenditure for the maintenance and education of the younger generation and also the outlays needed for drawing new manpower into production directly depend on the growth of the population.

The labour resources and the number of employed in material production reflect the quantitative side of the personal factor of production, i. e., only the volume of living labour which influences economic growth. The social productivity of living labour characterises efficiency in the use of living labour, i. e., the magnitude of the national income, social product (gross or final) per person employed in material production or per one man-hour worked in this sphere.

This method of calculating the possible growth rates of the national income in the plan period is based on an assessment of the labour resources, the fund of working time and the possible rise in the productivity of living labour. Moreover, the dynamics of living labour is compared with the general results of production.

Calculations begin with a demographic analysis of the birth and mortality rates, the sex and age and social composition of the population, on the basis of which it is possible to establish the general labour resources. Depending on the duration of the working week in the plan period the possible total fund of working time is found. By taking into account the existing structure of

distribution of the able-bodied population and some preliminary estimates of the enlistment of new manpower these calculations make it possible to determine the dynamics of the number of employed in material production and the fund of working time in this sphere.

Two indicators — the population size and growth rates and the number of employed in material production are the main ones used for calculating the growth rates of the national income.

If the size of population is  $P$ , its annual growth rate —  $(1 + p) = \frac{P_{t+1}}{P_t}$ , and the rate of increment  $p = \frac{\Delta P_{t+1}}{P_t} = \frac{P_t \cdot b - P_t \cdot m}{P_t} = b - m$ , where  $b$  and  $m$  respectively are the birth rate and mortality rate.

The second major indicator is the number of employed in material production ( $L$ ) and its growth rates  $(1 + l) = \frac{L_{t+1}}{L_t}$ , where  $l = \frac{\Delta L_{t+1}}{L_t}$ .

The rates of the natural increase of population and its sex and age composition determine the potentialities of drawing manpower into the national economy. Moreover, the growth rates of the national income directly depend on the increase of the inputs of living labour in the sphere of material production.

The productivity of labour changes, and hence, it is necessary to plan its level ( $\Pi$ ) and its growth rates  $(1 + \pi)$ . On the scale of the national economy labour productivity is planned mainly according to the national income, i.e.,  $\Pi = \frac{Y}{L}$ , while  $(1 + \pi) = \frac{\Pi_{t+1}}{\Pi_t}$ , where  $\pi = \frac{\Delta \Pi_{t+1}}{\Pi_t}$ .

A rise in labour productivity as a factor of growth of the national income is the result of the influence of many material and subjective working conditions — provision with instruments of labour, organisation of the production process, stability of relations between sectors and enterprises and material and moral stimuli. To analyse the impact of labour productivity on economic growth rates means to bring out the factors making for the rise in labour productivity itself.

At the initial stage of plan formulation three factors can be singled out which form the basis for the dynam-

ics of labour productivity — the structure of distribution of manpower, power capacity per worker and assets per worker.

The effect of changes in the structure of allocation of labour power on the rise of labour productivity is manifested in increasing the share of sectors with a higher labour productivity (as compared with the average for society as a whole). This applies above all to a general increase in the share of employed in industry whose labour productivity is higher than the average for the national economy.

Power capacity per worker is one of the main factors in the rise of labour productivity. The dynamics of labour productivity for long periods is close to the dynamics of power capacity per worker. This is taken into account when substantiating a possible rise in labour productivity. At this stage of calculation it is already possible to obtain such an important indicator as the electric power necessary for productive consumption. At first this indicator characterises only the need in electric power for ensuring the given rise in labour productivity. Then the possibility of achieving the desired level of this indicator is substantiated. In this case, as in the entire process of plan calculations, the technique of iterative approximation is utilised. In developing countries where electric power capacity per worker differs greatly from power capacity per worker, calculation of non-electric sources of power, including draught animals, is of essential significance.

The indicator of assets per worker, which most fully reflects the sources for a rise in labour productivity, characterises the provision of living labour with the main means of production. This provision directly affects the productivity of labour because the quantity of objects of labour which can be processed in a unit of time depends on it.

A hypothesis of the growth in the productivity of living labour in combination with the possible increase in the number employed in material production enables planners to establish the growth rate of the national income for the plan period. Since

$$Y = \Pi \cdot L, \text{ then } \frac{Y_{t+1}}{Y_t} = \frac{\Pi_{t+1}}{\Pi_t} \cdot \frac{L_{t+1}}{L_t}$$

or

$$(1 + y) = (1 + \pi)(1 + l) = 1 + \pi + l + \pi l \approx 1 + \pi + l,$$

i. e.,

$$y \approx \pi + l. \quad (2)$$

This means that the rate of growth of the national income is made up of the rate of increase in the productivity of labour and the rate of growth in the number of employed in material production.

The revealed dependence between the growth rate of the national income and the indicators of living labour enables planners to estimate the magnitude of the national income for any one year of the plan period as follows:

$$\text{since } Y_t = Y_0(1 + y)^t \text{ and } (1 + y) \approx 1 + \pi + l,$$

$$\text{then } Y_t = Y_0(1 + \pi + l)^t, \quad (2a)$$

where the general growth of the national income is shaped under the influence of two factors — the rise in labour productivity,  $Y_0(1 + \pi)^t$ , and the number of employed in material production:  $Y_0(1 + l)^t$ .

#### 4. Substantiation of the Growth Rates of the National Income by the Dynamics of Fixed Productive Assets, Investments and Accumulation

The second approach, utilised in constructing an aggregated model of the development of the national economy, is the substantiation of the growth rates of the national income by the possible dynamics of the fixed productive assets, investments and accumulation. Moreover, this approach can be utilised both independently and to substantiate the preceding one.

Since the growth rates of employed in material production and the growth rates of labour productivity depend above all on the rates of expansion of fixed productive assets, it is necessary to indicate the sources of their formation. An increase in assets is the difference between the magnitude of the newly commissioned assets and their retirement as a result of physical wear and tear and obsolescence. In turn, the

newly commissioned fixed productive assets represent a difference between two magnitudes — the volume of productive investments and the increase in uncompleted construction. Productive investments are utilised along three lines — replacement of retired assets, a net increase in assets and an increase in uncompleted construction.

Productive investments themselves depend on the scale of accumulation allotted for these purposes from the national income and the magnitude of depreciation allotments representing the transferred value of fixed productive assets which participates in their simple and extended reproduction. Since in most countries the overwhelming part of investments is made from the national income, the expansion of the volume of fixed productive assets and, consequently, also the possibility of drawing new labour into production and raising its productivity, are, therefore, determined by the scale of accumulation. Economic growth rates thus ultimately depend on the scale of productive accumulation which, at a given volume of the national income, is determined by the share of accumulation in it: the higher this share, the higher the growth rate.

The influence of productive assets, investments and accumulations on the rates of growth is displayed not only through an increase of their volume, but also a rise (or reduction) in the efficiency of their use. The factor of economic efficiency of productive assets accumulates the results of technological progress, mechanisation and automation of production and improvement in the pattern of the national economy. In conditions of underemployment of productive capacity special significance also attaches to the influence exerted by the general economic conditions (level of the total demand, deliveries of raw materials, provision with manpower, and so on) on the degree of use of the operating productive assets.

The use of productive assets is characterised by a number of indicators. Some of them relate to the available assets — output per unit of fixed assets (output-asset ratio), or the volume of assets per unit of output (asset-output ratio). Other indicators reflect efficiency in the use of incremental magnitudes — investments

per unit of increment of the product or income, efficiency of accumulation (ratio between the increase of productive assets and increase of the product or income).

Growth rates of the national income are directly linked with the fixed productive assets and, through them, with productive investments and productive accumulation. Therefore it is necessary first of all to establish the ties between the dynamics of the national income, on the one hand, and the dynamics of the fixed productive assets and efficiency of their use, on the other. This link can be denoted as follows: if  $K$  — fixed productive assets,  $k$  — their annual growth rate

$(k = \frac{\Delta K_{t+1}}{K_t})$ ,  $E$  — output-asset ratio  $(E = \frac{Y}{K})$ ,  $e$  — growth rate of output-asset ratio  $(e = \frac{\Delta E_{t+1}}{E_t})$ , then  $(1 + y) = (1 + k) \cdot (1 + e)$  or approximately

$$y \approx k + e. \quad (3)$$

The interconnection between the volume of the base and the planned national income, proceeding from equality (3), can be expressed as follows:

$$Y_t = Y_0 (1 + k + e)^t. \quad (3a)$$

Since the growth rates of the national income depend on the expansion of the fixed productive assets, i. e., on productive investments and the latter at a given volume of the national income are determined by the share of productive accumulation in it, the dynamics of the national income is determined by a change in the share of productive accumulation in it.

The interconnection between the growth rates of the national income and the change in the share of productive accumulation in the national income can be expressed as follows. If  $K$  — the volume of fixed productive assets,  $R$  — their annual retirement,  $E$  — the indicator of the output-asset ratio,  $I$  — the gross productive investments and  $A$  — the net productive investments or accumulation, then at  $E = \text{const}$ .

$$\Delta Y = E \Delta K = EI - ER = E(I - R) = EA$$

$$\text{or } \frac{\Delta Y}{Y} = E \frac{A}{Y}, \quad y = Ea.$$

Consequently, the growth rate of the national income is equal to the output-asset ratio multiplied by the share of productive accumulation in the national income, and the general formula for determining the planned volume of the national income is<sup>1</sup>:

$$Y_t = Y_0 (1 + Ea)^t. \quad (4)$$

The rise in the efficiency of the newly commissioned and existing assets makes it possible to achieve with the same share of productive accumulation higher economic growth rates. Therefore in the process of preliminary plan calculation special importance attaches to substantiating the long-term indicators of efficiency in the use of productive assets. The original forecast of change in the output-asset ratio is made on the basis of studying the tendencies existing in the economy. Moreover, the output-asset or asset-output ratio actually existing at the beginning of the plan period may be used for the first estimate.

The dynamics of the output-asset ratio is connected with the operation of many factors; moreover, they act in different directions. Not all these factors can be quantified and, therefore, in a number of cases it is necessary to resort either to an extrapolation or an estimate by experts. Among the main factors influencing the dynamics of the output-asset ratio are:

technological progress based on the application of the achievements of science and technology in production; a quantitative estimate of this factor of growth is possible on the basis of forecasting the economic results of the effect of technological progress on production;

shifts in the sectoral structure of production which lead to changes in the national economic output-asset ratio with an assumption that this indicator remains unchanged in big sectors of material production;

<sup>1</sup> In the given case since  $a = \frac{A}{Y} = \frac{\Delta K}{Y}$ , then the output-asset ratio is not average but incremental, i. e., is not  $\frac{Y}{K}$ , but  $\frac{\Delta Y}{\Delta K}$ .

the dynamics of the time in which equipment is utilised; this indicator accumulates the improvement in the organisation of production.

The quantitative estimate of these factors at the first stage of plan formulation is inevitably based on a number of hypotheses which have to be specified subsequently. But in their totality these calculations enable planners even at this stage to approach more or less realistically the estimation of the possible dynamics of the output-asset ratio.

Planning the growth rates of the national income on the basis of determining the share of productive accumulation in it also presupposes special examination of the dynamics of the consumption fund. Since the national income is divided into the accumulation fund and the consumption fund every increase in the share of accumulation reduces the share of consumption, and vice versa. An increase in the share of productive accumulation, all other conditions being equal, sends up the growth rates of the national income which is the source of consumption. But the share of accumulation for maintaining growth rates that are too high may reach a level that will reduce the consumption fund or freeze it at a definite level, which is also impermissible in view of population growth.

To reveal the internal contradictory nature of this problem let us turn to the simplest connection between consumption and the share of productive accumulation in the national income. Since  $Y = C + A$ , the share of productive accumulation ( $a$ ) is solved as  $\frac{A}{Y}$  and the share of consumption will be  $c = 1 - a$ . Making use of equality (4) we obtain:

$$C_t = Y_0(1 + Ea_t)^t(1 - a_t). \quad (5)$$

Equality (5) shows that the planned consumption fund will be the higher the greater the term  $(1 + Ea_t)$ , the value of which at given  $E$  depends on  $a$ . In other words, the consumption fund is the bigger, the higher the growth rate determined by the share of productive accumulation. On the other hand, an increase of  $a$  reduces the term  $(1 - a_t)$ , i. e., the share of consumption

and, consequently, its volume too. This gives rise to one of the cardinal problems of long-term planning — search of an optimal relationship between consumption and accumulation.

What complicates the solution of this problem is that attainment of an optimal relationship between consumption and accumulation must simultaneously be subordinate to three conditions: first, to ensure the maximally possible growth of both production and consumption for by expanding production today we increase consumption tomorrow; second, the rise in the consumption fund must be examined within the bounds of the entire period under review and not of some final year, i. e., the total and not the annual consumption fund should be maximised; third, the objective need constantly, annually to increase the consumption fund so that every advance in production becomes an advance in consumption.

At present the task of planning an optimal ratio between consumption and accumulation has not yet been solved. The biggest difficulty here is to explore this ratio with the simultaneous elaboration of the material composition of both funds, i. e., to determine the composition of the long-term social needs.

Determination of the long-term ratio between consumption and accumulation is also possible from the viewpoint of the tasks of raising the living standard. This presupposes the calculation of the consumption fund as the primary part of the national income on the basis of per capita consumption rates and projections for the development of the non-productive sphere. The consumer budget of the population for the pre-plan years serves as a basis for calculating the per capita rates for the plan period. A plan consumer budget of the population is drawn up on the basis of analysing the family budgets and using coefficients of the elasticity of demand for major food and non-food goods and norms of the provision of housing facilities and of social, cultural and other services.

In ascertaining the consumption fund the hardest problems are linked with substantiating changes in its composition. For this purpose a high level of economic studies of population demand, its composition and

especially elasticity is required. These studies make it possible to raise the level of planning the material composition of the consumption fund and to consider the actual tendencies in the consumer demand of the population.

##### **5. Interconnection of Living Labour with the Means of Labour and Planning the Growth Rates of the National Income**

Planning the rates of extended reproduction depending on the increase in the volume of living labour and its productivity or depending on the dynamics of the volume and efficiency of the productive assets, investments and accumulations, cannot be isolated from each other. Living labour and materialised labour are interconnected in the single production process.

This process is based on the simultaneous participation of living labour and productive assets which are interconnected and are in definite quantitative relationships. The drawing of new manpower into the sphere of production presupposes the creation of additional work places, i. e., an increase of fixed assets, and a corresponding expansion of circulating assets. On the other hand, use of the created productive capacity is impossible under the existing technical level without enlisting new masses of living labour. Productive assets without workers are inert, while living labour without means of labour is helpless.

An increase in manpower resources, resulting from population growth, creates only potentialities for expanding production. To realise these potentialities definite material prerequisites are needed. Among them are, first of all, the availability of additional work places. A definite level of labour mechanisation, a definite quantitative correlation between living labour and means of labour are characteristic of each industry and of the economy as a whole. In a developed economy there is practically no living labour not linked with the use of at least a limited magnitude of productive assets. That is why the enlistment of new manpower is always linked with investments dictated by the interaction of two factors — the number of annual workers

newly drawn into the productive sphere and the average cost of one work place.

The cost of a work place is at the same time the cost of assets per worker which is the main factor for raising labour productivity. Thereby the value of productive assets, above all, fixed productive assets, per worker simultaneously characterises the expenditure society makes for enrolling in production every new worker and his ability to set into motion a definite mass of means of labour and, consequently, to produce a definite quantity of goods. It should be stressed that from the angle of society it is efficient to draw into production as many new workers as possible with the least expenditure and simultaneously constantly raise labour productivity.

As the productive forces develop the cost of a work place (assets per worker) constantly rises; the enlistment of every new worker in social production demands ever greater investments and, simultaneously, the increasing assets per worker are the basis for the rise in the productivity of living labour.

The relationship between the additional manpower and the investments needed for this purpose conceals a socio-economic problem which is especially acute for developing countries. As a rule these countries have substantial unemployment and a concealed agrarian overpopulation. That is why an increase in the level of employment of the able-bodied population is one of the cardinal tasks. At the same time it is necessary to raise labour productivity by introducing modern technology, by increasing assets per worker. Consequently, the task is to raise the level of employment with rather limited investment resources, which is facilitated by the low cost of a work place, and also to raise labour productivity for which purpose an increase in assets per worker (cost of a work place) is needed. Ascertainment of the possible and most rational cost of a work place in the given economic conditions is an exceptionally important problem facing developing countries.

The indicator of the cost of a work place (assets per worker) makes it possible to link up living labour with materialised labour and thereby also the two approaches to planning the growth rates of the national

income outlined earlier. To begin with, the possibility of enlisting new manpower depends on the cost of a work place (assets per worker) and the volume of the newly commissioned assets. If the cost of a work place (assets per worker) is denoted as

$$B = \frac{K}{L}, \text{ then } \Delta L = \frac{\Delta K}{B} \text{ or } \frac{\Delta L}{L} = \frac{\Delta K}{B \cdot L} = \frac{\Delta K}{K} = k,$$

$$\text{i. e., } l = k$$

if  $B = \text{const.}$ , while if  $B = \text{variable}$ , then  $l = f(k)$ .

The growth rates of the cost of a work place (assets per worker),  $(1 + b) = \frac{B_{t+1}}{B_t}$ , are the basis for the rise in labour productivity; in other words, labour productivity can be regarded as a function of the increase in assets per worker:  $\pi = \varphi(b)$ . The simplest type of such a function can be the dependence  $\pi = \mu \cdot b$ . With such a function three cases are possible:

$$\pi = b (\mu = 1); \quad \pi > b (\mu > 1); \quad \pi < b (\mu < 1).$$

If  $\pi = b$ , then  $E_{t+1} = E_t$ , the output-asset ratio is unchanged. Similarly, if  $\pi > b$  the output-asset ratio grows:  $E_{t+1} > E_t$ , while if  $\pi < b$  the output-asset ratio decreases, i. e.,  $E_{t+1} < E_t$ .

An economico-statistical analysis of the relative movement of labour productivity and of assets per worker is one of the main prerequisites for planning the growth rates of the national income.

An approach to planning the growth rates of the national income either from positions of the dynamics of living labour or the dynamics of means of labour makes it possible to establish the plan targets of the national income depending on one or the other position and not the totality of living and materialised labour. Ascertainment of the link between the two methods with the help of indicators of the cost of a work place (assets per worker) makes it possible to go over to planning the growth rates of the national income depending on the total effect of both factors — living labour and means of labour — and bring out the role of each one.

While in the first and second methods the growth rates of the national income are taken either as func-

tions only of living labour or only of means of labour, now the volume and growth rates of the national income are denoted as a function of two variables operating simultaneously, i. e., as  $Y = f(K, L)$ .

The dependence of the growth rates of the national income on the dynamics of separate factors can be established by computing their incremental efficiency, i. e.,

$$\Delta Y_L = f(L + \Delta L, K) - f(L, K)$$

or

$$\Delta Y_K = f(L, K + \Delta K) - f(L, K).$$

If we denote the respective indicators of incremental efficiency as  $F_L$  and  $F_K$ , the increase of the national income can be presented as a result of the cumulative effect of living labour and means of labour:

$$\Delta Y = \Delta Y_L + \Delta Y_K = F_L \cdot \Delta L + F_K \cdot \Delta K.$$

In mathematical terms, the national income is a function of two variables — living labour and fixed productive assets —  $Y = f(L, K)$ , while factorial growth  $Y$ , depending on  $L$  and  $K$ , represents a full differential of this function:  $dY = \frac{\partial Y}{\partial L} dL + \frac{\partial Y}{\partial K} dK$ .

For practical calculations of the growth rates of the national income depending on living and materialised labour it is expedient to utilise a simpler form of denoting the same dependence:

$$y = F_L \cdot l + F_K \cdot k, \quad (6)$$

where  $y$ ,  $l$ ,  $k$  are the growth rates of the national income, the number of persons engaged in material production and the fixed productive assets.

The most intricate problem in planning the growth rates of the national income while simultaneously considering the influence of living labour and means of labour is to find the indicators of their incremental (marginal) efficiency.

An intrinsic feature of such indicators is that they characterise the relation between increments of factors of reproduction and the results of this increment, which

is explained by the dynamic nature of reproduction itself. To substantiate an increase in the national income by the expansion of the fixed productive assets it is necessary to utilise not an average indicator of the output-asset ratio but the incremental, i. e., additional volume of assets needed for increasing the national income by the planned magnitude. Since an analysis and planning of the growth of the national income have as their subject not its reproduction in the volume achieved earlier, but the creation of an additional national income it is therefore the incremental indicators of productivity (efficiency) of the elements of social labour that become decisive in this aspect. Incremental efficiency of living labour and means of labour points to the role of each of these factors in shaping the growth rates of the national income.

An approximate valuation of the role of living labour and means of labour in forming the rates of extended reproduction can be obtained as a result of joint mathematical processing of three dynamic series — national income, fixed productive assets and the number of persons engaged in material production. Planners use as a calculating instrument the uniform production function of the first degree of the type  $Y = aK^\mu L^{1-\mu}$  which follows from  $\frac{Y}{L} = a\left(\frac{K}{L}\right)^\mu$  that reflects the dependence of the productivity of living labour  $\left(\frac{Y}{L}\right)$  on assets per worker  $\left(\frac{K}{L}\right)$ . That the sum of coefficients in this two-factor function is  $(\mu + 1 - \mu = 1)$  implies that if, for example, the productive assets and living labour double, the magnitude of the national income also doubles. Such an assumption is quite conventional for a sufficiently long period, inasmuch as it proceeds from the extensive nature of economic growth (production rises only to the extent of inputs), but it makes it possible to illustrate in a relatively simple way the role of living labour and means of labour as factors of extended reproduction.

The simplest expression of (6) which links the growth rates of the national income with the growth rates of fixed productive assets and of the number of persons

employed in material production with the help of parameters of efficiency  $\mu$  and  $(1 - \mu)$ , is as follows<sup>1</sup>:

$$y = \mu k + (1 - \mu)l. \quad (7)$$

Making use of the two-factor function of national income growth it is quite easy to establish the planned growth rates of the national income, proceeding from different combinations of the dynamics of fixed productive assets and the number of persons engaged in material production. For this it is necessary to determine the area of possible magnitudes  $k$  and  $l$  and with the help of the established coefficients  $\mu$  and  $(1 - \mu)$  to find at once the probable growth rates of the national income. The idea of this calculation is reflected in the following assumption that  $\mu = 0.4$ :

$k \backslash l$	3.0	4.0	5.0	6.0	7.0	8.0	9.0
1.0	1.8	2.2	2.6	3.0	3.4	3.8	4.2
1.5	2.1	2.5	2.9	3.3	3.7	4.1	4.5
2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8
2.5	2.7	3.1	3.5	3.9	4.3	4.7	5.1
3.0	3.0	3.4	3.8	4.2	4.6	5.0	5.4
3.5	3.3	3.7	4.1	4.5	4.9	5.3	5.7

The table shows, for example, that at  $l = 1.0$  and  $k = 7.0$ ,  $y = 0.4 \cdot 7.0 + 0.6 \cdot 1.0 = 3.4$ , i. e., a 3.4 per cent increase of the national income annually. It is also important to stress that one and the same growth of the national income can be achieved with a different combination of  $k$  and  $l$ . For example,  $y = 3$  per cent can be achieved with  $k = 3$  per cent and  $l = 3$  per cent;  $k = 6$  per cent and  $l = 1$  per cent;  $k = 4$  per cent and  $l = 1.5$  per cent, and so on. This distinction of the method makes it possible in the process of plan

<sup>1</sup> The quantitative value of parametre  $\mu$  and also of  $(1 - \mu)$  is found by processing dynamic series, in the given case  $\left(\frac{Y}{L}\right)$  and  $\left(\frac{K}{L}\right)$  by methods of correlational analysis.

calculation to compare different variants of economic development — more labour-intensive and more capital-intensive.

It is natural that in the course of economic development, the relative role of living labour and means of labour changes just as their incremental efficiency does. This means that parameters  $F_L$  and  $F_K$  and also their ratio  $F_L : F_K$  must be considered variables depending on the increase in the scale of social production and on technological progress.

The simplest case examined here presupposes that the sum of indicators in the right part of the production function is 1. The meaning of this constraint was revealed earlier. Closer to reality is the assumption that the growth rates of production outstrip the growth rates in the inputs of living labour and fixed productive assets. In other words, if  $K$  and  $L$  rise by 1 per cent, the national income ( $Y$ ) will rise by more than 1 per cent. In the latter case it is assumed that in the production function  $Y = aK^\alpha L^\beta$   $\alpha + \beta > 1$ . In other words, in analysing and planning the growth rates of the national income it is necessary to consider one more factor — the rise in the combined efficiency of social production where technological progress is one of the main sources. In this case the indicated production function of the type  $Y = aK^\alpha L^\beta$  where  $\alpha + \beta > 1$  can be presented as  $Y = aK^\mu L^{1-\mu} e^{\lambda t}$  or

$$y = \lambda + \mu k + (1 - \mu)l, \quad (8)$$

where  $\lambda$  — the average annual rate of increase in the national income as a result of raising the combined economic efficiency of labour and assets.

A comparison of equations (8) and (7) makes it possible to establish that if the combined economic efficiency of labour and assets ( $\lambda > 0$ ) rises, the national income grows faster than the inputs of living labour and productive assets, in other words, we have not only extensive, but also intensive accretion of production. For example, in the absence of a rise in the combined efficiency, say,  $\lambda = 0$ ,  $\mu = 0.4$ ,  $k = 4.0$ ,  $l = 2.0$  the growth rate of the national income will be  $0 + 0.4 \cdot 4.0 + 0.6 \cdot 2.0 = 2.8$ ; if the national income as

a result of a rise in the combined efficiency increases by 1.5 points annually on the average, then  $y = 1.5 + 0.4 \cdot 4.0 + 0.6 \cdot 2.0 = 4.3$ . The use of the last type of production function in planning the growth rates of the national income demands a forecast of the indicator of change in the combined efficiency of labour and assets.

On the whole the multi-factor approach, in contrast to the one-factor approach, enables planners at least roughly to examine a cardinal problem of economic development, namely, the combination of factors of economic growth. In various economic conditions different combinations are possible between the increase in the inputs of labour and productive assets, between the dynamics of combined inputs (of labour and assets) and rise in their economic efficiency. The record of history shows that at a low stage of economic development an increase in the quantity of expended living labour (the labour-intensive variant of economic development) inevitably plays a particular role. Entering the period of full-scale industrialisation implies the gradual prevalence of the investment-intensive and labour-saving way of economic development. The experience of the most developed countries shows that full use of the achievement of the scientific and technological revolution enables them to go over to the simultaneous reduction of all types of inputs per unit of the produced national income.

Thus, the multi-factor substantiation of the growth rates of the national income represents a synthesis of different, more specific approaches and a stepping-stone to the next stage — planning the structure of social production.

## *Chapter IV*

### **BALANCE CALCULATIONS AND METHODS OF OPTIMISING PROJECTIONS**

Calculation of a country's rates of economic development and valuation of the growth factors of the national income presuppose transition from the general contours of a plan to more detailed projections, up to working out the targets for separate sectors. The balance method is widely utilised for such projections in Soviet economic planning.

Balance calculations are employed in national economic planning first of all for determining the main proportions of reproduction and the sectoral structure of the economy. Thanks to the balancing of separate sectors the scale of entire social production stably increases. The development of any sector must be examined within the general system of national economic inter-sector relations: an industry gets from other industries the equipment, raw material and fuel needed for production and, on the other hand, its output goes to consumer industries or to the population. A developed division of labour creates an objective need for the co-ordinated operation of all links of the economy because these links are not isolated but closely interconnected. Realisation of this necessity and the resultant conformity between separate spheres and sectors of the economy makes for balanced, proportional development of production.

Proportionality in no way implies formal balance between the component parts of the economy. In general, balance is possible both theoretically and practically, for example, in a backward, agricultural economy at a low level of development. In a certain sense short-term programming employed in some capitalist countries helps to establish formal balance.

In the Soviet economy proportionality is not reduced to the attainment of a balance. It presupposes consideration for additional objective demands, namely, 1) maximum conformity of the structure of production to the structure of social needs; 2) setting of economically efficient proportions which ensure priority development of the most progressive key sectors and lines of production, i.e., it is a matter of planned proportionality in the development of the economy.

National economic proportions, just as economic growth rates, are planned proceeding from the task of satisfying most fully society's needs. The structure of the Soviet economy is constantly changing, being adapted to the emergent requirements of production and the population. In line with the new demands new sectors arise, and in the traditional industries the forms of organising labour and production are improved. For example, the swift expansion in the manufacture of electronic computery is linked with society's needs in the means of automation, of accounting and control. The mounting demand of the population for consumer durables dictates the swift expansion of branches of the engineering industry which manufactures them. Expansion of housing construction makes greater demands on the production of furniture.

The economy of the USSR today can be regarded as a highly organised system operating on the basis of a single state plan. It includes a number of sub-systems (sectors of the economy and economic areas) and also a tremendous number of primary economic units (factories, state farms, collective farms, trading, transport and other establishments). The interaction of all the elements of the economy must be strictly co-ordinated, which presupposes definite proportionality of the entire system. Conditionally, the entire diversity of proportions can be reduced to three main groups: I) national economic proportions; II) inter-sector proportions and III) intra-sector or production proportions.

I. National economic proportions reflect the most general relationships in the creation and use of the social product and the national income; the singling out of these proportions actually reflects their role in planning the country's economic development as overall

characteristics of national economic relations. These proportions include:

newly created value and material production inputs in the gross social product; in the Soviet Union this proportion has been at the level of 1:1.2 in recent years;

output of the means of production and consumer goods, which provides the main characteristic of the material structure of production; in Soviet industry the share of the means of production is about 75 per cent of the gross output<sup>1</sup>;

the ratio of consumption and accumulation in the national income, which determines the resources for expanding production and the sources for raising the standard of living; in the Soviet economy a high and stable rate of accumulation is maintained at a level of over 25 per cent of the entire national income<sup>2</sup>;

the ratio of living labour and means of labour which characterises the provision of labour with mechanisms, power equipment, transport facilities, and the like; the USSR has attained a high level of assets per worker engaged in material production — namely, 5,000 rubles of fixed productive assets.<sup>3</sup>

Among the major economic proportions are also the ratios between the necessary and surplus labour, the sphere of production and the sphere of circulation, etc. Each of them reflects its own aspect of reproduction. In their totality economic proportions characterise the most general, cardinal links and relationships in a country's economy.

II. Inter-sector proportions concretise national economic proportions, link them with the sectoral structure of the economy, with the growth rates of separate sectors, and represent relationships between industry, agriculture and transport and sectors of the non-productive sphere. Planning of inter-sector proportions makes it possible to ascertain the scale of structural shifts in the economy, the rates of industrialisation and

<sup>1</sup> *Narodnoye khozyaistvo SSSR v 1968 godu*, Moscow, 1969, p. 185.

<sup>2</sup> *Ibid.*

<sup>3</sup> *Ibid.*, pp. 50, 546-47.

assignments for the development of progressive sectors.

III. Intra-sector, production proportions reveal in even greater detail the content of economic relations, they link up national economic and inter-sector proportions with the technico-economic indicators of reproduction. Intra-sector proportions reflect the main ratios in the production of goods (by types) in an industry; ratios emerging in the process of production from the viewpoint of utilising materials, fixed assets, labour and financial resources; ratios of production in branches manufacturing allied articles which are links in a single production chain (pig iron — steel — rolled stock; fibre — yarn — fabric).

National economic, inter-sector and intra-sector proportions make up a single whole. They enable planners to ensure combination and unity in solving national economic and sectoral problems, on the one hand, and also sectoral problems and the operation of separate enterprises, on the other. Only if national economic proportions are substantiated by more concrete ratios in the development of separate sectors and of enterprises within them is it possible to attain real proportionality on the scale of the entire economy.

Distinctions in each type of proportions dictate the need for applying specific balance calculations, the totality of which makes up the single balance method of planning.

### 1. Essence of the Balance Method

The idea of balance calculations is exceedingly simple. If we take the sphere of production, harmonious development of the economy presupposes conformity between the volume of output of definite goods and the need in them. Moreover, account is taken not only of the country's own needs, but also of the quantity of goods needed for export.

Balances of different type — value, labour and material — are used in national economic planning.

Value balances are balances of the social product, the national income, the money incomes and expenditures of the population, the money revenue and expen-

diture of the state (the national budget), and others. They determine the ratios of the main elements of the economy in money terms. Value balances of the national economy are used as a basis for establishing the most general socio-economic proportions, for example, the ratio between consumption and accumulation in the national income, between the output of means of production and consumer goods, between the real incomes of the population and their provision with goods.

The balance of labour resources holds an important place in the system of balances in general and labour balances in particular. On the one hand, it makes it possible to bring out the provision of production with the necessary manpower and, on the other, to characterise the unutilised labour resources. This balance furnishes initial data for planning the training of personnel.

Material balances in physical terms (tons, metres, or other units) characterise production and distribution of separate types of goods. These balances reflect the need in definite goods and the sources for obtaining them. A general state plan of material and technical supply is compiled on their basis. Rates of productive and personal consumption of various goods are utilised for ascertaining the need in them. Making use of statistical data and also of technical calculations, it is possible to estimate, for example, what quantity of fuel (oil, gas and coal) is needed for generating, say, one kilowatt-hour of electric power and also for producing other goods in the manufacture of which fuel is utilised.

This makes it possible to calculate the quantity of fuel the economy requires for production purposes. Then after ascertaining the quantity of fuel which will be used by the population for personal needs (for example, petrol for motorcars, gas in the household, and so on), the total needs of society in different types of fuel are estimated.

In estimating the needs in consumer goods study of the population demand is of great importance. This is done by planning and trading organisations and also research institutes. The volume of the demand is estimated on the basis of the planned level and dynamics

of population incomes. Trade statistics, special investigations and also budget surveys of families of factory and office workers and peasants are utilised for studying changes in the composition of the demand. For more than 40 years now Soviet statistical agencies have been conducting systematic observations of 50,000 family budgets. These studies offer a characteristic of the population's expenditures. On the basis of a thorough analysis of the demand, trading organisations draw up requests and orders which are incorporated in production plans.

The normative method is extensively employed in long-term planning of the needs in consumer goods. A profound study of the problems of the physiology of the human organism in different climatic zones of the country under varying working conditions and also a study of the range of social factors has enabled Soviet researchers scientifically to establish rational consumption standards (norms). They serve as a basis for drawing up long-term plans of the production and sale of goods.

After studying the needs, the possibilities of satisfying them are ascertained, first of all by increasing output through better use of available capacity and modernisation of equipment; then the need in the increase of capacity through new construction is determined.

The balance method makes it possible to analyse the multi-lateral relations between separate sectors and to ensure the co-ordinated development of different parts of the national economy.

Thorough technico-economic substantiation of the proportions in the plan is a primary trend in raising the scientific level of planning. Another trend is to construct and use economico-mathematical models, in particular a matrix inter-sector balance of production and distribution of the social product, and also to develop the theory and practices of optimal planning. This presupposes the wide use of mathematics and electronic computery in plan calculations.

Let us examine the content and schemes of some of the major balance constructions now employed in the USSR.

*Balance of the production and use of the gross social product.*<sup>1</sup> This balance characterises the material aspect of social production: the sectoral origin of the gross social product, its dynamics and use for replacement, consumption, accumulation and exports.

An approximate scheme of the balance of production and use of the social product is as follows:

I. Resources of the social product (a + b):

a) output of the social product as a whole and by sectors of material production, with the singling out of the social sectors of production (without foreign trade);

b) imports.

II. Use of the social product (a + b + c + d + e - f):

a) exports;

b) compensation fund — total and by sectors of material production;

c) consumption fund — total;

d) accumulation fund — total;

e) other expenditures and reserves;

f) losses.

Equivalence of resources and of consumption for productive purposes, non-productive consumption and accumulation is the main ratio established by this balance. The chief characteristics of the social product balance show its circulation in the course of reproduction as a whole and by major types of goods. For these purposes two groups of sectors of material production are singled out in the balance: Department I (output of the means of production) and Department II (output of consumer goods).

The balance provides for a social aspect — productive consumption and accumulation are broken down by state and cooperative-collective farm enterprises.

<sup>1</sup> The material of this section has been prepared on the basis of *Metodicheskiye ukazaniya k sostavleniyu gosudarstvennogo plana razvitiya narodnogo khozyaistva SSSR (Methodological Instructions for the Formulation of the State Plan of National Economic Development of the USSR)*, Ekonomika Publishers, Moscow, 1969, pp. 547-73.

The degree of specification of these characteristics in planning depends on the practical necessity and also on the available economic information. Details for the groups of material resources within Departments I and II are given for a minimal number of items. The indicators of the balance of the social product rest on the system of material balances of goods in physical terms for different sectors. This makes it possible in studying the interconnections of the two departments to rely not only on direct statistics but also on the corresponding computations which bring out the general results of productive consumption in each of these two departments. Indicators of the balance of the social product for long-term plans are calculated both in current prices of every year (they are used for assessing the turnover of goods, the shaping of production costs, profit, population incomes, and so on) and in comparable (constant) prices of one year, usually the base year.

The structure of the social product by value in 1966 is characterised by data of Table 1.

Table 1

Structure of the Social Product in 1966<sup>1</sup>  
(per cent of total output for each department)

	Gross product	Material production inputs	Wages and other types of labour remuneration	Surplus product	National income
Entire economy	100	54.4	23.9	21.7	45.6
Department I	100	57.7	24.7	17.6	42.3
Department II	100	49.2	22.6	28.2	50.8

*Balance of the production, distribution, redistribution and use of the national income* or the financial balance of reproduction. It reflects the formation of primary incomes, their redistribution, the formation of final incomes used for the needs of consumption and accumulation. The balance of the national income characterises the value aspect of reproduction and thereby ensures

<sup>1</sup> *Narodnoye khozyaistvo SSSR v 1967 godu*, Moscow, 1968, p. 112.

the co-ordination of financial indicators with the indicators of the material structure of production.

This balance sums up the incomes and expenditures of three groups of economic subjects: production enterprises (state and cooperative-collective farm), institutions and organisations of the non-productive sphere and of the population. The purpose of this balance is to demonstrate not only the equilibrium of incomes and expenditures but also to bring out the entire diversity of major relations in the process of redistributing incomes between enterprises, institutions of the non-productive sphere and the population, and to determine the final characteristics in the use of the entire national income.

The balance of the national income reflects the phases of exchange and distribution. The scheme of this balance is given in an abbreviated form in Table 2. This table shows that realisation of the goods produced in the material sphere (or productive services) is initial in the economic circulation of goods and incomes; part of the total income from the realisation of goods and services goes for replacing the production inputs, while the remaining part forms the net output which represents the national income on the scale of the entire economy. In the financial aspect, the net output includes the primary incomes of factory and office workers in the sphere of material production and also the magnitude of the profit obtained in these sectors. The primary incomes of enterprises and of factory and office workers are further redistributed within the bounds of the entire economy to ensure conditions of extended reproduction and satisfy the needs of the population.

These balances, which in a certain sense characterise the results of the economy's operation, are supplemented by a balance of labour and an overall balance of fixed assets.

The balance of fixed assets characterises the existence, increase and retirement of the fixed productive and non-productive assets. The sectoral aspect of the balance makes it possible to dovetail the targets of reproduction of fixed assets with the reproduction of the gross social product from two angles — utilisation of

Table 2  
Scheme of the Balance of the National Income

Sectors of the national economy	Formation and movement of incomes	
	Volume of output	Accumulation
Industry	Volume of output	Accumulation
Agriculture	Sale of goods	Non-productive consumption
Transport and communications	Material inputs in production	Purchase of goods
Construction	National income (net output)	Payment for services
Trade, procurements	Primary incomes of the population, paid in the productive sphere	Received (+)
Material supply and others	Profit of production enterprises	Spent (-)
Total, national economy	Handed over (-) to the financial-credit system or received (+) from it	
of which	Incomes in the non-productive sphere, paid (-), received (+)	
a) state production enterprises (by sectors)	Pensions, scholarships, allowances paid (-), received (+)	
b) cooperative-collective farm enterprises (by sectors)		
c) institutions of the non-productive sphere		
d) population (by social groups)		

the fixed assets and the resources for forming them. Sectoral balances of fixed productive assets are compiled for planning production and capital construction.

*The overall plan balance of labour resources* characterises the available labour resources and their composition, their allocation by sectors, occupations and social groups. It indicates: the able-bodied population engaged in the economy (workers, employees of state, co-operative and social enterprises, institutions and organisations, and collective farmers taking part in the work of their farms); other occupied able-bodied population (artisans not united in co-operatives, individual peasants, and so on); persons 16 years and older engaged in full-time study; able-bodied population of working age engaged in the household and in personal subsidiary farming.

*The balance of the money incomes and expenditures* of the population is a component of the balance of the national economy. It characterises the volume and sources of the money incomes of the population and also the volume and composition of its money expenditure. This balance used for planning purposes aims to establish a proper relationship between money incomes of the population, retail trade and the volume of paid services and savings. Balancing of the money incomes and expenditures of the population for the USSR as a whole and also by republics, territories and regions, is one of the main requisites for ensuring proportionality in national economic development plans, for a rise in the real incomes of the population and stable money circulation. This balance encompasses the entire population, without singling out separate groups and is drawn up according to the following scheme:

#### INCOMES

1. Wages
2. Incomes of factory and office workers received from their enterprises and organisations in addition to wages
3. Money incomes received from collective farms
4. Receipts from the sale of agricultural produce to the state and co-operatives
5. Pensions and allowances

6. Scholarships
  7. Receipts from the financial system
  8. Other receipts
  9. Money received by money order and letter of credit (deducting the transfer and paid-in sums)
- Total money incomes  
Excess of expenditures over incomes  
Balance

#### EXPENDITURES AND SAVINGS

1. Purchase of goods  
of which:
    - a) in state and co-operative trading establishments
    - b) in consumer co-operatives at local market prices
    - c) from collective farms
  2. Payment for services and other expenditures
  3. Obligatory payments and voluntary contributions
  4. Savings in the form of bank deposits and state loans, including an increase of deposits in savings banks
  5. Money sent by money order and paid for letters of credit (deducting the received sums)
- Total money expenditures and savings  
Excess of incomes over expenditures  
Balance

#### 2. Static Model of the Inter-Sector Balance

Fundamental propositions of the inter-sector method of economic analysis and systematisation of initial data were already formulated in the first years when the basic principles of the Soviet planned economy were elaborated. The first balance of the national economy for the 1923/24 economic year was based on the principle of input-output tables.<sup>1</sup> Somewhat later this method was utilised for analysing the capacity of the Soviet industrial market. For these purposes inter-sec-

<sup>1</sup> The fundamental scheme of the inter-sector balance was later on, in the 1940s, utilised by W. Leontief for constructing the input-output econometric model.

tor tables of relations between Soviet industries were prepared for the 1926-1928 economic years. In the 1950s Soviet economists began to compile inter-sector balances with the help of electronic computers. Up to now balances were prepared for 1959 and 1966 (on the basis of statistical reports) and also plan balances for 1962-1965, 1970 and 1971-1975 in physical and value terms. Three groups of factors now dictate the special importance of scientific and practical construction of inter-sector models for economic planning.

1. Technological progress extends the sphere of using separate products and increases the number of stages in processing the initial raw material. Alongside direct relations, relations of the first order, the importance of the mediated relations of the second, third and other orders is enhanced. Each industry becomes less autonomous and shifts in its development increasingly affect allied sectors of social production. A need arises for simultaneously describing and defining the degree of co-ordination in all the inter-sector flows of goods.

2. The consistent improvement of planned guidance of economic development raises the role of the aspects of economic analysis and management which demand consideration of the entire complex of multi-lateral economic links. The inter-sector balance serves as a universal instrument in the analysis and planned setting of prices, in the calculation of the economic efficiency of production, an instrument which makes it possible to consider the effect of a definite measure as it spreads throughout the chain of interconnected links.

3. Development of electronic computers and their application in economic management dictate a uniform organisation of information, the construction of economic models in which the streams of specific differentiated data would be combined and expressed in aggregated, general results.

An inter-sector balance is a kind of economic-mathematical model of the process of reproduction within the bounds of an annual cycle. Outwardly it is a table consisting of four quadrants and constructed in the aspect of the economic sectors. It ensures the dovetailing of production and distribution of output of

separate sectors. But the inter-sector balance is not confined to the production sphere: it fixes relations along the lines of consumption and accumulation and also characterises the redistribution and use of the national income.

The inter-sector balance combines quantitative proportions with their qualitative characteristics, with coefficients characterising the efficiency of social production and labour. The balance also incorporates economic information making it possible to calculate the total inputs of labour, assets and materials for every variant of the structure of production. A fundamental scheme of the inter-sector balance is given in Table 3.

Table 3

Fundamental Scheme of the Inter-Sector Balance

Inputs	Output	Productive consumption of output		Final output	Total distributed
		1, 2 ... j ... n	Total		
Current material inputs	1	$x_{11}x_{12} \dots x_{1j} \dots x_{1n}$	$W_1$	$y_1$	$X_1$
	2	$x_{21}x_{22} \dots x_{2j} \dots x_{2n}$	$W_2$	$y_2$	$X_2$
	⋮		⋮	⋮	⋮
	⋮		⋮	⋮	⋮
		I Quadrant		II Quad.	
	i	$x_{i1}x_{i2} \dots x_{ij} \dots x_{in}$	$W_i$	$y_i$	$X_i$
	⋮		⋮	⋮	⋮
n	$x_{n1}x_{n2} \dots x_{nj} \dots x_{nn}$	$W_n$	$y_n$	$X_n$	
Total	$c_1c_2 \dots c_j \dots c_n$	$\sum_{j=1}^n C_j$	$Y$	$X$	
Value added		III Quadrant $(v_1 + m_1) \dots$ $\dots (v_j + m_j) \dots (v_n + m_n)$	$v + m$	IV Quad.	
Gross output		$X_1X_2 \dots X_j \dots X_n$	$X$		

The vertical column of figures represents the total inputs for the production of goods in a definite sector over a year or any other period of time (formation of value of the produced goods). They include both ma-



known magnitudes to the number of equations, i. e.,  $n$ , is a term for solving such a system. But the general number of variables in the system equals  $2n$ . This makes it possible, by giving  $n$  magnitudes from  $X_1 \dots X_n$  and  $y_1 \dots y_n$  to find the other  $n$  values. In the simplest case when the volume of production of goods in sectors  $X_i$  ( $i = 1, 2, \dots, n$ ) is known from the plan projections, the volume of the final output in all sectors can be computed with the help of the following equation:

$$y_i = X_i - \sum_{j=1}^n a_{ij} \cdot X_j.$$

If data on the magnitude of final output  $y_i$  are calculated in all sectors it is possible to estimate the gross output of each sector  $X_i$ .

Balance equations can also be denoted as follows:

$$X_i = \sum_{j=1}^n A_{ij} y_j$$

where  $A_{ij}$  — coefficients of the total inputs of products of  $i$  sector per unit of the final output of  $j$  sector.

Coefficients of total inputs play a special part in analysing the volume of output by sectors and also as an instrument of economic analysis because they include both direct and indirect inputs along the entire chain of production links.

The total inputs of electric power for the production of one ton of aluminium, for example, consist not only of the consumption of electric power directly for electrolysis and also for the production of alumina and cryolite, but also of the inputs of electric power for the production of materials received from other industries, in particular, chemicals, fuel, etc., in the part in which they are utilised for the production of aluminium.

The coefficient of total inputs of coal per motorcar is approximately seven times greater than the coefficient of direct inputs because it includes the consumption of coal for the production of metal and electric power used in the manufacture of the motorcar, the

inputs of coal for the generation of electric power needed for the production of metal used in this motorcar, in other words, this indicator accumulates the totality of direct and indirect inputs, in our case of coal, required for making one motorcar.

Using the matrix of the coefficients of total inputs, nomographs can be made showing with sufficient precision the quantitative relations in the production and consumption of product in different industries.

In the iron and steel industry, for example, the coefficient of direct consumption of coal for the production of metal is 0.0812. If we take into account only the direct consumption the increase of output in the iron and steel industry by 1 per cent will require a growth in coal extraction by 0.15 per cent. But if we consider the coefficient of total inputs an increase of 0.41 per cent will be needed.

In computations based on a static model of the inter-sector balance it is economically expedient to use coefficients of material inputs and also the volume and structure of the final product as initial elements of plan calculations. Plan coefficients of current inputs have to be specially elaborated when a country's economy changes technologically and structurally at comparatively high rates. Changes in the methods and structure of production do not always allow the use of data of inter-sector balances of past years for plan projections.

The working out of plan coefficients of direct inputs is the most labour-consuming job in compiling an inter-sector balance. The total nominal number of coefficients is equal to the square of the number of sectors covered by the balance. For example, in the case of a balance of  $120 \times 120$  sectors, this figure will exceed 14,000 coefficients. But actually such a balance has only about 7,000 coefficients, which corresponds to the actual flows of goods into productive consumption. Of these 7,000 coefficients, as demonstrated by the experience of the USSR, about 1,000 cover more than eight-tenths of all the material flows and hence are of decisive significance. This is taken into account by economists in preparing the initial information for a plan inter-sector balance.

In the USSR two main methods have been applied for determining plan coefficients of direct material inputs:

1) The simplest method is to adjust the basic input coefficients. For this purpose it is necessary to use statistics on the consumption of raw and other materials, fuel and power, data of the inter-sector balance for the past period, the available normatives and calculations for reports and estimates.

2) The method of directly calculating the coefficients of direct material inputs in terms of value is more complex; it is based on technico-economic rates of inputs in value and physical terms.

Plan value coefficients of direct material inputs of goods produced in  $i$  sector per unit of gross output in  $j$  sector are calculated according to the formula:

$$a_{ij} = \sum_{k=1}^m \sum_{l=1}^q a_{kl} \frac{p_k}{p_l} w_{kl} d_{lj}$$

where  $a_{ij}$  — coefficient of direct inputs of products of  $i$  sector per unit of gross output of  $j$  sector in value terms;

$a_{kl}$  — coefficient of direct inputs of  $k$  product for  $l$  product in physical terms;

$p_k$  — price of  $k$  product;

$p_l$  — price of  $l$  product;

$w_{kl}$  — share of  $k$  product in total inputs in  $l$  product;

$d_{lj}$  — share of  $l$  product in gross output of  $j$  sector;

$m$  — number of  $k$  products in  $i$  sector;

$q$  — number of  $l$  products in  $j$  sector.

As seen from this formula the level of coefficients of direct inputs in terms of value depends on the magnitude of corresponding coefficients of direct inputs in physical terms, on the ratio of prices of materials and output, the product structure of the gross output of the sector and the level of integration between the sectors concerned.

Economically, the final product is the part of the gross social product which in the given year goes beyond the bounds of current production and is used for personal and social consumption, replacement of

retired fixed assets, thorough repair and accumulation of fixed assets and also the accumulation of circulating assets plus the export-import balance.

In other words, the value of the final social product consists of the value newly created in the given year by living labour and the value transferred from the means of labour accumulated in previous years.

Thus, the main part of the final product is the utilised national income; its composition by elements is as follows:

1) replacement of the retired and thorough repair of fixed assets;

2) consumption fund (personal and social);

3) accumulation fund (increase of fixed and circulating assets, reserves and stocks);

4) export-import balance.

At the first stage in designing the national economic plan the total volume and main elements of the final product are established on the basis of macro-economic calculations. Following this its sectoral structure has to be calculated. Here the most intricate task is to calculate the sectoral structure of the personal consumption fund. For this purpose use is made of such techniques as analysing the tendencies of change in the composition of the personal consumption fund; calculations of rational consumption rates; calculation on the basis of plan coefficients of demand elasticity depending on the level of per capita income.

At the same time the method of extrapolating structural shifts is utilised.

Intricate specific problems have to be solved in planning the sectoral structure of other elements of the final product. A profound economic analysis of the existing structure and also of trends of its changes in the plan period are initial in all cases.

Creation of a normative base and ascertainment of the elements of the final product enabled planners to calculate variants of the inter-sector balance of production and distribution of goods for 1970. Since 1967-1968 a number of variants of the inter-sector balance up to 1975 has been compiled.

The model described above can be employed for establishing the volume of production and distribution

of goods by industries. At the same time these calculations provide a basis for determining the necessary inputs of labour and fixed assets. For these purposes Soviet planners also calculate the coefficients of direct and total inputs of living labour and productive assets per unit of output, i. e., information which makes it possible to secure the balancing of the final and gross social product, of labour resources and productive assets.

The availability of plan coefficients of total inputs of labour and productive assets per unit of the final output allows directly to co-ordinate the planned volume and sectoral structure of the final social product with the amount of labour invested in material production and the productive assets needed for its production.

### 3. Dynamic and Optimal Models

Soviet economists have recently begun to employ dynamic models of the inter-sector balance and optimal sectoral models. A dynamic model of the inter-sector balance offers a number of advantages as compared with a static model which does not ensure the organic co-ordination of the gross output plan with the plan of investments. In a static model of the inter-sector balance productive investments are regarded as given, with their subsequent specification in an iterative way. In a dynamic model productive investments, linked with the expansion of output, are ascertained as a result of the solution of equations of the model itself. A dynamic model of the inter-sector balance shows how production over a number of years is interconnected.

This model of the inter-sector balance of the production and distribution of goods in the national economy is expressed by the following system of equations:

$$X_i(t) = \sum_{j=1}^n a_{ij}(t) X_j(t) + \sum_{j=1}^n \sum_{r=1}^{\tau} b_{ij}(t) k_{ij}^r \Delta X_j(t+r) + Y_i^*(t),$$

( $i = 1, 2, \dots, n; t = 1, 2, \dots, \tau$ )

where  $X_i(t)$  — the volume of output of  $i$  sector in  $t$  year of the plan period;

$b_{ij}(t)$  — unit investment of products of  $i$  sector per incremental unit in the output of  $j$  sector;

$\tau$  — maximum gestation of investments — the period from the beginning of investments to the obtaining of output;

$k_{ij}^r$  — share of investment of products of  $i$  sector for increasing output in  $j$  sector over  $r$  years up to the end of construction in the total volume of investment of products of  $i$  sector for increasing output in  $j$  sector;

$Y_i^*(t)$  — final output of  $i$  sector in  $t$  year minus investments needed for expanding production.

Solution of the equations of the dynamic model of the inter-sector balance provides the basis for estimating the volume of output by sectors for every year of the plan period and the productive investments required for expanding production as broken down by sectors and years.

The contradictory nature of the influence exerted by different factors of production on economic results makes it necessary to choose from the many possible variants one that would ensure the best use of the available resources for achieving the target. This is done with the help of optimal planning.

Optimal planning has two distinctive features: first, the existence of an objective (criterion) function, which characterises the main aim of production in the plan period; second, it includes in the calculation different ways of achieving the set objective, i. e., different economic and technological variants. Optimal planning is possible at different levels — national economic, sectoral and local (enterprise or economic area). The tasks of sectoral and other local production plans are the same: to obtain a maximum final output (of the sector, enterprise) of a definite composition and quality through best use of the natural resources, productive assets, labour, raw and other materials, fuel and electric power, i. e., all the component elements of production.

On the national economic scale the optimal plan also proceeds from maximally satisfying the total needs of society with the available resources. But the needs themselves, being determined by the production factors, must be optimised. The theory of this problem is now being elaborated.

Optimal planning is based on theoretical and practical achievements of Soviet economic science, mathematics, cybernetics and the development of electronic computery. The use of mathematical methods and electronic computers in planning not only greatly accelerates economic computations for planning purposes, but, what is most important, simulates real economic processes by constructing economic models. The system of optimal planning models includes: aggregated national economic models which register the interaction of rates and factors of extended reproduction; static and dynamic models of inter-sector relations which characterise the sectoral structure of production and the flow of goods between different sectors; models reflecting the dependence of the level and composition of the consumer demand and volume and distribution of incomes by population groups on the levels and relationship of prices of separate goods; models of foreign trade, of goods exchange between areas, location of production, and others.

The system of economico-mathematical models of optimal planning also includes models designated for solving local production problems, for finding optimal directions of freight flows, rational use of the available machinery, fuel or raw materials.

Specific characteristics of social needs and definite indicators of resources are used at each level, each stage of optimal planning depending on the degree of aggregation. At the level of overall plans the achievement of a maximally used national income (or maximum of the consumption fund for the plan period) with the available productive assets and labour resources may be taken as a criterion. At the level of a multi-sector model for planning purposes the social needs are characterised by the structure of the final product, which includes investments and consumption (static

model) or only consumption (dynamic model). The resources are the productive assets, labour force and the intermediate product in the sectoral aspect. To construct an optimal inter-sector balance, besides these two components, it is also necessary to employ several methods of producing the given element of the final product (in the generation of electric power, thermal and hydroelectric stations; in the manufacture of fabrics — chemical and agricultural raw material by types, and so on). In constructing an optimal plan at a separate enterprise, the volume and assortment of the final output can be characterised by indicators in physical terms; the resources, by the number and capacity of machines, the quantity of raw materials, the number of workers of different trades, while the variants of production of the final output, by different manufacturing methods.

The techniques of optimal planning sharply raise the demands made on plan norms of unit inputs of raw and other materials, fuel, electric power, productive assets, investments and labour. The norms for the plan period reflect the progress of science and technology, and improvements in the organisation and methods of production. Plan norms should consider the most progressive tendencies in the development of technology. For optimal planning it is particularly important that the normative basis allow calculations of variants. That is why in setting plan input rates it is necessary to provide for the possibility of different production solutions. A comparison of different variants of production makes it possible to choose the most efficient one which ensures minimal total labour and material inputs in achieving the target.

Let us examine a typical problem of optimal planning — optimisation of the development and location of the production of homogeneous products, for example, cement, fuel oil or certain foodstuffs. The solution of the problem presupposes finding an expedient volume of output of products for the given places or areas of their production. It is necessary to satisfy the need in product  $P_j$  ( $j = 1, 2, \dots, m$ ) given for each of  $m$  places of consumption, with minimal inputs for production and transportation to the consumer.

Possible variants of the volume of output for each of  $n$  places of production are estimated in advance. Let us assume that  $b_i$  of such variants with volumes  $A_i^{s_i}$  ( $s_i = 1, 2, \dots, b_i$ ) are possible for  $i$  place or enterprise. Variants of using and reconstructing the enterprises available at the beginning of the plan period and also variants of building new enterprises are considered. The total input equivalent is estimated for each of the  $b_i$  possible volumes of production  $A_i^{s_i}$  at  $i$  enterprise, which includes for enterprises being built or reconstructed investments  $K_i^{s_i}$  multiplied by the normative coefficient of the efficiency of investments  $E$ , and for all enterprises the current inputs  $C_i^{s_i}$  calculated for the entire volume  $A_i^{s_i}$ . In the course of preparing the initial information the expenditure for transporting a unit of the product from  $i$  enterprise to  $j$  consumer are also estimated and denoted through  $g_{ij}$  ( $i = 1, 2, \dots, n; j = 1, 2, \dots, m$ ).

This problem can be solved by the following economic-mathematical model of the optimal location and development of the production of goods.<sup>1</sup>

We have to estimate the volume of production  $X_i$  ( $i = 1, 2, \dots, n$ ) for each of the enterprises and a non-negative volume of transportation or deliveries  $x_{ij}$  from  $i$  place of production to  $j$  place of consumption ( $i = 1, 2, \dots, n; j = 1, 2, \dots, m$ ), which would satisfy:

the conditions for covering the needs of every consumer

$$\sum_{i=1}^n x_{ij} = \Pi_j \quad (j = 1, 2, \dots, m);$$

the conditions of allocation for each enterprise of products between consumers on a scale not exceeding the volume of the produced output

$$X_i \geq \sum_{j=1}^m x_{ij} \quad (i = 1, 2, \dots, n);$$

<sup>1</sup> In preparing this section the author made use of materials of the article written jointly with E. B. Yershov (see *Planovoye khozyaistvo* No. 2, 1966).

the condition for the choice of  $X_i$  volume from among the given volumes

$$A_i^1, A_i^2, \dots, A_i^{b_i}$$

$$X_i = A_i^{r_i}$$

(here  $r_i$  is the number of the variant of development of  $i$  enterprise chosen in the optimal plan) and would minimise the total input equivalents for the production and transportation given by the criterion function:

$$\sum_{i=1}^n \left( C_i^{r_i} + EK_i^{r_i} + \sum_{j=1}^m g_{ij} x_{ij} \right).$$

In the given static problem all the initial information about the needs and possibilities of production and, consequently, the information obtained as a result of calculations, usually relates to the last year of the plan period. Should this period cover several years, variants for part of the enterprises operating at the beginning of the plan period may be examined with volumes of production smaller than those already achieved or even a variant of fully discontinuing the production of the given product. In the latter case  $A_i^1 = 0$  is introduced and the transition to the manufacture of other goods is specially considered for such an enterprise. Let us note that in ascertaining inputs  $C_i^{s_i}$  and  $K_i^{s_i}$  the possibility may be considered of combining the production of the given goods with that of other goods.

In problems with many given variants of the volume of output for every enterprise the inequality expressing the condition of allocation of goods cannot be replaced by a strict equality and part of the annual capacity of the enterprise  $(A_i^{r_i} - \sum_i x_{ij})$  may be kept in reserve.

Insignificant changes may be introduced in the criterion of optimality so that the current inputs correspond to the real volume of production  $\sum_i x_{ij}$ , and not to the

maximally possible volume  $A_i^{r_i}$  under the given variant. Excess of the possible volume of production  $\sum_i X_i$

over the total needs  $\sum_i \Pi_i$  does not run counter to the formulation of the problem of optimally developing and locating the production of the given goods because it makes it possible even in the static problem to consider to some extent the dynamics of needs beyond the bounds of the plan period. This is most clearly displayed in problems which obviously consider the level of needs for several stages of the plan.

In a static form the model of optimising the development and siting the production of homogeneous products has been applied for such an important item as cement. Calculations have been made for three levels of long-term needs (100, 125 and 150 million tons) and four variants of the recoupment period, ranging from five to ten years.

An analysis of the obtained computations made it possible to single out the mills most promising as regards the further development of the industry and also those poorly operating.

The possible volumes of production are not necessarily given by an enumeration of magnitudes  $A_i^j$ , as is the case in manufacturing industries with a typical volume of annual output accepted in designing enterprises. For the extractive and a number of manufacturing industries the possible volumes of production for enterprises may constantly change within certain limits. In such cases the unknown volume  $X_i$  either is equal to zero (an enterprise is not built, is not operated) or is encompassed in a range

$$m_i \leq X_i \leq M_i$$

where  $M_i$  and  $m_i$  are the biggest and smallest volume of production for  $i$  enterprise. In models of such a type the inputs are given as function  $f_i(X_i)$  of volume  $X_i$ . A function often utilised is

$$f_i(X_i) = \begin{cases} 0 & \text{when } X_i < m_i \\ U_i X_i + V_i & \text{when } X_i \geq m_i \end{cases}$$

or in a more general case a "piece-wise" function. What characterises the latter is that the range of possible volumes of production is divided into a number of

intervals, for each of which the conventionally constant input equivalents that do not depend on  $X_i$  and inputs that grow linearly, together with an increase of  $X_i$ , are estimated. One of these intervals may correspond to a variant of using an existing enterprise without enlarging it and others, to several possible levels of its reconstruction.

More complicated functions for establishing inputs should reflect with greater precision the transport cost of delivering goods to consumers. This expenditure, if the conventionally constant inputs are singled out and if account is taken of the reduction in the freightage cost per ton/kilometre as the volume of transportation ( $x_{ij}$ ) rises, is usually expressed by the following function:

$$g_{ij}(x_{ij}) = \begin{cases} 0 & \text{when } x_{ij} = 0 \\ g_{ij}x_{ij} + h_{ij} & \text{when } x_{ij} > 0. \end{cases}$$

Models in which the inputs are given as a function of the volume of production and transportation have been used, for example, for solving the problem of optimally siting the opencast mines of the Kansk-Achinsk coalfield and the cheese factories and creameries in Altai Territory and in the Moldavian Soviet Socialist Republic.

In the model described above the transportation expenditure was considered only for the delivery of finished goods or raw materials, which is permissible when one of these expenditures changes slightly as compared with the other in different variants of siting an enterprise. But it is also possible simultaneously to consider the expenditure on transporting raw materials and finished goods. In such problems use has been made of the linear dependence of the expenditure on the volume of production and transportation, while the discrete plurality of possible productive capacity by separate enterprises was not taken into account. This made it possible to employ techniques used in the ordinary transportation problem of linear programming.

In solving concrete problems, besides the terms formulated in the simplest model of location, a need arises to consider a number of circumstances and constraints.

Among them, for example, are constraints in the case of separate deliveries of the type

$$d'_{ij} \leq x_{ij} \leq d''_{ij}$$

or overall constraints in the use of scarce resources. Thus, if a maximally possible volume of investments is given, the model includes constraint

$$\sum_i K_i^{r_i} \leq K$$

or

$$\sum_i K_i(X_i) \leq K$$

where  $K_i^{r_i}$  are investments for  $r_i$  variant of development of  $i$  enterprise in an optimal plan and  $K_i(X_i)$  are the same investments taken as a function of the volume of production  $X_i$ . There are instances when such additional constraints insignificantly complicate the technique of finding optimal solutions, while giving a more precise economic formulation of the problem.

An approach to problems of development and location in a sector as a monoprodukt problem is practically by far not always possible and justified. In a more general case it is necessary to consider several stages of processing the goods (known as the multi-stage siting problem), the quality of the goods, nomenclature, possibility of substitution in the consumption of a number of products. A case in point is the optimal fuel balance, in which the needs are given in terms of reference fuel, while the inputs of consumers are differentiated by the types of the fuel they use.

In this case the mathematical problem is formulated as follows:

We take  $m$  centres of fuel consumption, each of which is conventionally called a "consumer", and  $n$  centres of fuel production. We regard as given needs  $A_j$  (in terms of reference fuel) of  $j$  consumer utilising one type of fuel and also coefficients  $a_{ij}$  of the efficiency in the use of the fuel of  $i$  supplier in relation to the type of fuel used in calculating the needs of  $j$  consumer.

If the volume of production of fuel by  $i$  supplier does not exceed the given level  $B_i$ , the unit input equivalent

$b_i$  for the production of a marketable ton of reference fuel is calculated. If the volume of production of  $i$  supplier exceeds volume  $B_i$  the additional unit input equivalent  $C_i$  per ton of reference fuel produced above the fixed level is taken into consideration. The maximally possible volume of production  $M_i$  of  $i$  supplier is regarded as known.

The additional input equivalent  $h_{ij}$  for every consumer in utilising fuel of  $i$  supplier, as compared with similar inputs in utilising the most economical type of fuel, are estimated, and the unit input equivalent  $g_{ij}$  for delivering a ton of reference fuel by  $i$  supplier to  $j$  consumer is given.

In the problem it is necessary to find the non-negative magnitudes  $x_{ij}$  ( $i = 1, 2, \dots, n; j = 1, 2, \dots, m$ ) which is the quantity of reference fuel of  $i$  supplier delivered to  $j$  consumer, and  $y_i$  is the excess of the volume of production by  $i$  supplier above the level  $B_i$ . The unknown magnitudes must satisfy the following inequalities:

$$\sum_j x_{ij} \leq B_i + y_i \leq M_i \quad (i = 1, 2, \dots, n)$$

$$\sum_i a_{ij} x_{ij} = A_j \quad (j = 1, 2, \dots, m)$$

and minimise the total magnitude of the input equivalent needed for satisfying the given requirements of all consumers in reference fuel:

$$\sum_i \sum_j (b_i + h_{ij} + g_{ij}) x_{ij} + \sum_i C_i y_i.$$

Constraints can be additionally introduced in the problem, for example, as regards the volume of utilised investments, the capacity of gas pipelines, and so on. Methods of linear programming are used for finding optimal solutions. Similar models could also be employed for other groups of substitute products.

In calculating optimal balances of goods entire economic industrial complexes which encompass a definite sphere of production and consumption of respective goods and not separate enterprises are considered. Each group is taken as an initial unit (initial variant). Groups which unite production sites (suppliers) and groups which unite consumers must be homogeneous;

the former as regards the method of production, the type of goods and economic indicators of operation; the latter, for the method of consuming the product, the magnitude of the expenditure linked with its consumption and the effect received by the consumer when substitute products are used. For example, in calculating an optimal balance of production and consumption of fuel for furnaces separate fuel-producing districts and their location are taken as initial if fuel of one type is produced in the same way and the economic results of mines and oilfields are not too differentiated. If one type of fuel is produced in different ways in a coal area or oilfield, they must be represented respectively as several conventional points (methods) of fuel production. The initial unit in fuel consumption is all the consumers of an administrative region which have a similar type of furnaces or other fuel-consuming installations and demand fuel with similar technical specifications.

To simplify calculations the transport component is not included in the objective function of optimal balances in the case of goods with a very small cost of delivery to the consumer.

In calculations of optimal balances of production and consumption of goods the choice of the optimality criterion is especially important. In a general case when a balance of substitute goods is calculated and transport costs make up a big share of the expenditure it is necessary to consider in the objective function the sum of inputs in production and consumption (taking into account the consumption effect) and the cost of transportation. If a balance of goods for which there are no substitutes is calculated it is sufficient to take as a criterion only the production and transport inputs.

In local calculations when rational variants of production have to be chosen, the formula of the annual input equivalent is utilised. Here, the normative coefficient of efficiency of investment plays the role of an investment constraint. In solving big national economic problems by linear programming methods and in cases when it is possible in formulating the problem to consider directly in the mathematical model the investment and capacity constraints, normative coefficients of effi-

ciency need not be used. In such cases in constructing the objective function (criterion) it is sufficient to consider only the current inputs. Moreover, in solving the problem both the optimal variants of the plan and the coefficients of economic efficiency of using productive capacity and investments are found.

But not in all problems solved by mathematical programming methods is it possible to consider constraints in investments and productive capacity in formulating the problem. More often are instances in planning when constraints in some types of investment and capacity can be set in the initial model, while this cannot be done for other types, although on the whole they are scarce in the national economy. In such cases in constructing the objective function it is necessary to consider the scarcity of investments through the normative of the efficiency by calculating the inputs according to different variants, with the help of the formula of the annual input equivalent.

Calculations make it possible to find the optimal volume and methods of producing goods by enterprises or groups of similar enterprises; optimal schemes of attaching suppliers to consumers; the most advantageous allocation of available resources for construction. This enables planners to ascertain the efficiency of utilising the available productive capacity in the plan period and the efficiency of investments and also to find the optimal structure of production and consumption of substitute goods.

Optimisation of plan projections is usually not confined to the construction of one model. As a rule, a series of calculations is made in which the behaviour and stability of the optimal solution is studied, depending on changes in needs, inputs for the production and transportation of goods. Economico-mathematical valuations are also made characterising the economic efficiency of different variants of long-term development of the production and use of resources.

Depending on the type of function used for ascertaining the inputs, the discrete nature of the many values assumed by the unknown magnitudes and other distinctions of the employed models, different techniques are used for the precise or approximate finding

of optimal solutions, including methods of linear, non-linear, integer and dynamic programming. In intricate multi-product and integer problems good results are obtained by breaking down the general problem into several simpler ones which are solved with the help of standard techniques. The development of optimal planning methods puts to the fore questions of considering the production interconnections on the scale of the entire economy.

Optimal planning methods are used on an ever wider scale in the USSR. While at first the range of economic problems was limited to the bounds of separate enterprises and then to sectors, at present work is being done to design an optimal plan on the scale of the entire national economy. The Soviet Union is the country where optimal planning originated,<sup>1</sup> and considerable achievements have been registered both in the applied and theoretical trends of research in this sphere.

Optimal national economic planning enables us to raise planning to a qualitatively new stage, which makes it possible fuller to satisfy society's needs with the same resources.

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<sup>1</sup> Problems of optimal planning are examined in the well-known works of V. S. Nemchinov, L. V. Kantorovich, V. V. Novozhilov and Lurie.

## Chapter V

### PLANNING INVESTMENTS IN THE ECONOMY

The experience of the planned development of the economy in the USSR shows that investments have been the main instrument for changing the sectoral and territorial structure of production, building up new progressive industries, introducing new technology and raising labour productivity through mechanisation and automation. They ensured high economic growth rates and an advance in the living standard of the people.

Ultimately the trend of investments, their flows, allocation over the country's territory and efficiency predetermine the future economic and technical level of production. It is for this reason that great attention is paid in the Soviet Union to planning investments. In many developing countries the investment programme often represents the core of the national plan.

A distinctive feature of the investment plan in the USSR is its close dovetailing with other sections of the national economic plan. The intimate link between the investment programme and other sections of the national economic plan is explained by the fact that investments are one of the main factors for expanding productive capacity. The investment plan must be backed by financial and material resources and manpower of the requisite skill. Material resources for investment can be planned only by considering the production plan. A high level of efficiency of productive investments is ensured by investments in science and development of new manufacturing processes, in the system of education and in the training of new personnel and advancing the skill of the employed.

A change in the efficiency of each unit of investment, in turn, affects both the general volume of the national product and income and also the distribution of the latter into the accumulated and consumed parts.

### 1. Investment Programme of a Country

Ascertainment of the volume of investments, the criteria for their allocation and valuation of efficiency in calculating the construction plan always depend on the conditions of production, the level of a country's economic development and the social changes being carried out. The prevailing socio-economic relations, the presence or absence of exploiting classes, the level of commodity production in the national economy and the degree of influence exerted by the state on the scale of accumulation — all this determines the possible volume of investment for expanding production and increasing a country's non-productive fixed assets.

The relationship between the increase in the scale of investments, their allocation and the necessary growth of consumption is a very acute problem when the productive forces are at a low level. To lay the foundation of a highly industrial economy in the form of heavy industries, the power industry, the transport system and other elements of a modern infrastructure big investments have to be made without receiving a commensurable return over a definite period. But after the cycle of building and assembly work is completed in the entire intricate and multi-linked chain of production, the return yielded by the new capacity steadily increases. This is expressed in a rise of labour productivity in all sectors, expansion in the output of consumer goods, in the possibilities for reducing the working day, making bigger appropriations for research and ever greater tapping of the natural resources.

An analysis of consumption and the scale of past investment is the initial basis for setting the targets in planning investments. It makes it possible to compare the significance of long-term and current tasks and, by deciding the importance of each of them, to estimate the future social needs. Investments represent a dependent magnitude. Substantiation of their scale, direction

and flows is contained in the overall balance calculations of the rise in society's needs and the possible volume of production in the plan period.

The necessary investments in the plan period can be roughly estimated by comparing society's needs (including personal and social needs and also exports) with the attained volume of production and the expected commissioning of new capacity, the construction of which is being completed, and also possible imports. The difference between the needs and the available capacity is the magnitude of the additional capacity that has to be developed.

The scale of the required investments is determined by the efficiency of every unit of investment, i. e., the expenditure for increasing capacity. The needed volume of investments is compared with their possible magnitude. The latter is determined by the rate of accumulation in the national income, the volume of the national income and the magnitude of renovation, i. e.,  $I = a \cdot Y + R$ , where  $I$  — investments,  $a$  — the share of accumulation in the national income,  $Y$  — the national income and  $R$  — renovation.

At present replacement of retired fixed assets claims about 20 per cent of the total investments in the USSR. The magnitude of renovation, in turn, depends on the sum of the created fixed assets and the speed of their retirement. But the main part of investments comes from the newly created national income.

Accumulations account for 25-30 per cent of the national income in the Soviet Union. They include: increment of fixed assets (production buildings and houses, installations, equipment and machinery, draught and productive livestock, and so on), an increase in material circulating assets (stocks of raw and other materials, fuel and finished goods, balances of commodities in trade, stocks of farm produce and uncompleted construction), an increase in state material reserves, and in personal stocks of farm produce kept by the population.

The rate of accumulation in the preceding period is the guidepost for subsequent projections but not a rigid indicator. Its magnitude for the initial stage of industrialisation can be regarded as the lower boundary of

accumulation. The industrialisation process demands an increase in the share of accumulation. As the gap between developing and developed countries is bridged, the problem of a high rate of accumulation is removed from the agenda. The structure of the use of accumulations may also change. A definite saturation with means of production makes it possible to allot a considerable part of the investments for non-productive needs. But in these conditions, too, the further growth rates will depend both on the efficiency and volume of investments in production.

In the USSR the share of accumulations used for increasing the fixed productive assets amounted to 38-41 per cent of the total in recent years; the share of accumulations going for an increase of the material circulating assets and reserves was 34-42 per cent.

A comparison of the needed volume of investments for socio-economic development with available resources (part of the national income and renovation) makes possible the first preliminary balancing of the investment plan. This balance can be achieved above all by changing the rate of accumulation or the magnitude of investment coefficients  $b_k$ , inasmuch as the increase in output ( $\Delta X$ ) depends on the volume of investments and their efficiency, i. e.,  $\Delta X = \frac{a \cdot Y + R}{b_k}$ . The ceiling of the accumulation rate is apparently a magnitude which preserves the former level of per capita consumption. The minimal value of the accumulation rate conforms to the size of investment needed for maintaining a constant ratio between a country's fixed productive assets and population (the constraining parameter will be the rate of population increase). Otherwise the fixed assets will be consumed with a resultant lowering in the scale of production and the standard of living.

Investment coefficients are largely predetermined by the attained technological level of production and its structure. But their magnitude may alter depending on the intensity of changes in production processes and the allocation of investments. In this connection it is necessary to have a correct idea of the content of investment coefficients, especially those utilised for general economic calculations in macro-models of growth.

If deep structural changes are taking place in the economy investment coefficients must consider the influence exerted by sectoral efficiency of investments.

The lag in returns on investments as compared with the period when they are made, known as the gestation effect, is of essential significance for plan calculations of the efficiency of investments. This is especially important if a sharp change in the structure of production is contemplated. That is why in calculations of economic efficiency, alongside a year-by-year comparison of output, profitability, costs and labour productivity with investments, it is advisable, for control purposes, to compare these investments with the output which may be obtained in future, for example, after three years. Thus, it is expedient to compare investments made in 1968-1970 with the output that will be received in 1973-1975.

At the macro-economic level the balancing of the necessary and possible investments in terms of money must be assessed, and the extent to which the investments are backed by material resources should be calculated. This is ascertained above all by the relationship of the available and needed capacity in sectors which produce elements of the fixed assets. For these purposes use is made of the data of the balance of the national economy which divides production into two departments: output of the means of production and of consumer goods. For industry group A is singled out (output of means of production) and also a characteristic is given of the volume of output in the engineering industry and construction, whose output represents major material elements of the investment plan.

Such overall calculations which rest on macro-economic balances with the singling out of means of production can be utilised as an initial base for further less aggregated calculations or can serve as the general framework for allocating investments by sectors.

Investments by industries and sectors of the national economy and also by areas are allocated in accordance with the sequence of accomplishing general economic tasks set for the given plan period. A comparison is made of investment efficiency by sectors. The national economic criteria of efficiency may not always coincide

with the efficiency criteria of some particular sector. In this respect during the first two five-year plans priority in investments was given to heavy industries, although their efficiency indicators were not the highest at that period.

A national economic approach is particularly important for plan calculations of the economic efficiency of investments. For example, better concentration of ores may increase costs and lower productivity at a separate mining and ore-dressing enterprise. But this will ensure higher labour productivity on a social scale, inasmuch as the concentrated ores will bring about a rise in labour productivity and improve the economic performance of metallurgical works. That is why indicators of total investments which take into account investments in allied sectors and are comparable for all interconnected industries are of great importance in valuating the projections of investments by industries.

Indicators of economic efficiency of investments for the USSR as a whole or for a Union Republic differ from indicators applied in sectors, sub-sectors and separate enterprises. National economic indicators are above all calculated for the net product of the economy of the country or a republic. It is not always possible to obtain such characteristics for separate establishments. Valuation of the national economic efficiency of investments in the plan is consummated by calculating the indicators of national economic efficiency of investments measured as the increment of the national income or of the final product per unit of investment.

The specification of macro-economic projections of investments by sectors makes it possible to consider changes in the structure of social production in calculating investment efficiency. Moreover, it is necessary to estimate the general effect of introducing new materials in the main producing sectors and also in allied industries and in the consumption sphere. For this purpose it is necessary to establish the allied industries and to calculate the total investments in all the main sectors. Such calculations also envisage the adoption of the most rational scheme of transport links.

The main trends of investments are ascertained by

calculating a number of alternative variants of economic development and comparing the efficiency of each one. A comparison of the projected indicators with those of the pre-plan period is an obligatory condition. In comparing a number of variants only comparable indicators may be used.

Two approaches are possible in calculating the direction of investment in an industry. One consists in determining the characteristics which link up macro-models and multi-sector models and in making investment projections within the framework of multi-sector models of the economy. The second is to select sectoral investment projections for inclusion in the national economic plan and their balancing within the framework of the total volume of investments and material resources.

The first approach in specifying investment projections may be effected in the form of plan calculations, proceeding from an estimate of the volume and structure of the final product as the initial point of planning. In projecting investments by sectors with the help of different modifications of inter-sector models described in Chapter IV, it is necessary to bear in mind that the greatest stability is displayed either by sufficiently aggregated normatives or specific normatives typical for a whole group of enterprises and the more widespread production processes. An aggregated normative obtained as a weighted magnitude of production norms depends on the structure of sub-sectors and the methods of production. Such a normative is less suited for another structure of the plan with a different relationship of sectors and different territorial relations. In using aggregated normatives it should be borne in mind that if a plan provides for transition to a new pattern of production it is necessary to have data on the old and new systems of weights and structural relationships inherent in the base and plan variants.

Use of dynamic models of the inter-sector balance requires extensive and unified information. Detailed information is needed about asset normatives, indicators, unit investments, structure of investments and the investment-intensity of goods.

A dynamic model of economic growth must consider the uneven pace of capital construction, the pauses inevitable in the course of commissioning fixed assets and productive capacity. When the volume of investments is large, evenness of dynamics in the commissioning of fixed assets in terms of value may conceal the most diverse material streams and a different structure of the new production apparatus. For a more precise reflection of the diversity of real investment processes capital construction has to be broken down by all sectors of the economy and investments singled out by years. This will make it possible to consider the specific features of construction in separate sectors and lines of production.

The second approach in working out more detailed macro-economic indicators of investments is to co-ordinate sectoral investment projects, the volume of which is established proceeding from the need to ensure the required expansion in the output of goods. The volume of investments by sectors is estimated on the basis of a balance co-ordination with the production programme of all sectors and also with the contemplated development of all sectors in the non-productive sphere which ensure an advance in the standard of living.

Such an approach in formulating a detailed investment plan by sectors is utilised for annual and medium-term plans and it is based on thorough calculation and valuation of indicators for all enterprises and institutions. Balances of productive capacity are the initial basis for calculating the volume of the needed investments by separate industries. These balances ascertain the productive capacity available at the beginning of the plan period and also the additional capacity for the projected increase in output. Additional output may be obtained through better use of available productive capacity. If such reserves are exhausted, the additional productive capacity has to be created with investments aimed at enlarging and reconstructing operating enterprises and building new ones. This shows the importance for investment planning of balances of productive capacity by sectors, areas, and enterprises.

To provide enterprises, ministries and all other planning and managerial agencies with systematic data on available productive capacity which could serve as a firm basis for planning production and investments, since 1964 balances of productive capacity have been compiled at operating enterprises of all Soviet industries as of January 1 every year.

A balance of productive capacity of an enterprise is drawn up to establish the capacity at the beginning of the plan year, proceeding from the available capacity at the beginning of the base year and its change (increase and decrease) in the course of that year.

A balance of productive capacity is compiled at enterprises and then summed up in higher agencies in accordance with a special form. The following form (Table 1) was used for 1967. (See page 124.)

An analysis of the use of available capacity is highly important, especially in developing countries. The latter quite often have underemployed capacity. If this situation is preserved an increase in investments leads to an even bigger underemployment of capacity. In view of this, the task of planning agencies might be, without increasing the scale of investments, to allot them in the first place to lines of production which restrain the use of available capacity. For this purpose it is necessary to ascertain the degree to which the capacity of different sectors is not dovetailed; in a sector, the lack of dovetailing between enterprises, and in an enterprise, the non-dovetailing of different types of equipment. The direct result of non-dovetailing of capacity is that some groups of equipment, the production potential of which is higher than the capacity of the bottlenecks, are not utilised to the full, which reduces the loading up of the entire plant. The bigger the disparity between the capacity of the bottleneck group and the capacity of the other groups and the smaller the share of machines in the bottleneck in the entire plant, in other words, the greater the non-dovetailing of capacity, the lower the loading up of the equipment. Investments eliminating bottlenecks and non-dovetailed capacity between separate shops and sections of production make it possible, with comparatively small outlays (chiefly for

Table 1

## Balance

of Productive Capacity of \_\_\_\_\_ (name of enterprise or organisation presenting report)  
as of January 1, 1967

A	B	C	I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Name of goods	Code of goods	Unit of measurement	Capacity as of January 1, 1967, established according to balance for 1966	Increase in capacity, total	Commissioning of new capacity (enlargement, reconstruction of operating and building of new enterprises)	Total	Changes in the regime of operation, increase in the number of shifts and hours worked	Change in the nomenclature of output (reduction of labour intensity)	Decrease in capacity, total	Change in the nomenclature of output (increase in labour intensity)	Change in the regime of operation, decrease in the number of shifts and hours worked	Retirement of worn-out and obsolete capacity	Capacity as of January 1, 1968 (Column 1 + columns 2-7) in the nomenclature and assortment of 1967	Average annual capacity in operation in 1967	Output of goods or quantity of processed raw materials in 1967	Use of average annual capacity in 1967 (col. 13 : col. 12)	Regime of operation, number of shifts or hours worked daily taken in calculated capacity	Information: Capacity as of January 1, 1968, in the nomenclature of the 1968 plan
Change of productive capacity in 1967																		
as a result of																		
organisational and technical measures																		

buying equipment), substantially to increase the capacity of entire sectors.

The results of comparing available capacity with the needed volume of the industry's output bring out the respective magnitude of investments. It is dictated by the growth rates in capacity and the investment per unit of capacity. The total need of all sectors in investments is the magnitude necessary for expanding to one or another degree the production of goods or services.

Mention should be made of difficulties in calculating the need in investments, proceeding from the increase in output. Since investments are a function of the production programme, the scale of production in all industries itself depends to a considerable degree on the size of investments and scale of construction. This applies above all to branches of the building materials industry and engineering and the related branches of heavy industry because their capacity too depends on the allotted investments. A big difficulty is also presented by the estimate of the need in investments in related sectors. The principle of comprehensive planning may be violated here, which could lead to imprecise calculations.

Notwithstanding these difficulties in co-ordinating investments by sectors if they are determined on the basis of the production level, balance can be achieved by repeated computations. The constraints are the total volume of investments obtained from macro-calculations.

The initially calculated needs of industries in investments, as a rule, exceed the possibilities. In the course of plan formulation, the volume and trends of investments in different industries are specified.

Thus, a comparison of the investment projections in every industry with the sequence of accomplishing socio-economic tasks, with the indicators of national economic efficiency and the resources of the asset-producing sectors, makes it possible to choose a specified variant of investments by industries. This enables planners to ascertain not only the sectoral structure of investments for material production and the non-productive sphere, but also their technological structure.

The structure of investments includes:

- a) the cost of building and assembly work;
- b) the cost of equipment, tools and fixtures included in the fixed assets (equipment designated for replacement because of wear and tear and obsolescence at operating enterprises is specially singled out);
- c) other investments, including those designated for deep drilling for oil, gas and thermal waters, for surveying and designing, especially for construction in future years and also for perennial plants, and so on.

## 2. Planning Investments of Sectors

In planning investments in sectors variants of accomplishing economic tasks which would bring about the biggest rise in the efficiency of production have to be ascertained. For this purpose calculations are made of the comparative economic efficiency of the different variants and of operating enterprises which have the best indicators of investment efficiency at the set volume of output.

The scale of investments in a sector, obtained from calculations at the national economic level, is the initial limit for choosing from among different variants of creating additional capacity. An increase in capacity is possible by extending and reconstructing operating enterprises and building new ones. The number of variants is also increased by different schemes of the territorial location of the additional capacity. The task of comprehensively developing separate areas further complicates the choice of the most efficient projects because it is necessary to consider different factors depending on the specific features of production, in particular:

- a) available productive capacity in the building industry and the needed additional expenditure for enlarging it;
- b) available sources of power and water;
- c) provision with labour resources and the need in additional investments in housing and public utilities in view of the contemplated enlistment of additional workers;

d) available transport facilities and the need in additional investments for road construction to link up with the existing network of roads;

e) proximity and economical nature of raw material sources;

f) proximity to places of intensive consumption of the output of the given sector, and so on.

If there are several competing designs of new enterprises in a sector or other variants of increasing capacity, investments are channelled into projects which ensure the necessary expansion of capacity and the highest efficiency. The following technico-economic indicators are used for valuating designs:

- a) period of recoupment of investments (according to the estimated cost);
- b) investments per unit;
- c) production of goods per unit (in rubles) of fixed assets;
- d) cost of production per unit;
- e) output per worker.

The diversity of indicators in practice is reduced to the total annual input equivalent ( $A_i$ ) denoted by the formula:

$$A_i = C_u + EI_u + T_e$$

where  $C_u$  — cost of production per unit;

$E$  — sectoral normative coefficient of investment efficiency;

$I_u$  — unit investments;

$T_e$  — transport costs for delivering goods from producing factories to places of intensive consumption.<sup>1</sup>

The technico-economic substantiation of construction projects (new enterprises, the enlarging and reconstruction of existing ones) included in the plan requires a comparison of the economic indicators of the given project with the normatives and average sectoral values of the respective indicators (for example, recoupment) and also with indicators of similar most efficient enterprises.

<sup>1</sup> In case of need the sum of the annual input equivalent also includes the investment in transport.

A coefficient inversely proportional to the recoupment period is utilised for determining the efficiency of investments in sectors. This is the indicator of profitability ( $P_i$ ) widely utilised in practice. It represents the difference between the value of the annual output in wholesale prices (of the enterprise) and its cost of production in relation to all investments, according to the formula:

$$P_i = \frac{O_w - O_c}{I_t},$$

where  $O_w$ —annual output in wholesale prices (of the enterprise);

$O_c$ —cost of production of annual output;

$I_t$ —total sum of investments (considering also the change in circulating assets).

Comparative efficiency of investments is thus calculated by comparing the cost of production, the unit investment and the recoupment period. This period is determined by commensurating the additional investments, i. e., their difference in the submitted variants, and the saving of production costs. In case the variant ensures a lower cost of production and a saving of investments, there is no need to consider the period for the recoupment of the additional investments.

In determining the economic efficiency of investments in projects of non-productive designation, the main indicators of economic efficiency are the unit investments, considering the need to ensure the steadily growing requirements of society.

In addition to the main value indicators of investment efficiency, in choosing the most advantageous variants use is also made of indicators in physical terms which characterise labour productivity (output per worker), the inputs of fuel, power, raw and other materials, the use of equipment and production floor space, the employment of progressive building elements, and so on.

In calculating the comparative economic efficiency when choosing the most expedient variant of investments the obtained coefficients of efficiency and the periods for recoupment of the additional investments are compared with the normatives of these indicators

which are set in a differentiated way for various sectors of the economy.

Normative coefficients of comparative efficiency differentiated by sectors take into account the structure of assets and the distinctions of the given sectors, their rates of technological progress and the level of the latest technology. Normative coefficients for separate sectors, depending on their nature, have been fixed at not less than 0.15-0.3, which corresponds to a recoupment period of not more than 3-7 years. For certain sectors (transport, the power industry) longer normative recoupment periods have been set, but not more than ten years (normative coefficients of efficiency of not less than 0.1).

The setting of normative indicators of economic efficiency of investments in the form of coefficients or recoupment periods does not mean that all projects which yield a lower efficiency must be discarded. For other reasons, specifically for considerations of labour protection and the improvement of working conditions, projects with a lower efficiency may be accepted for construction.

In examining several variants of increasing capacity by building new enterprises normatives of comparative efficiency may be utilised, alongside calculations of general or national economic efficiency. For selecting and substantiating the plan variant calculations of comparative efficiency may be applied according to the formulas:

$$\frac{I_{u1} - I_{u2}}{C_{u2} - C_{u1}} = R; \quad \frac{C_{u2} - C_{u1}}{I_{u1} - I_{u2}} = E;$$

where  $I_{u1}$  and  $I_{u2}$  — unit investments for the compared variants;

$C_{u1}$  and  $C_{u2}$  — unit cost of production for the same variants;

$R$  — period for the recoupment of the additional investments (in years);

$E$  — coefficient of efficiency of the additional investments.

The condition for choosing the best variant of investment must be the ratios  $\frac{R}{R_n}$  and  $\frac{E}{E_n}$ , where  $R_n$  and  $E_n$

are, respectively, the normative recoupment period and the normative coefficient of efficiency of the additional investments (comparative efficiency).

In utilising calculations of comparative efficiency to establish the level of efficiency of the planned investments in new construction, it is necessary to bear in mind the existence of constraints in the application of these calculations. Thus, comparative efficiency can be calculated only if  $I_{u1} > I_{u2}$  and  $C_{u2} > C_{u1}$  or  $I_{u1} < I_{u2}$  and  $C_{u2} < C_{u1}$ .

All the examined variants of investments in new construction must satisfy the demands of general or national economic efficiency.

In comparing variants with a different volume of output, the sum of investments, and the cost of the annual output for a variant with a smaller scale of production are adjusted to a comparable volume of output.

In comparing variants which differ for the duration of construction, account is taken of the economic results of shortening or lengthening the period of building and commissioning the enterprise. The resultant economic effect is calculated on the basis of the average return which can be obtained in the given sector by making productive use of investments.

If variants of investments with different periods of gestation are compared, the expenditure of the later years is reduced to the current year. For this purpose it is divided by a coefficient which considers the average effect that can be obtained in the given sector from the productive use of investments.

The coefficient ( $E_e$ ) which takes into account this average effect is expressed by the formula

$$E_e = (1 + E)^t,$$

where  $E$  — the sectoral normative coefficient of efficiency;

$t$  — the period in years.

By summing up all the projects selected for investment the expected increase in capacity can be ascertained, taking into account the biggest efficiency and the other necessary characteristics. Such calculations serve as the basis for valuating the original estimates

of increasing production and the required investments. The choice of the more efficient solutions makes it possible either to revise the original limits of investments or to value in a new way the possibilities of increasing the output of goods and volume of services. Such new valuations and consequent decisions as to the scale of growth may be made only at the multi-sector, i. e., national economic level.

The chosen projects for investment must be co-ordinated with the available resources of building materials and building equipment, i. e., the capacity of the construction industry and other elements needed for building work and, consequently, with the capacity of the sectors which produce investment goods. If the tasks of required construction and the capacity of the sectors ensuring this volume of building work do not coincide, the construction targets must be revised.

The production programme of the construction industry as part of the investment programme encompasses not only projects commissioned in the given plan period but also projects for which only a definite stage of building work has to be accomplished. This particularly applies to long-term building programmes which hold a special place in the investment plan.

Long-term programmes consist of projects of building up fundamentally new sectors in the production sphere. In the infrastructure they envisage the development of large power systems, the network of rail, air and water transport, canals and irrigation systems, the development of big cities and their satellites, the building of large educational and scientific centres, and so on. These programmes are based on scientific forecasts of the development of technology, data of geological prospecting, appraisals of tendencies in different spheres of society's socio-economic life. The carrying out of large projects, as a rule, goes beyond the bounds of five-year plans and may encompass a period of 10-20 years. Present-day conditions of material production demand planning of construction designated not merely for the immediate period. It is necessary to provide a basis for the development of new sectors, new centres of industry, agriculture, science and culture.

At present long-term investment programmes are so large in scale that they are increasingly regarded as the initial point for formulating five-year plans.

Building plans are drawn up with the help of normatives of inputs of labour and materials per unit of building output, the duration of the construction processes, normatives of assets per worker and asset-intensity in every specific branch of building. Norms are employed in preparing designs of buildings or installations; in estimating the cost of construction and making other financial calculations, in setting construction schedules, reserves, and so on.

Unified technical norms, approved in a centralised way and in force throughout the country, have become widespread in the Soviet Union. Single norms and rates of building and assembly work, for example, have been approved for application at all construction sites. Planners employ technico-economic norms of utilisation (output) of building equipment and the expenditure of building materials and labour inputs for certain types of jobs; norms of the duration of construction and of reserves; normatives of circulating assets, coefficients of efficiency, and so on.

### 3. Investments in the Development of Export Sectors

Investments in sectors working for export are planned depending on the place the latter hold in a country's economy and also on the level of its development. If a country possesses some resources of interest to foreign buyers, in making investments in sectors producing such resources account should be taken of the effect derived from the international division of labour. This general approach does not mean that such a criterion is applicable in all cases. For countries insufficiently developed economically and not possessing the capacity for producing modern means of production or other manufactured goods which compete with imports, the material resources for initial industrial development, as a rule, have to be obtained in foreign markets. The share of imported equipment in gross internal capital investments in such countries reaches 30-40 per cent and in some cases is even much higher. Even

in developing countries like India and Brazil which are comparatively advanced industrially, the share of foreign deliveries is not below 20 per cent; moreover, the tendency is upward in view of the lag of national production of investment goods behind the rise in investments.<sup>1</sup>

Consequently, in many developing countries it is expedient to orient part of traditional production on exports. The export of raw materials, although it is of low efficiency, ensures the receipt of the necessary financial resources and definite types of means of production. If, subsequently, a country imports mainly goods needed for developing the primary and processing industries which compete with imports, the productive capacity created with their help will be able to supply goods both for satisfying internal needs and for the further expansion of exports.

The need to load up the available capacity in face of a shortage of raw materials brings about an increase in their imports and, consequently, a corresponding expansion of exports. For countries standing at a higher stage of industrial development the tendency is to increase the exports of manufactured goods.

A still higher level of development is marked by an extension of trade in the latest equipment, the latest types of materials, patents, and so on. Although the price of these new articles and goods is high, their purchase saves time and investments. That is why a country which has new and diverse categories of modern production is able to trade effectively on a mutually advantageous basis. For these purposes it must make the necessary investments and as a result build up definite capacities.

In the USSR investments for expanding exports are calculated in accordance with the general scheme of plan formulation and depend on whether the export (or part of it) is an autonomous element of the plan or represents a function of imports. The possibilities of increasing output both with capacity built or recon-

<sup>1</sup> V. G. Pavlov, *Promyshlennyy export v strategii ekonomicheskogo razvitiya* (Industrial Exports in the Strategy of Economic Development), Moscow, 1967, p. 37.

structured at the beginning of the plan period or on account of imported equipment and materials are brought out at the preliminary stages of planning in the sectors (ministries) and in the USSR State Planning Committee. An increase in imports must be secured by a rise in exports. In this case additional investments in export sectors are inevitable. The task is to choose the best variant. The efficiency of investments in export sectors is assessed by a number of indicators. The exports of goods must be advantageous from the national economic viewpoint, i.e., it is necessary to make the smallest possible current inputs and investments for the production and transportation of export goods, which enjoy a big demand in the foreign market, and to ensure the obtaining of maximum foreign-exchange receipts.

Foreign trade has to satisfy the needs of the economy in goods which it is more advantageous to buy abroad than to produce within a country. Moreover, the national inputs in export goods sold to pay for imports must be smaller than the inputs for the national production of imported goods or their substitutes.

In appraising every project for expanding the production of export goods all the elements of the inputs must be considered. National economic inputs for export production, as in any sector, are calculated by the cost of production, adding the investment-output ratio multiplied by the normative coefficient of efficiency.

Since this valuation is made for each project in national prices, to determine the degree of its conformity to export needs, it is necessary to establish its efficiency in terms of foreign exchange. For this purpose the net foreign exchange receipts of exports per unit of goods are compared with the total inputs for their production and transportation up to the border. A comparison of the relative efficiency of the export of separate goods serves as the basis for choosing a structure of investments in export sectors which makes it possible to increase the export of goods whose foreign-exchange receipts are comparatively bigger than the inputs for their national production and transportation.

Since investments in the production of goods for export are made in order to increase export receipts, and on this account extend imports, the indicators of the efficiency of exports must be co-ordinated with indicators of the efficiency of imports necessitated by exports.

The economic efficiency of the export of goods can be ascertained by taking into account the efficiency of the imports of the goods which are bought or will be bought with the obtained foreign exchange. The composition and quantity of these imported goods are known as the import equivalent. Imports, in turn, must be compared with the magnitude of inputs (current and investment) for the production of national goods replacing imports.

The indicator of the relative efficiency of the import of goods ( $X_i$ ) is mathematically expressed as:

$$X_i = \frac{I_i}{F_e} \text{ (ruble/foreign-exchange ruble)}$$

where  $I_i$  — inputs in the national production of goods analogous to imports (determined the same way as inputs for the production of export goods);

$F_e$  — total foreign-exchange expenditure for the purchase of imported goods and delivery to the border.

Indicators of relative efficiency can be utilised for comparing the efficiency of exports or imports within the bounds of trade with a separate country or group of countries whose currencies are mutually convertible.

To compare the efficiency of expanding capacity for the export and import of goods bought and sold in different countries and for different currencies, it is necessary to introduce adjustments in the efficiency indicators which take into account the objectively existing differences in the purchasing power of currencies obtained from the sale of exports and used for the purchase of foreign goods.

If a commodity is sold for freely convertible currency, it is possible to consider the average weighted indicator of the relative efficiency of imports as applied to the composition of all goods bought for freely

convertible currency. If a commodity is sold for a non-convertible currency within the bounds of one country, the average efficiency of imports of all goods from the given country should be considered.

The magnitude of the efficiency indicator of the import equivalent ( $X_{ieq}$ ), with the help of which the purchasing power of the currency obtained from the exports of the given commodity is specified, is expressed as follows:

$$X_{ieq} = \frac{I_i Q_i}{F_e Q_i},$$

where  $Q_i$  — the quantity of separate kinds of goods entering the import equivalent;

$I_i Q_i$  — the total inputs for the national production of the products of the import equivalent;

$F_e Q_i$  — total expenditure of foreign exchange in payment for the import equivalent.

On the whole, the indicator which can be used for valuating the efficiency of each project for extending exports (considering the efficiency of the import equivalent  $X_{ei}$ ) can be denoted as

$$X_{ei} = X_e X_{ieq}, \text{ where}$$

$X_e$  — relative efficiency of exports in terms of foreign exchange.

If some or other goods enjoy a big demand within a country and the productive capacity is limited, it is inexpedient to increase its exports. In this case the efficiency of producing and consuming the goods within the country may be higher than the efficiency of selling it in the foreign market. A comparison of efficiency in the home and foreign market is a requisite in substantiating the economic efficiency of foreign trade and investments in the production of export goods.

The constraining parameter for each new investment in an export project is the indicator of the efficiency of foreign trade as a whole ( $X_{ft}$ ) measured as follows:

$$X_{ft} = \frac{I_i Q_i}{I_e Q_e},$$

where  $I_i Q_i$  — total national economic inputs for the national production of imported goods bought in a country or group of countries or for the production of all goods imported into a country;

$I_e Q_e$  — total national economic inputs for the production and transportation of goods exported to one country, a group of countries, or the total volume of exports.

If the indicator of efficiency is above 1 foreign trade with separate countries and group of countries is economically advantageous and ways should be sought for increasing the volume of exports and imports of the respective goods.

In some cases capacity for the export of a separate commodity can be increased only by making comparatively big investments for the additional output and reducing the price in the foreign market. In this instance the indicator of the export efficiency will decline. The boundary determining the expediency of increasing the volume of exports is the requirement that the efficiency of exports (considering the efficiency of the import equivalent) for the last additional lot of goods should not be below 1.

The most rational projects of investments in production for export must be not only efficient but also meet the country's internal needs. This presupposes, first, co-ordination with the entire construction programme, and, second, the comprehensive balance of production and consumption of all groups of goods directly or indirectly linked with exports or imports.

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Co-ordination of investments by sectors, including investments in production for export, their dovetailing with the material and labour resources and also the capacity of the construction industry make it possible to elaborate the entire comprehensive programme of investments in the national economic plan. The result of this work is the national economic plan of investments which contains both overall indicators of the commissioning of fixed assets and the volume of work and also indicators for separate big projects. The plan

of investments of the USSR consists of several sections, the most important of which are characterised by the following indicators:

- 1) assignments for the commissioning of productive capacity and fixed assets by separate sectors, ministries and areas;
- 2) volume of investments and building and assembly work given in the same aspects;
- 3) structure of investments;
- 4) estimates of reserves;
- 5) calculations of unit investments and the economic efficiency of the planned investments;
- 6) itemised construction lists, i. e., an enumeration of the most important projects with a specification of the scale of investments, building periods and designed capacity for each project.

## *Chapter VI* **PLANNING OF LABOUR**

Skilled labour is an indispensable requisite for the functioning of social production. The number of skilled workers must satisfy the needs of the national economy, especially sectors developing at the fastest pace. The training of skilled personnel is a primary requisite for raising the efficiency of production.

Many developing countries are faced with the task of making maximum use of the available manpower reserves, i. e., ensuring the full employment of the able-bodied population.

Soviet national economic planning has accumulated considerable experience in coping with problems of labour and employment. This experience has been crystallised in conditions of the dominance of social ownership of the means of production and planned management of economy on a countrywide scale. The full employment of the labour force creates the conditions for high and stable economic growth rates. That is why the labour plan is one of the leading sections of the national economic plan and is organically linked with its other sections. It is intertwined especially with the production and building plans. The scale of investments and their allocation shape the structure of social production and thereby influence efficiency in the use of manpower. An increase in the volume of production and of productive capacity is accompanied by a rise in the number of employed. In turn, the volume of production and the scale of construction depend on the number of workers, their skill and productivity. The labour plan is also connected with the plan of trade and social and cultural measures, production costs, the introduction of new equipment, the location of production in the country's territory, and so on.

## 1. Content of the Labour Plan

The labour plan as part of the Soviet national economic development plan is called upon to ensure the full employment of the able-bodied population and the manpower needs of the national economy. The training of skilled personnel, in accordance with the demands of modern technology, is likewise planned. Special attention is paid to the use of the labour resources by the country's areas, to the migration of labour between areas and from country to town. Fulfilment of the labour plan has to ensure the steady and swift growth of labour productivity; increase in the number of people employed in the social economy; extension and improvement of the training of skilled personnel; and rise in wages.

The accomplishment of these tasks has its distinctions in different periods of economic development, which is linked with the socio-economic and demographic conditions.

Nevertheless, a combination of a rise in labour productivity with an increase in the number of employed is a characteristic of the Soviet economy. In the USSR an increase in labour productivity does not become a factor which reduces employment. The number of people employed in social production is growing at high rates. In various periods the importance of one or the other factor (growth in labour productivity and increase in the number of workers) in extending production correspondingly either rises or decreases, reflecting the conditions of economic development.

Two types of indicators are used in planning labour in the USSR. One, the broader group, is made up of indicators used in calculating the substantiation of the plan; the other consists of indicators which are targets of the labour plan. This is determined by the specific feature of substantiating the labour plan.

The drawing up of the plan consists of two organically connected stages: an analysis of the use of manpower in the pre-plan period and long-term plan calculations. An economic analysis helps bring out the main processes and also the positive and adverse sides in employing manpower by sectors, the national

economy as a whole and in the territorial aspect. Moreover, a demographic analysis of the labour resources is made and the manpower reserves are determined.

For this purpose a wide system of indicators for calculating the plan is used. They are given in many variants because the designing of a national economic plan includes several variants of using manpower, proceeding from different parameters of developing the national economy. The purpose of the variant calculations is to find the optimal employment of the labour force.

The balance method plays a big part in these calculations. The system of balance calculations enables planners to co-ordinate and reciprocally dovetail the targets for labour in all links of planning — from enterprises to central planning agencies. The overall manpower balance and the relevant calculations establish conformity between the labour resources and the needs of the national economy, the necessary proportions in the use of labour resources by sectors and the country's areas and rational distribution and redistribution of these resources. Balance calculations make it possible to determine the share of the population engaged in the social economy and in full-time study, and the composition of the employed in material production and in the non-productive sphere.

The indicator giving the share of the able-bodied population working in the social economy and studying full-time makes it possible to analyse the level of employment in different areas of the country. By comparing this indicator with the share of employed in agriculture and the service sphere planners establish the nature of employment in one or another area.

Balance calculations bring out the scale of migration from country to town and also between republics and regions. The practical significance of these indicators goes beyond the bounds of planning the rational use of manpower. Thus, the indicator of migration from country to town is important in planning urban development, the building of houses, public utilities, and service establishments, cultural, educational, health and other institutions.

Indicators characterising the sources of the formation of manpower for separate sectors by areas hold an important place in calculations.

Indicators of the labour plan calculations must be closely co-ordinated, ensuring thereby a correct characteristic of the relationship between the manpower resources and the needs of the national economy, between the rise in labour productivity and the change in the number of employed, the training of skilled personnel and the requirements of the economy, the wages fund and the number of workers, etc.

This entire system of calculations covers different aspects of manpower use and is aimed at ascertaining and most fully substantiating the best variant of the plan. Thanks to this substantiation the number of indicators which represent direct assignments of the labour plan may be limited to a minimum. But they are of a directive nature.

This does not mean that the targets envisaged in the plan are achieved in an administrative way. The national economic plan contains a system of economic instruments designed to regulate the processes of population migration, the enlistment of manpower into the key sectors of industry and the national economy. These instruments are the levels of wages differentiated by sectors and areas, development of the public services network, accelerated housing construction, and so on.

The system of materially stimulating the most expedient use of manpower holds an essential place in national economic planning.

## 2. Basic Principles of Planning Labour

The assignments of the state labour plan are formulated on the basis of definite methodological principles.

In the USSR the planned, balanced development of socialist production ensures the full employment of the population and steady rise of its living standard.

That is why a comprehensive approach to considering the factors of growth of rates and scale of production and the factors influencing the use of labour resources is an important methodological principle in

planning labour. Another principle consists in the need to envisage a combination of investments and the use of manpower which ensures the obtaining of goods and services with the least total social inputs. There is an interconnection between the rates of investments, their structure and allocation and the use of manpower. This interconnection is concretely expressed in shaping the determining national economic proportions in the distribution of manpower: between material production and the non-productive sphere, between industry and agriculture; in industry, between the extractive and manufacturing sectors, and so on.

Shaping the basic national economic proportions in the use of manpower presupposes an overall and thorough analysis of the tendencies of these proportions in the past period, and disclosure of the factors which influence their further development and change. The use of balances of manpower and the inter-sector balance expressed in a labour measure (in workers or man-hours) commands great significance in this analysis.

Among the basic methodological principles of planning labour resources is the need to consider not only the economic effect as a whole from fulfilling the labour plan but also the concrete social consequences which may result from the contemplated use of the labour force in separate sectors and regions of the country. This is of special significance in choosing a variant for the siting of enterprises when it is necessary to take into account factors influencing the development of production in the given area, not only in the immediate, but also in the more distant future: the rise in labour productivity, the appearance of new generations of skilled workers and the advance in the standard of living. It is impossible to plan the location of new enterprises without considering the available manpower reserves. Let us assume that a project for building an engineering plant in a definite district is inferior for many economic indicators as compared with variants in other districts. But since the new enterprise ensures fuller employment, the variant less efficient economically may be preferable in some cases (Table 1, p. 144).

Table 1

**Comparative Annual Production Inputs of  
an Engineering Plant**  
(hypothetical figures)  
*thousands of rubles*

	Location of the plant		
	Variant A	Variant B	Variant C
Production inputs, of which	12.1	10.5	11.4
wages	10.8	9.4	9.7
Cost of transportation	0.5	0.4	0.3
Public utility services	0.2	0.2	0.5
<b>Total</b>	<b>12.8</b>	<b>11.1</b>	<b>12.2</b>
Rise in the level of employ- ment of the population in the district (per cent)	47.3	25.7	17.0 *
Rise in the incomes of the population (per cent)	55.6	17.3	25.4

\* Manpower will have to be partly enlisted from other districts.

Taking into account the whole range of consequences of building the new enterprise in a district with substantial manpower reserves, it is expedient to bring production closer to the labour force, i. e., to select variant A. Therefore in choosing a siting variant consideration should also be given to creating conditions for solving an important social problem — achieving full employment — and this ultimately is linked with raising the material standard and cultural and technical level of the population. The state of the labour force, the age-sex composition in separate districts, has also to be taken into account. In this context utmost use of a district's own labour resources, considering the tendencies of their long-term formation, is an important principle in planning.

Ensuring the rational use of manpower presupposes long-term planning. The five-year plan is the basic link of such a system of planning in the Soviet Union. It envisages accomplishment of this task with a view to the possibilities and resources the country has in each given period of economic development.

### 3. Methodology of Calculating Labour Productivity

The method of calculating the saving of working time by factors underlies planning of the rise in labour productivity.

The factors affecting a rise in labour productivity are combined in four groups linked with:

an advance in the technical level of production and the provision of labour with technical facilities (mechanisation and automation, introduction of new types of equipment and production processes, modernisation and renewal of equipment);

improvement in the organisation of production and labour (the introduction of new management systems — automatic control systems and others — elimination of losses of working time, reduction in the number of workers engaged in ancillary processes, rise in workers' skills, and so on);

structural changes in production taking into account the influence of inter-sector and intra-sector shifts;

influence of natural conditions, especially in the extractive industries and agriculture.

To raise the scientific level of substantiating the rise in labour productivity a classification of factors by types is employed, with distinctions for separate sectors: industry, agriculture, construction, transport and trade.

To avoid a possible double count since some measures bring about a saving of working time not for one factor but for several, it is expedient to credit the saving to the factor whose influence is the greatest. Well-organised statistical information ensures reliability and sufficient substantiation of the saving (reduction in inputs) of working time.

To obtain correct results it is expedient to calculate the total saving of labour separately for each factor. Special attention should be paid to a comprehensive

analysis of the attained level of labour productivity, to disclosing the reasons and conditions which hamper an increase in labour productivity, and so on.

The growth of labour productivity for each group of factors is calculated according to the formula:

$$L = \frac{D \times 100}{W - D}$$

where  $L$  — rise in labour productivity,  $D$  — decrease in the number of workers, and  $W$  — number of workers calculated for the volume of production in the plan period according to output in the base period.

First of all, the initial number of workers for the plan period is estimated assuming that the base output is preserved and then the number of workers which can be cut by the contemplated measures is deducted. For example, in the base period the labour force numbered 250,000. Since the plan calls for a 50-per cent expansion of output in five years, all other conditions being equal, the labour force should increase by 125,000 and total 375,000.

The contemplated measures for raising the technical level of production make it possible to reduce the number of workers by 73,000. Moreover, production specialisation cuts the need in manpower by another 13,000. These measures will raise labour productivity by 29.9 per cent  $\left( \frac{86,000 \times 100}{375,000 - 86,000} \right)$ .

To ascertain the influence exerted on labour productivity by factors linked with a reduction of idle time, better fulfilment of output quotas, combining of trades, and so on, account should be taken not of the initial number of workers, but of the reduced figure as a result of raising the technical level of production. Let us assume that these factors will help reduce the number of workers by 12,000, then the increase in labour productivity will be 4.3 per cent  $\left( \frac{12,000 \times 100}{289,000 - 12,000} \right)$ .

The influence of factors linked with structural shifts applies to the number of workers determined under the influence of the factors named earlier. This is understandable, inasmuch as the saving of working time should be calculated in relation to the actual number of workers.

Such an approach to measuring the saving of working time owing to different factors makes it possible to establish more correctly the influence of the whole range of factors on the growth of labour productivity. Moreover, the calculations are based on an estimate of the saving as a result of the influence of factors linked with changes in the technical level of production. The dates for carrying out each measure and the coefficient of its spread effect are considered. The latter characterises the share of the category of workers influenced by the measure.

Planning the level and growth rates of labour productivity for the plan period makes it possible to estimate the number of workers and the wages fund.

#### 4. Shaping an Efficient Structure of Employment in the Economy

Efficiency in the use of the labour force has different aspects. One of them is expressed in increasing the share of persons employed in social production and engaged in study. Another aspect consists in shaping the most expedient proportions of its distribution by sectors of the economy and areas of a country. The structure of employment changes constantly, reflecting the law-governed process of economic development and of technological progress.

The balance method is the main instrument of planning and ensuring the efficient use of manpower and full employment of the able-bodied population. As the scale of social production is extended and its technical level rises and swift qualitative changes take place in the sphere of labour, the importance of the balance method is enhanced. In these conditions even small planning miscalculations may lead to the irrational use of manpower and consequently to the slowing down of the rates of economic and socio-cultural development and of the improvement in the living standard of the people.

Overall balances of labour (manpower) resources and balance calculations are utilised in Soviet planning. These calculations help establish the additional

need in factory and office workers, the sources for covering it, the provision of jobs to young people, the additional need in skilled workers and specialists, sources for satisfying it, and other questions.

Balances are drawn up for the country as a whole and for separate territories — Union Republics, regions (territories), big economic areas and Autonomous Soviet Socialist Republics. They accomplish two tasks. The first is to co-ordinate the labour resources with the need in them so as to ensure full employment. The other is to establish, with the help of balances, the most efficient structure in the use of the labour force. Moreover, balances make it possible to locate production most rationally, to plan the most expedient development of sectors.

A balance of labour resources is a system of tables drawn up in accordance with a definite layout and consisting of two interconnected sections. The first section characterises the number and composition of the labour resources; the second, their distribution and use. The overall balance of labour resources presents data for the base period and for the plan period (average annual figures). The labour resources and their use are examined in the balance separately for town and country.

The first section of the overall balance gives the number and composition of the labour resources, and also the inter-area redistribution of labour resources and the migration of the population from the countryside to the cities.

The second section gives the distribution of labour resources. It makes it possible to determine the proportions and interconnections in the distribution of labour. This section provides for three types of distribution which characterise from every angle the socio-economic aspect in the use of manpower resources:

1. Distribution of labour resources by types of occupation: in the national economy, full-time study, in the household and in personal subsidiary farming. These indicators help establish the ratios between the total labour resources and the part engaged in the national economy, and also the degree of employment of the able-bodied population.

2. Distribution of the employed in the national economy by sectors and spheres: in material production and the non-productive sphere and also within each of them.

A rise of efficiency in the use of manpower in material production presupposes a redistribution of labour from agriculture to non-agricultural sectors; a change of employment in industry as a result of the accelerated development of the most progressive sectors. Industry increasingly takes over functions previously performed by other sectors (construction and agriculture). This makes it possible to perform them with smaller inputs.

The smaller the territory for which the balance is drawn up, the wider the classification of sectors. Such an approach allows for planning comprehensive economic development and establishing a proper ratio between sectors with a predominantly male or female labour force.

3. The third type of distribution of the labour force is by social groups: workers, office employees, collective farmers, artisans united in co-operatives, individual peasants and artisans, families of workers and collective farmers. This part of the balance characterises the social composition of employment. It shows how the relationship changes between the employed in the state and collective-farm sectors, between members of families of factory and office workers and collective farmers; it also gives the number of persons engaged in personal subsidiary farming. This section gives an idea of the share of artisans not united in co-operatives and other categories.

Such data help plan population incomes per gainfully employed person by categories of employed and make other economic calculations.

In their totality these three types of distribution of the employed in the national economy characterise quite fully the use of the labour force. A comparison of data for the plan period with corresponding figures of the pre-plan period help reveal the main tendencies and laws in the use of manpower.

Information on the use of manpower separately in urban and rural localities contained in the balance

allows planners to trace the process of industrialisation and socio-cultural development both in town and country. This also creates the possibility for establishing how the relationship in the distribution of labour in town and country is shaped by separate sectors.

Irrespective of whether they are compiled for the country as a whole or separate territorial sub-divisions, balances are based on common methodological principles, uniform for the entire system of balances.

Long-term balance labour calculations have to be preceded by a profound analysis of labour resources by definite areas in the pre-plan period. Such an analysis helps bring out shortcomings in the use of labour resources and to chart the main trends in the rational long-term use of these resources.

Methodologically, it is expedient to make such an analysis by separate groups of questions which will ensure its greater thoroughness and profundity.

The first group of questions characterises demographic aspects of employment (the size and composition of the labour resources, factors, influencing their movement, settlement of the population and its migration from the countryside to the cities and by areas).

The second group of questions helps establish the nature of labour activity of the population in the economy and the efficiency of its utilisation (distribution of labour resources by main spheres of employment and economic sectors, sex and age composition, use of working time in the main sectors, and so on).

The third and fourth groups of questions are linked with ensuring the needs of the national economy in manpower and disclosing the labour resources which could be drawn into the national economy in the long-term aspect (main sources for satisfying the manpower needs of the national economy; the size and composition of the labour resources not engaged in the social economy or in full-time study; conditions which ensure the possibility of drawing them into the social economy).

An analysis of each of these groups of questions is closely linked with an analysis of the other groups. In their totality they help ascertain the degree of em-

ployment of the population in the social economy and the possibility of ensuring its full employment; provide a sufficiently complete idea of the main problems of utilising the labour resources which existed in the pre-plan period.

In drawing up a balance of labour resources it is necessary to dovetail its indicators with those in all the sections of the national economic plan, and at the first stage of its formulation, with the preliminary estimates of the basic indicators. The latter influence the working out of the labour plan. Technological progress, the introduction of comprehensive mechanisation and automation are displayed in assignments for the growth of labour productivity and the number of factory and office workers and also in the calculation of the number of collective farmers. Ascertainment of the number of employed persons by sectors provides the basis for constructing the balance. In material production the number of employed is established proceeding from the rise in labour productivity and the possible expansion of production. The number of employed by branches of the service sphere is established, proceeding from data on the development of the respective network of establishments and normatives of labour inputs. Each branch has its units in which the normatives are expressed. They are elaborated in a differentiated way for town and country and also by areas (considering the size and density of population and so on). For example, the number of teachers in schools depends on the contemplated number of classes, number of pupils and curricula.

The compiling of a balance must not be reduced to a mechanical computation of separate balance data, to the technique of its construction. The interconnection of indicators presupposes their logical dovetailing, the finding of their best combination ensuring the most rational use of labour resources. It must also be borne in mind that many indicators of the balance are closely interconnected and can be reciprocally substantiated.

It is important correctly to determine in the balance the distribution of labour resources by the predominant (main) type of activity. The point is that in the course

of a year the same persons may be engaged in different types of activity. Thus, in agriculture in the most intensive periods not only those directly engaged in the sector are employed but also workers of other sectors (industry, the service sphere, students and pupils). There is also such dual employment in other sectors. To avoid a double count and ensure the comparability of labour resources with their use the principle of predominant employment is utilised in balance calculations. This, of course, definitely affects the indicators of the real structure of employment, in the first place, the labour inputs in agriculture. Available information about the participation of people from other sectors in agricultural work (in annual reports of state and collective farms and also in reports of industry, and so on) makes it possible to adjust the distribution of labour inputs. Such materials are utilised for calculating the levels of labour productivity and other economic indicators.

Comparability of the labour resources with their use separately in town and country has to be ensured in the balance. The reason for it is that labour resources are calculated for the place of residence, while their use is given for the place of employment or study. The process of so-called pendulum migration takes place. This refers to persons who live in the country but work or study in the city. For purposes of comparability it is conventionally assumed in calculations that all the persons working and studying in cities are classed among the urban population. This makes it possible to ascertain more correctly the degree of employment of the population and its distribution by types and sectors of the economy.

To find the best use of labour resources the variant method is employed. Its essence is as follows. The balance of labour resources represents an economico-statistical model of the employment of labour. It can be used for obtaining different variants of labour distribution in accordance with the main indicators of national economic development (on the basis of the balance of the national economy) and choosing the best one. The latter must ensure optimal rates of extended reproduction, most fully satisfy the material and cultur-

al needs of the population, with the necessary labour inputs and full employment of the population.

In view of the cumbersome nature of balance calculations and the brief periods of plan formulation a limited number of variants is used in practice. But even this yields a big effect, making it possible to bring out the advantages or shortcomings of one or another variant and to select the best one.

The use of a system of economico-mathematical models has recently acquired practical value in optimising balance calculations. Modelling the use of the labour force in material production is acquiring particular importance. To find the most efficient structure of labour inputs in production sectors it is expedient to utilise an inter-sector balance given in labour criteria. This model enables planners to obtain full labour inputs per unit of output. This indicator serves as a prerequisite for finding the best variant of labour inputs in all sectors of the economy for the production of a unit of the final product of a definite structure.

The methodological principles of constructing a balance of labour resources are supplemented by concrete methods and techniques of calculating separate positions of the balance. The available statistical information plays the decisive part in choosing the calculation methods which are constantly being improved.

Drawing up of an overall balance of labour resources presupposes the elaboration of a wide system of tables as a basis for calculating and substantiating separate positions of the balance. Calculations of labour resources are based on estimates of the size of the population in future and also forecasts of possible participation of persons of pension age in the national economy; the number of students 16 years and older engaged in full-time studies; the scale of the inter-regional mechanical migration of population; the distribution of population between urban and rural localities, and so on.

Balance calculations of the additional need in manpower and sources for its provision by sectors are of particular importance in drawing up an overall balance of labour resources. Of great significance is the proper substantiation of the need in manpower by sectors,

taking into account the withdrawal of workers from employment for various reasons (study, retirement on pension, and so on).

Calculations of the provision of jobs for young people are important in the system of labour balances. They make it possible to ensure the drawing of juveniles and young people not engaged in full-time studies in social production and to bring to light possible sources of enrolment for educational establishments engaged in training personnel.

Young people are the main source of replenishing the labour force and the main task of balance computations dealing with the provision of jobs for them is to determine the conditions for utilising this category in the national economy. These calculations help planners to establish the possible number of young people graduating from educational establishments or dropping out for various reasons before completing their studies. Allowing this possibility in advance, the balances provide for drawing young people into industrial training and work. On the basis of these calculations enterprises are given assignments for the enrolment of young people and proposals are drawn up for re-rout- ing young workers to other regions.

The balance of labour resources thus makes it possible to incorporate in the labour plan assignments for providing manpower to sectors and regions with an insufficient labour force, including assignments for the distribution and redistribution of personnel and the placing of young workers.

##### **5. Ascertainment of the Need in Skilled Personnel and Planning Their Training**

Ascertainment of the economy's need in skilled personnel is a basic element of balance calculations for meeting it. Balance calculations dovetail the additional need in personnel with the available possibilities to cover it taking into consideration the respective material facilities. In so doing priority is given to satisfying the needs in skilled personnel (workers and specialists) of key sectors, i. e., those which in the given

plan period are decisive for the successful fulfilment of the entire national economic plan.

The main demand made on the methodology of determining the needs in skilled personnel is that it disclose most fully the influence of different factors on shaping this need. This work is done in two stages: analysis of the changes in the vocational composition of the workers and their skill under the impact of technological progress and the direct calculation of the need by separate sectors during the plan period, considering the trends and scale of technological progress. These calculations furnish the basis for personnel training plans.

*Ascertainment of the Need in Skilled Workers.* The initial moment is provided by an analysis of changes in the vocational composition of workers and their skill as a result of technological progress in the past period.

For these purposes a classification of workers is made. It is based on the production and technical principle which allows the grouping of workers by vocations and specialities according to their relation to the instruments of production and to technology. The leading vocations and specialities are singled out in each vocational group, considering the importance of the vocation in each sector, its spread and prospects in view of technological progress.

The initial material for estimating the number of workers by vocations for the plan period is data on the number and composition of the fleet of machines, plan of organisational and technical measures, projections of the volume of production and labour productivity, rates of labour inputs; in the service sphere, data on the development of the network of enterprises, establishments and organisations.

First the total number of workers by vocations is calculated for the plan period and then the additional need is established so as to meet the increase in the number of work places and replacement of workers due to retirement, transfer to full-time study, and so on.

The main thing in estimating the number of workers by vocations is the choice of the method ensuring the most proper consideration of the sector's specific

features and initial data. In long-term calculations aggregated computation methods are applied which make it possible, depending on changes in the initial data, to prepare several variants of the need in skilled workers. Extensive use is made of empirical dependences of the vocational composition on the level of the technical basis of production.

Particularly intricate is the calculation of the need in skilled workers in sectors where there is no increase but rather a decrease in the number of workers of some vocations. As a result essential shifts in the vocational composition of workers are planned without an absolute increase in their number.

Three methods of ascertaining the number of workers by vocations are mainly employed in different sectors and categories of production depending on the nature of production, the jobs performed by the workers and the available information.

In cases when the labour-intensity of production is calculated the number of workers of respective vocations is obtained on the basis of labour input figures. But these data encompass not the whole range of workers of enterprises and are calculated on a full scale not in all sectors.

In industries and enterprises where processing is done by apparatus or with equipment requiring special technical servicing, the number of workers by vocations is determined on the basis of servicing rates. This group links up with workers engaged in auxiliary and ancillary operations ensuring the continuity of the production process.

In cases when workers directly act upon the objects of labour and their number depends on a change in the scale of production, the manpower need by vocations is estimated on the basis of the available equipment and output quotas.

Calculations of the additional need in skilled workers are highly important for an increase in work places.

In sectors of the economy where the need in workers is determined by the number of work places, their long-term vocational composition is established with the help of the normative of the size and service rates

considering the expansion of the network of the respective enterprises and establishments.

An important methodological problem in estimating the need in workers by vocations is to establish the number of workers in new vocations arising because of technological progress and also released from industry under the influence of mechanisation and automation. Separate calculation of the vocational composition of these categories is of methodological and, moreover, practical importance. Considering the emergent shifts in the technical basis of production and their influence on the number of workers by vocations, measures for the rational employment of skilled personnel have to be planned in advance. For this purpose it is necessary to establish how many workers and in what trades have to undergo retraining so as to be employed at the given enterprises, other enterprises of this sector or in other sectors. Ascertainment of the need in new vocations makes it possible to introduce in good time changes (adjustments) in the composition of persons undergoing training.

The additional need in skilled workers is also estimated in order to replace the retired workers by years of the plan period. Soviet planners methodologically differentiate a natural decrease (caused by death, disability, retirement on pension) and a decrease for other reasons and also manpower turnover. Among the reasons are: transfer to full-time study, transfer to the post of a specialist upon graduation from higher or specialised secondary educational establishment after studying while working; change of vocation or post not linked with the gaining of a special education and also call-up to the army. Turnover of personnel is considered in calculating the additional need if there is a turnover between sectors.

The additional need in workers to replace withdrawal is usually calculated as a whole, without a breakdown by definite vocations. Then the established percentage of withdrawal for separate reasons has to be considered when estimating the number of workers in each vocation. Such computations do not require an absolute degree of precision. For this reason they are made on the basis of aggregated data.

To ascertain the additional need in workers for replacing withdrawal, account is taken of the sex and age composition of the labour force in the plan period, including persons of pension age, improvement of the working conditions, change in the pattern of production and expansion in the scale of higher and specialised secondary education. Corresponding adjustments are made in the respective indicators. Methodologically these calculations present no particular difficulties, and as a result the need in skilled personnel by vocations is ascertained. A plan of training workers by vocations is drawn up on the basis of calculations of the need in skilled personnel, taking into account the analysis of changes in the nature of labour and functions performed by the workers.

An intricate problem facing planners is retraining of the employed personnel in view of the expected shifts in the vocational composition and skills of the workers under the impact of technological progress. Here it is necessary to differentiate between two groups of workers: unskilled and low-skilled, on the one hand, and highly skilled, on the other. While in the first case retraining in fact represents the teaching of new vocations and skills, retraining of skilled workers from one vocation to another may be done directly at enterprises. As a rule, skilled workers learn a new trade which has some features in common with the original vocation.

*Ascertainment of the Need in Specialists.* The need in specialists, irrespective of the sphere of their activity, is determined by the entire planned volume of work and the work performed by each specialist.

The initial moment is the construction of a model showing the use of specialists in the pre-plan period. Such a model helps to bring out the provision of an enterprise, institution or organisation with specialists by vocations and skills during that period. The obtained data serve as a basis for estimating the need in specialists for the plan period. At the same time, it is necessary to analyse the utilisation of specialists.

The need in specialists for new posts should be ascertained separately for operating enterprises, institu-

tions and organisations and for those to be commissioned in the plan period.

Proceeding from the long-term plans of operating enterprises and other organisations and programmes of organisational and technical measures, the necessary changes (increase or decrease) are introduced in the initial number of posts. These data serve as a basis for further calculating the need in specialists. What makes this task involved is that the period for which the need is established does not coincide with the plan period. The main planning period is five years, while the need in specialists should be estimated 8-10 years in advance. This presupposes two methods of considering the relevant factors. For the first five years the need is established for each speciality, proceeding from the detailed projections of the development of production and the non-productive sphere envisaged in the five-year plan. For the next five years calculations are made by an aggregated method for groups of specialities considering the computations made for the first five-year plan and the general trends in the development of the sector.

Moreover, the need is calculated for the sector as a whole applying normatives of the full provision of the sector with specialists.

The choice of a normative depends on the specific conditions of a sector (for example, the number of specialists for 10,000 kw of rated capacity of electric power stations, per 1,000 spindles in the textile industry, and so on). These normatives can be elaborated according to data of the technical designs of enterprises commissioned at the end of the plan period (five years) and be extended to the entire sector. In case no new enterprises are to be commissioned, the normative can be obtained from data of technically and economically advanced enterprises.

Figures of the increase in the number of specialists, obtained on the basis of these calculations, can be broken down by groups of specialities, considering their structure at the end of the plan (five-year) period and tendencies of change during these years.

As for sectors of the service sphere and some other types of activity, the need in specialists for the period

beyond the five-year plan can be calculated by the method used in computations for the first five years.

The influence of technological progress is first of all considered in detailed calculations of the need in specialists for the five-year period. A more intricate nomenclature and assortment of output make for a greater need, because of higher labour-intensity in elaborating the production operations and more complicated control of the production process.

The main factors which reduce the need in specialists are industrial specialisation and co-operation, the change-over to the manufacture of less intricate articles, improved organisation of production management and mechanisation of managerial labour and rise in the skill and general educational level of workers.

In sectors of the non-productive sphere the need in specialists is determined by the size of the served groups, their sex and age composition, the nature of the services and the organisational structure of the service establishments. Ascertainment of the need in personnel for science and scientific servicing is the most intricate problem here.

In sectors where the need in specialists is determined on the basis of staff normatives (education, the public health services, and so on) it can be calculated by dividing the total volume of work in the plan period by the fixed volume of work per specialist.

For newly commissioned enterprises, offices and organisations the future need in specialists can be calculated on the basis of staff estimates in the designs of the construction projects and the staff schedules of enterprises, advanced technically and organisationally, which were commissioned in the last years of the pre-plan period.

Calculation of the need in specialists for replacing their retirement should be made separately to establish the possibilities of natural withdrawal, withdrawal in view of transfer to other sectors, enrolment for full-time study and for other reasons. For the national economy as a whole, such differentiation is of no practical significance; it will be necessary to replace only the natural retirement. But when the need is calculated for separate areas and, the more so, for separate enter-

prises these factors must be considered. For the period beyond the bounds of the five-year plan only natural withdrawal can be determined.

The calculations of the additional need in specialists serve as the basis for ascertaining the scale of enrolment in higher and specialised secondary educational establishments. Data of these calculations can also be used for adjusting the contingents of students at the beginning of the plan period and their redistribution by specialities in accordance with the newly arising needs of the economy.

## *Chapter VII*

### **ECONOMIC INSTRUMENTS OF PLAN IMPLEMENTATION**

Planned management is a characteristic of an economic system based on socialist property, on the general interest in the best use of all the production potentialities for the all-round satisfaction of man's needs. This is displayed in the purposeful, conscious and co-ordinating activity of economic agencies which ensure the dovetailing of the production and commercial operation of every enterprise and association with the general interest of the people.

The machine of the planned management of the economy performs three main functions:

analyses the situation in the economy and the main tendencies of its long-term development;

draws up and makes decisions (in the form of the national economic plan and other guiding programmes);

applies a range of directive and economic measures ensuring the implementation of the adopted decisions.

In the previous chapters we examined the first two functions of planned management while the present chapter discusses the third function, i. e., the system of measures and assignments ensuring the implementation of the national economic plan and the regulating influence exerted by managerial agencies on different stages of the extended reproduction process.

#### **1. Direct and Indirect Regulation**

The experience of economic development in the USSR demonstrates that two methods of regulation — a) direct and b) indirect — can be applied for carrying out the state plan.

The fundamental principle in utilising both methods is centralised guidance of the socialist economic system, i. e., the single trend and co-ordination of economic activity in all its links. This means that in the USSR regulation of economic processes and the corresponding co-ordination of all functioning links of the economy are determined by the general aims and tasks set before the economic system as a whole. Under socialism centralisation of planned management is based on the operation of objective economic laws, the dominance of socialist property and the absence of exploitation. But the methods and forms of the display of centralisation differ, depending on the link of the economy and the tasks being accomplished.

The general function of managing socialist production is exercised by the state. In some cases it acts as the owner of the means of production and regulates relations between society, on the one hand, and enterprises and individual citizens, on the other. Acting as owner of the means of production, the socialist state directly influences the growth rates and structure of the productive forces with the help of centralised investments, credit and reserves; it sets direct production assignments to ministries and, through them, to associations and enterprises. This ensures a single trend in shaping and developing the macro-structure of the economy: national income, funds of accumulation and consumption, major inter-sector proportions, and so on.

State agencies are also able indirectly to influence production by regulating concrete forms of economic relations (including commodity-money relations). For this purpose extensive use is made of the planned formation of prices and rates for services, of finances and the material incentive system.

Direct management methods are expressed in the form of directives — definite assignments and instructions given by higher managerial agencies which regulate and control the design, production, circulation, distribution and at times also the consumption of goods. Direct links between the managerial machine and the corresponding sections of reproduction are intrinsic here. Hence the binding nature of the decisions of

directive bodies. Their decisions and measures must be based on cognition of objective economic laws and be free of subjectivism and voluntarism. Directive forms of management are effective and they are an important instrument in applying economic policy; they are based on the mechanism of the general laws governing socialist reproduction and express the interests of the entire society.

Economic forms of influencing enterprises (associations) correspond to indirect methods of management. With the help of these forms the production process is regulated through various elements of the production relations. As a rule, economic forms of management rest on cognised laws which reflect stable ties in the behaviour of production collectives and individual workers, depending on the material conditions of their activity. The economic forms do not bear a categorical and directive nature.

Both direct and indirect methods proceed from the necessity of co-ordinating the collective and personal interests of the people with the social interests. This makes it possible to utilise most fully the advantages of the socialist mode of production.

The employment of both forms of planned management in regulating socialist reproduction promotes the fullest satisfaction of the needs of all members of socialist society. A primary task of economic policy is properly to combine directive and economic methods of guidance. Direct methods of managing the economy make it possible to concentrate resources in the principal sectors, to win time in solving major economic problems. But these methods to a definite extent restrict the initiative of the lower production links.

It is a distinction of economic methods that they are quite elastic and at the same time operate to a certain extent automatically and generally in the set direction. They encompass a wide range of measures which bring about progressive changes in the pattern of the national economy, contribute to the efficient use of resources for fulfilling big scientific and technological and social programmes. These methods presuppose the extensive use of commodity-money relations, credit,

prices, cost accounting,<sup>1</sup> profit, and the material incentive system. Economic instruments are aimed at exercising thrift, constantly improving production organisation and processes, reducing the periods for the development of new technology and its introduction in the economy, i. e., at stimulating collectives and every worker to expand and improve production, making optimal use of all available resources.

Economic instruments exert a regulating effect on the assortment and quality of output by enterprises, the use of available productive capacity, on labour productivity of the personnel and the development of commercial relations of an enterprise with raw-material suppliers and sales organisations.

In most cases economic instruments assume the form of a definite normative which is set on the basis of the socially necessary labour inputs or indicators of their efficiency (results). These normatives are directly linked with the operation of objective economic laws. That is why the system of normatives must be based not on individual but average sectoral or group inputs. The use of such normatives as criteria for assessing the results of operation and stimulating the collectives of enterprises, for comparing them with individual results of enterprises makes it possible to bring out more clearly and at the same time objectively the best and the lagging collectives. Enterprises where the inputs are below the social normatives will obtain a surplus profit or some other additional result. The system of economic methods ensures the use of part of the additional results for providing greater incentives to the best collectives.

<sup>1</sup> The cost-accounting system (*khozraschot*) is a method of management of socialist enterprises based on commensuration, in money terms, of the inputs and results of economic activity, the covering of the expenditure with the enterprise's income, on the ensuring of profitability of operation and on the provision of material incentives to the enterprise and its personnel. The covering of an enterprise's operating expenses by receipts from the sale of its output and the obtaining of profit distinguish a cost-accounting enterprise from an enterprise or institution which is financed by the state budget. Under the cost-accounting system economic relations are established: a) between separate enterprises and the state; b) between enterprises themselves; c) between enterprise and their personnel.

This greatly enhances the interest of collectives of enterprises in fully utilising the productive resources for extending output, in displaying initiative to improve plant and production methods, raise the quality of goods and better satisfy the demands of consumers.

Economic methods thus help intensify the development of the national economy and promote its greater efficiency.

Economic methods are part of the system of planned guidance. In a number of cases they serve as indicators of the plan and are of a normative nature. There is a tendency to have certain directive targets of the state plan perform the function of economic instruments (this, for example, applies to the profit and profitability targets).

Economic methods exert a regulating influence on production and the sale of goods only if there is a functional connection between the results of operation and the material interest (income) of the personnel.

Two trends in the influence exerted by economic instruments should be differentiated:

a) effect on the interests of a production collective as a whole, stimulating the rational use of all resources of an enterprise through profit, payment for assets and the incentive funds;

b) effect on the personal interests of workers, prompting them to strive for better individual performance (through wages, bonuses, additional holidays, improvement of living conditions and facilities for rest and recreation).

One of the basic demands in applying economic instruments is that they concentrate the initiative of collectives on coping with the plan targets. This is achieved through constant control and corresponding regulation of the entire system of economic management.

## **2. Distinctions in the Development of the Forms of Management**

Every important period in the history of the Soviet economy has been accompanied by definite distinctions in the use of some or other methods of centralised man-

agement dictated both by the specific tasks and the concrete historical situation.

Immediately after the victory of the October Revolution the Soviet Government began to prepare for the extensive use of economic methods of regulating economic processes. Preparations were made for a monetary reform. The objective was to exchange all previously issued money for new currency, to stabilise prices and organise trade. But the outbreak of the Civil War and foreign intervention compelled the government to put off this work. Urgent measures had to be taken to mobilise all the resources for the needs of the front and to cushion the impact exerted on the economy by the deranged monetary and financial system and the spontaneous private market.

At the end of 1917 and early 1918 the state introduced a monopoly of trade in major goods and set stable prices for them. But the limited commodity resources at the disposal of the nationalised sector prevented the organisation of full-scale trade at the stable prices. The demand vastly exceeded the supply. Goods exchange was particularly difficult with the countryside. The government increasingly resorted to direct intervention in economic life so as to organise, in view of the goods shortage, the supply of the front and rationing in interior areas. The working people received rations at low prices. Within the nationalised sector one enterprise handed over its goods to another on the instructions of central bodies without any money settlements. In this situation the issue of money depreciated the incomes of the private sector and served as one of the forms of mobilising the resources of the economy for the needs of the front. The amount of money in circulation grew inordinately. Under the influence of the sharply increased demand prices on the unorganised market reached astronomical figures. Money no longer played the part of a universal equivalent. The entire system of commodity-money relations was deranged.

Barter became the dominant form in the exchange of products not only on local markets but on a country-wide scale as well. A surplus-grain appropriation system was introduced, which provided for the removal

of all food surpluses which the peasants had above the established norms. At the beginning of 1921 the urban working people satisfied their needs mainly with free food rations and public utility and other services. The emergency measures of the state were dictated by the extremely grave situation during the Civil War.

Transition to peacetime conditions made it possible to effect a sharp turn towards a New Economic Policy — NEP. This policy envisaged a livening up of commodity-money relations, utmost and priority development of trade, in the first place between town and country, and an advance, on this basis, of the country's productive forces.

In the new conditions of peaceful economic development the socialist state was faced with a number of new tasks. It was necessary to gain control of the trade mechanism, and undertake to regulate the market and money circulation with the help of systematic and well-conceived economic measures. A serious reform of management was carried out in 1921-1922. State trusts, uniting several enterprises of the same type and also designing organisations, became the main cost-accounting link. Syndicates, functioning on a commercial basis, handled the supply of materials and equipment and sale of goods. New methods and forms of centralised regulation and planning of prices were devised in this period and widely utilised in setting prices. Co-operatives were given the right to set retail prices in accordance with the market situation.

The monetary reform of 1922-1924 which created a stable currency in the USSR was among the primary measures that furnished the requisites for implementing the New Economic Policy. Demand and supply on the market were balanced and prices were stabilised.

During this period special attention was paid to providing incentives with the help of economic instruments, to raising the efficiency of industry and reducing costs. The trusts and associations, operating on a cost-accounting basis, set up during the transition to NEP, proved to be the proper form of coping with these tasks. Some industries which had operated at a loss, after being transferred to cost accounting (1922), began to show a profit.

Improvement of technical and economic operation of state enterprises created favourable conditions for introducing order in the price-formation system. The factory prices of manufactured goods were repeatedly revised downward. Top prices were introduced for a number of goods. The lowering of rail freight rates was of importance in reducing the prices of raw materials such as ores, timber, coal and peat, in the case of which transportation costs make up a big share of the price.

Measures were also taken to stabilise and cut retail prices. Lists of uniform obligatory prices for many types of goods were introduced. State agencies adopted new principles of regulating trade mark-ups. Originally these mark-ups were set in percentage of circulation costs of trading organisations. This, first, did not stimulate the rational organisation of trade and the combating of losses. Second, it did not set a limit to retail prices. The new trade mark-ups were fixed in percentage of the wholesale prices of industry which made for greater efficiency in regulating retail prices.

The New Economic Policy, extensive use, alongside directive methods and planning techniques, of market forms for stimulating the growth of production, the monetary reform and stabilisation of prices — all this made it possible, in a relatively brief period, to regain the prewar level of industrial and agricultural production, to arrange a balanced goods exchange between town and country and raise somewhat the living standard of the working people.

But the task of eliminating the substantial lag of the country's economy behind those of the more developed capitalist states remained unsolved. It was necessary to overhaul the entire economic and social structure of society, to build up a modern material and technical basis and develop science in a brief period. All this demanded improved methods for solving many economic problems, which ushered in a new stage in planned management.

The first five-year plans increased the redistributive functions of central management agencies in view of the need to mobilise accumulations for financing construction in industry on a scale tremendous for those

days. Planned management played an energetic part in the mechanism of reallocating resources between sectors.

The need for concentrating in the hands of central agencies the biggest part of accumulations for accelerating the development of key heavy industries dictated the considerable extension of directive methods of guidance. The state covered the entire expenditure of financing construction and extending the productive assets.

To these ends budget subsidies were also widely utilised which localised in large measure the rise in the prices of goods in view of the increase in production costs. Actually, in the 1930s state subsidies helped create a new system of stable prices, which qualitatively differed from those in the 1920s. Payments from the budget covered all the money outlays of producing enterprises, i. e., ensured the satisfaction of their minimal material needs. Thus, the system of subsidies, notwithstanding its intrinsic serious shortcomings of an economic nature, made it possible to preserve the stability of prices over long periods and to control money circulation in a very intricate situation. All these measures were designated for a definite period.

Progress in industry and the completion of collectivisation in agriculture were accompanied by a noticeable rise in the efficiency of production and consolidation of the country's general economic situation, which was reflected in the system of commodity-money relations. The sphere of the use of economic methods and instruments for regulating and stimulating economic development was gradually extended. But this tendency was interrupted by the outbreak of the Second World War which demanded a tremendous exertion of effort by the people and the mobilisation of all resources for victory over the enemy. Again direct methods of managing the economy had to be employed for coping with these tasks.

They were also preserved in the initial postwar period when the Soviet Union had to restore the national economy, efface the aftermath of the war and step up the growth of its economic potential, utilising the advantages of the new management methods for concentrating resources on key sectors. The winning of time

and acceleration of growth rates of the key sectors were put forward as the cardinal objective.

Tasks of accelerating the growth rates in the living standards of the people and raising the efficiency of production are now put to the foreground. The new situation and new tasks are accompanied by an essential reconstruction of the mechanism of planned management. The paramount task is to utilise most efficiently the available resources for the proportional expansion of all sectors, for ensuring a dynamic balance of the national economy on the highest technological basis and steadily improving the welfare of the people.

### 3. The Present Economic Reform

An economic reform is under way in the USSR which provides for introducing a new system of planning and economic stimulation. Improvement of centralised planning and of the material incentive system meets the present-day conditions and tasks of economic construction.

In the planning sphere the role is being enhanced of long-term plans which provide for the solution of big economic and social problems, progressive shifts in the pattern of the national economy, the introduction of scientific and technological achievements and at the same time create a stable basis for planning at factory level.

National economic planning is also gradually being relieved of the need to handle petty, specific questions, which enables it to concentrate effort on fundamental problems of the proportional development of social production and raising its efficiency.

Transition to the new conditions of management has demanded a considerable improvement of planning finances and credit and fuller use of prices, profit and bonuses.

Under the economic reform, centralised management is able, with the help of a complex of economic instruments, to control and purposefully influence the economic activity of enterprises. The rights of enterprises, in turn, have been substantially expanded, a mechanism

of material incentives to the collective of an enterprise as a whole and individual workers is in operation and it orients enterprises on introducing the most efficient regime of operation.

In this context great importance attaches to the scientifically-based choice of criteria (indicators) for objectively assessing the results of the economic activity of enterprises and materially stimulating their collectives.

The indicator of goods sold and also the indicators of profit and profitability are utilised for assessing the work and rewarding production collectives and, consequently, for stimulating their economic activity.

These indicators do not affect uniformly the economic activity of enterprises. The indicator of output sold, which replaced the "gross output" target, has a number of undoubted advantages as compared with the latter because it reflects the link of production with the satisfaction of society's needs. It thereby stimulates a change of the assortment in favour of goods which are in demand by the consumers and also an improvement in quality. But it should be borne in mind that the indicator of output sold inherited from "gross output" one unpleasant attribute: it stimulates the production of material-intensive goods, of articles made from expensive raw material, and retards the introduction of cheap substitutes or a reduction in the weight of goods. Experience shows that at many enterprises where the volume of output sold serves as the criterion for assessing and stimulating productive activity, the assortment is changed in favour of articles produced from relatively more expensive types of raw and other materials, which quite frequently raises the average price of the produced goods of the given group.

Production at the level of enterprises and associations is stimulated more effectively by targets of profit and especially profitability.

This does not mean that profit becomes the purpose of the productive activity of enterprises. The mechanism of the self-adjustment of enterprises to the most economical regime of work operates within the framework of the state plan, which directs all the links of the national economy to the maximum satisfaction of society's

needs. The profit and profitability targets are objects of centralised planning. In these conditions profit acts, on the one hand, as one of the main ways of realising the net income designated for forming the social funds of accumulation and consumption, and, on the other, as an overall indicator of the results of production.

Profit is the difference between the value of the output sold at wholesale prices and its cost of production. The profit indicator both for its total and its rate stimulates enterprises to raise the economic efficiency of production. The latter reflects the economic effect of increasing the volume of goods sold, reducing production costs and improving quality because, as a rule, higher prices are set for articles with better utility properties. An enterprise receives a profit when the goods have been paid for by the client: this means that it has produced what is needed for satisfying society's requirements.

It should be borne in mind, however, that the target for increasing the mass of profit can be topped not only through better organisation of the production process and tapping all other potentialities, but also with the help of additional investments and the accumulation of excessive productive assets. That is why it is impossible objectively to judge the results of an enterprise's operation only by the actual volume of its net income. To gain a proper picture of the economic activity of an enterprise the size of the obtained profit must necessarily be compared with all the inputs as a result of which it was obtained. That is why in the new system of management the indicator of profitability, i. e., the ratio of profit to the value of the employed fixed productive assets and the rated circulating assets, is also utilised for assessing the work and materially stimulating production collectives.

The material incentive system is a component part of the new mechanism of economic management. The fundamental coincidence of the interests of socialist society and of separate collectives makes it possible to design the material incentive system in a way that it should be advantageous for an enterprise to produce goods most efficient from the viewpoint of the entire economy.

To make a production collective materially interested in profitable operation the following three stimulation funds are set up at enterprises:

- a) material incentive fund,
- b) fund for social and cultural measures and housing construction,
- c) production development fund.

The first fund is designated for bonuses to the personnel of enterprises: the payment of a bonus for the annual results of the economic activity of the entire collective and also of bonuses and allowances to individual workers. The importance of this fund as a material incentive is steadily growing.

The fund for social and cultural measures and housing construction serves as a source for financing the building of children's institutions, sports installations, houses, factory holiday homes and also for improving cultural and other services to the personnel.

The size of these incentive funds is the bigger the higher the profitability of production and the volume of output sold. This makes every worker, engineer and other employee of an enterprise strive for high general performance indicators, for rational and thrifty operation.

The production development fund is made up partly from profit and partly from depreciation allotments and is utilised for financing the outlays of enterprises for modernising equipment, introducing new plant and production processes and improving the quality of output.

After transferring enterprises to the new conditions of management, the growth rates of production and profitability rose and other technical and economic performance indicators improved as a result of moral and material stimuli, rise in the scientific level of planning and labour organisation.

At the same time bonuses and other payments from the incentive funds raised average earnings, especially in the case of engineering and technical personnel who play a leading part in organising an optimal regime of an enterprise's operation.

Economic methods of centralised management are especially effective at the level of production associations. The functions of cost-accounting associations in-

clude questions of technical policy, investments, allocation and reallocation of financial resources through differentiated wholesale prices, organisation of the sale of output and the guarantee of timely settlements with suppliers. This makes it possible to combine the tendency to even out the average sectoral quantitative characteristics of such instruments as price, profitability, payment for assets and allotments to incentive funds with a differentiated approach to assessing the work and rewarding collectives of enterprises.

Further improvement in the use of commodity-money relations within the bounds of centralised planning and management of production is a major requisite for the successful application of new management methods. The reform presupposes definite changes in the sphere of circulation of means of production too. The development of wholesale trade, in turn, sharply raises the question of balancing the demand for, and supply of, means of production. A solution of this question presupposes a considerable improvement of financial planning, specifically the elaboration of the income and expenditure balances of enterprises and associations.

For the efficient work of sectors in the new conditions it is important that all measures for the improvement of planning and stimulation be applied comprehensively, taking into account the intricate interconnections of all sectors in the economy.

#### 4. Price as a Regulating Factor

Consistent implementation of measures of the economic reform presupposes further improvement of planned price formation, an increase in the regulating role of prices and their conversion into a flexible and active instrument of the state plan.

Experience shows that a many-sided, qualitative reconstruction of the operating price-formation system is a key problem of the economic reform. Price must become an important stimulus to greater efficiency of social production, to accelerating technological progress.

The possibilities and scope of utilising economic methods in guiding the socialist economy largely depend

on the way the operating prices are set. The new mechanism of planning and material stimulation can function normally if prices of definite goods are economically justified, well-based and co-ordinated.

The mechanism of planned price formation is being steadily and intensively improved in the Soviet Union. In 1966-1967 a general review of wholesale prices of industrial goods was completed. Work of practical current regulation and improvement of the operating price-formation system continues. A system of long-term prices is being built up. All this work is based on a big cycle of research which has been conducted in recent years and is experimentally being tested on economic-mathematical models. Since price is an object of planning, in other words, a consciously-utilised category, it is possible to reflect in the levels and ratios of prices the interests of all of society, i. e., to take into account the demands of socialism's economic laws.

But price is also a primary element of the market mechanism. Consequently, it comes under the influence of the law of value. To ignore the law of value signifies, in essence, to ignore the objective conditions in which hundreds of thousands of production cells of the socialist economic system, the enterprises, develop. The law of value is the law of the movement of prices in the socialist economy too.

The law of value, expressing the objective interconnection between the interests of separate collectives which realise their output as commodities, orients them on the exercise of thrift. The point is that the contradictory striving of separate enterprises to achieve the most advantageous terms of purchase and sale is balanced in a definite price. Price is not of an accidental, but of a stable, objective nature, i. e., is a law to which the proportions of commodity exchange are ultimately reduced. From this it follows that the relationships of planned prices of separate commodities must correspond to the proportions of the inputs objectively needed for their production.

The socially necessary normative of inputs emerges in the course of manufacturing the main mass of goods of the given type under normal conditions of production with an average level of skill and intensity of labour.

Practically this normative is close to the average sectoral figure. From recognition of a single normative of inputs follows the conclusion about the objective nature of the average sectoral norms of production inputs and the net income of an enterprise.

In recent years Soviet economists and industrial executives have paid special attention to considering the quality of substitute goods in price formation. In the past enterprises which improved the technico-economic parameters of their goods frequently were harassed by financial difficulties because their additional expenditure was not compensated in the price. Today in substantiating prices the prevailing approach is to consider not only the production costs but also the use properties of the goods.

Use value is a definite totality of the useful properties of articles which satisfy man's material or spiritual requirements. The unity and interaction of use value and value makes the producers watch the qualitative side of labour, its usefulness. If this connection is upset for some reason, for example, when the price does not reflect the use properties, the result is that enterprises are not interested in improving the quality of their goods.

Consumers are first of all interested in the use properties of the goods and then in the price. The cheapest articles will not be sold if their use properties do not meet the needs of the consumers. This formulation of the question by no means implies that the value of commodities disappears or is replaced by the category of utility. Both sides of a commodity really exist and depend on each other. Practically this means that goods of better quality as compared with the mass of output used for the same purposes must, as a rule, have a higher wholesale price. In this case enterprises will be materially interested in undertaking the production of new goods with improved use properties and in modernising traditional goods.

There is always an objective ceiling to the mark-up in the price for improved quality. This ceiling is the level at which it is equally advantageous in the economy to utilise the old and improved article. This means that the entire effect of raising the use

properties is incorporated in the wholesale price and remains completely with the producer. This raises an intricate task before the planned price-formation system — to master the methods of analysing and calculating the economic efficiency in the use of substitute goods. Without such information it is impossible successfully to manoeuvre with prices and utilise them as an instrument for economically influencing the composition of the demand and supply.

What makes the question intricate is that the level, the magnitude of the use value depends not only on the material characteristics of the article, but also on the sphere and method of its consumption. For example, it is not always possible to assert that seamless pipes are of a better quality than electric-welded ones. In some spheres of consumption, for example, in water mains seamless pipes yield no additional effect as compared with welded, while in the production of high-pressure boilers only the former are utilised. Here the social utility of seamless pipes is much higher. Thus, the price must consider not only the improved technico-economic parameters of the goods but also the effect practically realised in consuming this output in different sectors of the economy.

Study of the regulating effect of the planned price on the demand and supply is the more important as the different sides of the Soviet economy are more balanced and the sphere of commodity-money relations is extended, specifically with the development of wholesale trade in means of production. The overall balance or equilibrium of the demand and supply decisively depend on three factors: the level of production, the sales prices and the money resources of the consumers.

Price formation is assigned quite an important role in the mechanism of balancing the composition of demand and supply. This composition can be upset (and is often actually upset) within the framework of their general equilibrium. Here are two typical instances: the first is when the cause of such a discrepancy is the disproportion in the material composition of the output, which, in turn, is frequently the consequence of different profitability in producing various articles owing to the inconsistent structure of

prices. Another reason for disproportions is the upsetting of the relationship of prices for substitute goods when the substitute article is artificially made cheaper and the sale of the traditional goods encounters difficulties. In such a case a corresponding change in the relationship of prices is needed, considering the social efficiency of these substitute materials. This will restore the equilibrium between demand and supply and create prerequisites for introducing economic methods of regulating the manufacture and distribution of the given articles.

### 5. State Regulation of the Use and Distribution of Manpower

State control over the most rational use of manpower in the national economy is effected in a centralised way in the USSR. The People's Commissariat of Labour, set up in 1917, immediately after the October Revolution, was the first state body engaged in regulating the distribution and utilisation of the country's labour resources. It was charged with a wide range of duties in the sphere of wages and labour protection, the state regulation of relations between labour and capital, control over the observance of labour laws and explaining their application and ascertaining the manpower needs of industry, agriculture and trade. Subsequently it also had to draw plans of labour and perform other duties. It had a ramified network of organisations in the localities.

Labour exchanges played a special part among the local agencies. They were of particular importance up to 1929, in the period prior to the First Five-Year Plan. They acted as intermediaries in hiring workers and also recruited workers for all industries. But they played their biggest part in studying the demand for, and supply of, labour, in keeping check of unemployed who were getting relief and in keeping records of labour resources and distributing manpower in a planned way to all sectors of the economy. One important function of the labour exchanges was to inform the population about the demand for workers, for which

purpose special bulletins on the state of the labour market were issued.

At the end of the 1920s when the First Five-Year Plan was being drawn up, the People's Commissariat of Labour elaborated plans of providing manpower for industry and transport by vocations and skills at the area level. These plans envisaged the release of surplus labour from enterprises, the sending of workers to enterprises in need of manpower, the redistribution of skilled workers between areas and the training of skilled personnel. The People's Commissariat of Labour did a tremendous amount of work in keeping an account of the labour resources by areas.

In subsequent years state agencies which performed certain functions in regulating the use of labour resources were modified as the conditions in the country changed.

At present these functions are exercised by State Committees for the Use of Labour Resources set up at the Councils of Ministers of the Union Republics.

One of the primary tasks of these Committees is to study the labour resources by areas and draw up proposals for their rational use and distribution. They keep an account of the persons who have to be provided with jobs, ascertain the needs of definite areas in more work places and, on the basis of the balance of labour resources, offer their opinion on draft plans for the development of one or another area (especially the siting of enterprises) from the viewpoint of the manpower factor. For this purpose the size and composition of population, including persons not engaged in social production, are comprehensively analysed and the migration of population and the turnover of manpower and its causes are studied.

The Committees draw up economically grounded recommendations as regards the main trends for the rational use of labour resources by definite areas and also proposals for the current solution of problems of job provision.

One of the important functions of the Committees is to inform the population about the manpower needs by areas, indicating the vocations, living and working conditions in the respective regions.

The lower link in the system of state regulation of the distribution and use of the labour resources concentrates efforts on keeping an account of the population which could be drawn into social production under definite conditions (care of children in pre-school institutions, the availability of work near the home, and so on); the local Committees help in job provision, inform the population about the needs in personnel, study the labour resources of concrete areas and strive to ensure the fulfilment of the plan for the organised recruiting of manpower and the resettlement of the population.

Vocational guidance of young people and the solution of other problems which ensure the rational employment of the population are becoming an important function of the State Committees for the Use of Labour Resources.

## *Chapter VIII*

### **ORGANISATION OF PLANNING AND CONTROL OF PLAN FULFILMENT**

The present organisation of Soviet planning is a product of prolonged historical development. Planning is done simultaneously in three aspects — national economic, sectoral and territorial. The experience of the Soviet Union and other socialist countries shows that the drawing up and fulfilment of national economic plans requires the establishment of special state planning agencies and also of planning agencies within the system for managing sectors and enterprises.

#### **1. Structure of Planning Agencies**

The direct work of planning is done in the USSR by the following planning agencies: state (State Planning Committee of the USSR, State Planning Committees of the Union and Autonomous Republics, planning commissions of executive committees of territorial, regional, and district Soviets of Working People's Deputies), departmental (planning-economic boards and divisions of ministries and departments) and industrial (planning departments of enterprises and organisations).

State planning agencies are divided into three groups — all-Union, Republican and local. Organisationally, they represent a single system. Their common task is to formulate comprehensive economic development plans (respectively for the country as a whole, for a Union or Autonomous Republic, territory, region or district) and verify their fulfilment.

The State Planning Committee of the USSR Council of Ministers (USSR Gosplan) is the all-Union central agency of national economic planning. It is subordinat-

ed directly to the USSR Council of Ministers and engages in general state planning.

The USSR Gosplan concentrates attention on ensuring proper national economic proportions and links, raising the efficiency of social production and finding resources for the accelerated growth of the national income and improving the standard of living. It ensures the methodological and organisational unity of the entire planning system. The USSR Gosplan draws up the national economic plans and, moreover, controls their fulfilment. In this respect special attention is paid to the timely commissioning of productive capacity and the organisation of the manufacture of new goods. The USSR Gosplan elaborates measures for the timely prevention of disproportions in the development of the national economy which may arise during plan fulfilment.

Special functions in national economic planning are also performed by the State Committees of the USSR Council of Ministers — for construction, science and technology, and material and technical supply. Their names indicate the functions they are assigned in the system of state guidance of the economy.

Ministries and departments engage in planning the development of their respective sectors, jointly with the USSR Gosplan and other planning agencies. USSR ministries guide production and also the activities of research and design organisations in their respective sectors.

Local economic bodies and local planning commissions engage in territorial planning. Regional, territorial, city and district planning commissions draw up draft plans of economic and cultural development and submit them for approval to the corresponding executive committees of local Soviets. After approval these plans are sent to the higher planning agencies.

The sectoral principle of industrial management has substantially raised the role of the Gosplans of the Union Republics as state agencies which, on the basis of a thorough study of the potentialities and needs of a republic, determine the most expedient proportions in the development of its economy, efficient location of

the productive forces, ways for comprehensive economic development in combination with expedient specialisation in the countrywide division of labour. The Gosplans of the Union Republics have the task of ensuring the proper combination of the sectoral and territorial principles of planning.

The Councils of Ministers of the Union Republics examine the draft plans of enterprises on the territory of the Republic, drawn up by USSR ministries and departments and submit their proposals on these plans to the USSR Council of Ministers and to the USSR Gosplan.

## 2. Types of Plans and Their Interconnection

The system of plans in the Soviet Union and the way they are interconnected can be pictured as a pyramid, the base of which is made of plans of production enterprises; plans of production associations and then of central sectoral organisations come within the part of the pyramid covered by sectoral planning; another part, pertaining to territorial planning, covers the plans of the respective planning agencies, including plans of the Union Republics. Lastly, at the apex of this pyramid is the state plan for the development of the national economy of the USSR.

The state plan is drawn up both in value terms and in physical terms — the quantity of some or other goods which have to be produced in the plan period.

The national economic plan is a composite of the assignments for the Soviet national economy as a whole and for separate sectors in accordance with the aims set before the economy for the given plan period. For convenience these assignments, which are also called plan indicators, or targets, are grouped by separate sections. The structure of the state plan naturally depends on how developed the national economy is, on the social and sectoral structure of production, and also on the aims and tasks of the plan.

Sections connected with long-term social development hold an important place in the state plan. They envisage a further growth in the incomes of the people,

the development of science, culture and the health services.

In socialist society the people's standard of living rises on the basis of technological progress and improved production methods, chiefly through an increase in labour productivity. That is why in all sections of the plan great attention is paid to raising labour productivity.

A national economic plan necessarily has sections which chart the development of industry, agriculture, transport and communications, foreign trade, material and technical supply, retail trade, the development of separate economic areas and also improvement in the living standard. The general section consists of the overall national economic development plan which includes the main indicators of material production, labour and wages, finances, cost of production and accumulations.

The sectoral design of the national economic plan reflects the real forms of the social division of labour and specialisation of the production apparatus — of industry and other sectors of the economy.

The plan of an enterprise is the primary link in the entire system of sectoral planning. The plan of an enterprise envisages the volume of output and dates of production, the needed productive resources and also rational economic relations with other enterprises and organisations, and lastly, financial indicators of economic activity.

Plans of the managerial middle link (firms, associations) aggregate these plans and incorporate a number of new elements in co-ordinating the activity of enterprises under their jurisdiction; they solve questions of production specialisation and co-operation, technological policy and also labour remuneration, prices, sale of output, and the like.

Plans of central economic bodies (ministries, chief boards) represent comprehensive programmes for the development of the given sector. They envisage the volume of output of the main goods in the given sector, the wages funds, technical re-equipment of operating enterprises, specialisation, co-operation and integration of production, new construction, taking into account

better use of operating capacity and fixed assets, and financial indicators.

Sectoral plans provide for priority growth of the most efficient lines of production and technologies, greater specialisation and co-operation within sectors, mechanisation and automation, the manufacture of the more important, new machines, mechanisms, equipment and materials and consumer goods. Much attention is paid to working out and applying progressive input rates of materials, fuel and labour, rationally using productive capacity, raising labour productivity and cutting costs.

All plans of separate sectors are strictly co-ordinated and they make up a single economic plan. Only precise co-ordination of sectoral plans creates that consciously maintained proportionality in the national economy which is a paramount feature of socialist planning.

For all the importance of sectoral planning it does not encompass many questions of the economic relations in industry within a territory. That is why sectoral planning has to be combined with territorial planning by economic areas. This above all is dictated by the fact that every enterprise has more or less developed relations with other enterprises in the given economic area. Moreover, the need for an economic area (territorial) plan is determined by the existence of enterprises of local and republican subordination which are not covered by centralised sectoral management.

### 3. Sequences of Plan Formulation

The principle of democratic centralism underlies the process of drawing up and approving national economic plans. The democratically elected guiding bodies of the country after a thorough analysis of the results of development in the preceding period, assessment of the main resources and potentialities of the economy begin to draw up draft Directives for the new five-year plan. The highest management and planning agencies and also research organisations take part in this work. The draft Directives of the country's leading bodies formulate the basic, economic and socio-political tasks

for the coming period, chart the main trends in economic development, outline major proportions, volume of production and growth rates of large sectors of the economy. Millions of people take part in discussing these drafts.

The countrywide discussion of the draft Directives of the plan is consummated by their examination at a Congress of the Communist Party of the Soviet Union. The Congress makes a decision on this draft and commissions the USSR Council of Ministers to ensure, on the basis of these Directives, the formulation of the national economic development plan, with a breakdown by years, ministries, departments and Union Republics, and to submit it for consideration to the country's highest legislative body, the Supreme Soviet of the USSR. For these purposes the planning agencies draw up initial variants of the plan which determine the place and role of every sector and economic region in the country's economic development.

The main indicators, outlined in the Directives, serve as the initial basis for drawing up draft plans by sectors, Republics, economic regions and enterprises. Detailed draft plans elaborated by enterprises form the basis for plans of ministries, departments, territories, regions, Autonomous and Union Republics. The USSR Gosplan, enlisting the services of a number of central institutions and departments, co-ordinates and dovetails these drafts, compiling the draft national economic development plan of the USSR as a whole. After approval by the USSR Supreme Soviet, the assignments of the national economic plan are passed down to the management bodies and enterprises that have to carry them out. Furthermore, on the basis of state plan assignments the enterprises prepare full-scale plans of their production and economic activity. The principle of democratic centralism is also observed in the course of plan fulfilment, creating the best conditions for rationally combining the interests of society, a collective and a worker.

National economic development plans are of a directive nature. They are approved by state bodies and become binding assignments. Approved plan targets of an enterprise can be changed only in exceptional cases

after a preliminary discussion of the matter with its management in a way and periods fixed by the USSR Council of Ministers. If plan assignments are revised all interconnected indicators of the plan and all settlement of an enterprise with the budget have to be adjusted simultaneously.

Combination of current (annual) planning with the formulation of long-term plans is an important principle of the Soviet planning system. Historically current plans arose first. These were plans of the production and distribution of major goods.

At present the five-year plan with a breakdown of major assignments by years is the basic form of planning. Annual plans specify the assignments contained in the long-term plan; they take into account the course of fulfilment of a long-term plan, new requirements of society and the achievements of science and technology.

Long-term plans reflect fundamental socio-economic tasks of the country's development, they incorporate big investment programmes ensuring the application of the latest scientific and technological achievements, set national economic proportions and the structure of social production, the level of the national income and welfare of the people.

As the rates of the scientific and technological revolution are accelerated and the sphere of its impact on society's life is widened, practical needs insistently face planning and scientific institutions with the task of long-term forecasting and the elaboration of sufficiently grounded and reliable hypotheses of technological and economic development.

A long-term plan is designed in two stages. At the first stage central planning agencies construct an aggregated model of the plan which offers general guidelines as to the trends and growth rates of the economy in the period covered by the plan. Aggregated plan projections, after their examination and approval by the country's leading bodies, are passed down to economic agencies and enterprises. Next comes the formulation of a full-scale, i. e., detailed plan by all the links of planning and economic agencies.

The designing of a long-term plan in two stages is an important organisational principle, which makes it

possible to take fuller account of the potentialities and reserves of production.

A major rule in working out the assignments of the long-term plan by years is to ensure the rhythmic and proportional development of the economy, which presupposes the balancing of the plan for every year. But naturally, even given very high precision in formulating the long-term plan all changes in economic life cannot be foreseen. Therefore the adjustment of the annual assignments is inevitable. Changes in the plans of consumer goods production in conformity with the changes of orders of trading organisations are introduced by the enterprises themselves within the bounds of the profit targets set by the plan.

#### 4. Plan Indicators

Assignments of the national economic plan make up the basis of the plan for an enterprise's operation. The organising role of this plan is displayed along two lines. First, the plan provides the basis for organising the production process within an enterprise or another economic unit. Second, under a highly developed social division of labour, which is a characteristic of the socialist economy, every enterprise can function only by exchanging the results of its activity with other sections of the economy. The plan of an enterprise determines its economic relations in the national economic system.

The plan targets, which fix the production assignments and the economic side of the production process within an enterprise, are examined and approved by the head of an enterprise.

The plan reflects the interconnections of shops and sections in compliance with the demands of technological progress. The production plan, say, of an average-sized engineering plant encompasses the manufacture of tens of thousands of parts which pass numerous phases of production and, within them, hundreds of thousands of processing operations. All these processes must be co-ordinated in time and in space by observing proportionality between the scale of work and the productive capacity.

The indicators which determine the relations of the given enterprise with other enterprises and organisations contain only data necessary for shaping national economic proportions, for organising the production links of enterprises and determining the economic relations of the given production collective with society, of the enterprise with the state.

These indicators of an enterprise's plan include:

*production* — the volume of output sold at operating wholesale prices. The volume of goods sold is determined without the cost of intra-factory circulation, i. e., without the value of articles of its own production designated for further processing within the given enterprise;

*labour* — only one indicator is approved: the total wages fund. This enables an enterprise itself to decide on the size of the personnel and to manoeuvre with the average wage within definite bounds. Approval of the wages fund enables it to ensure proper relationship between payment for work and the main quantitative and qualitative targets of the enterprise's operation (growth in the volume of output, profit, and so on);

*finance* — the total sum of profit and the target of profitability (the ratio of profit to the sum of the fixed assets and the rated circulating assets); payments into the budget (for example, payment for assets) and appropriations from the budget. The profit target takes into account the net income created at the enterprise, stimulates an improvement in the quality of goods and the manufacture of new, more progressive articles.

The profitability target is given in the form of the ratio of profit to the average annual value of the fixed productive assets and rated circulating assets;

*construction* — the total volume of centralised investments, including building and assembly work, the commissioning of fixed assets and productive capacity on account of centralised investments;

*introduction of new plant* — assignment for the mastery of the manufacture of new kinds of goods and the introduction of new production processes, comprehensive mechanisation and automation of particular importance for the development of the sector;

*material and technical supply* — the volume of deliveries of raw and other materials and equipment to an enterprise which are allocated by a higher organisation.

The targets set to an enterprise are given in the annual plan, as a rule, with a breakdown by quarters, while production assignments in physical terms in exceptional cases are also given with a breakdown by months, taking into account the contracts for the delivery of goods concluded by the enterprise.

All the other indicators of an enterprise are not subject to approval by higher organisations and are drawn up by the enterprises themselves and are used by planning agencies as calculating material in formulating the plans.

## 5. Control Over Plan Fulfilment

In verifying the fulfilment of national economic plans, planning agencies pay special attention to analysing the data characterising the solution of major economic problems and the development of the key sectors.

The USSR Gosplan and the Gosplans of the Union Republics analyse above all the fulfilment of the overall indicators of the state plans on the basis of data of central and republican statistical agencies, and thoroughly verify the implementation of directives and decisions of leading bodies. Ministries and managerial agencies of enterprises constantly control plan fulfilment for a wider range of technico-economic indicators which characterise the operation of every enterprise, shop or construction site. But all of them utilise the uniform general methodology of analysis and methods of organising the verification of plan fulfilment.

A study of all aspects of production and financial activity and an analysis of the indicators of the work of a sector or the economy of a republic are made for all interconnected indicators. Verification of plan fulfilment must be comprehensive, that is, encompass all the sections and indicators of the plans.

An analysis of plan fulfilment must not be of a statistical nature which merely registers the results of operation but should be scientific and based on a profound study of the dynamics of the economy, its practical achievements and advanced experience. Such an analysis furnishes the necessary material for bringing to light the potentialities of production and formulating new tasks of economic development.

The main practical way of verification is to compare figures of the plan and of actual performance. In analysing the operation of enterprises and ministries the actual figures are usually compared with similar average indicators for the sector as a whole and with data of the advanced enterprises. The balance method is widely employed in checking the fulfilment of national economic plans.

The annual report and the bookkeeping balance sheet, which characterise from every angle the production and economic activity of an enterprise, make up a major document reflecting the results of an enterprise's economic activity.

State statistics serve as the main instrument for verifying and analysing the fulfilment of economic plans. The Government of the USSR, the USSR Gosplan, the Councils of Ministers of the Union Republics, ministries and departments receive from the Central Statistical Board of the USSR (CSB), and its agencies the necessary statistical data on the fulfilment of national economic plans for the country as a whole and for separate enterprises, sectors, republics and also the other statistical information needed for managing the national economy, formulating plans and verifying their fulfilment. The CSB, with the help of its apparatus, both in the centre and in the localities, arranges censuses, periodic surveys and other statistical work needed for planning agencies. To improve planning and control of plan fulfilment in present-day conditions statistical information reflecting both the quantitative and qualitative characteristics of processes in the economy is needed. This is achieved by widely employing electronic computers.

Many important decisions on economic questions are taken by the Soviet Government on the basis of an

analysis of the development of various sectors of the socialist economy. These decisions provide for a system of measures, at times to be carried out over a number of years, designed to develop separate sectors in order to meet the demands of the entire economy.

Verification of plan fulfilment includes, alongside a study of how targets are met, a check of how government decisions and instructions on economic matters are carried out.

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The principles of national economic planning in the USSR are constantly being enriched both in practical activity and theoretical studies. The 24th Congress of the CPSU, held in 1971, attached great importance to further improving the planning system in the Soviet Union. The Congress resolution orients planning agencies on raising the scientific grounding of plans and the degree of balancing all their indicators at all planning levels. In view of the greater significance assumed by the socio-economic aspects of the country's development, the Directives of the 24th CPSU Congress provide for thorough elaboration of the socio-economic sections of the plan. As interrelations in the economy become more intricate greater attention has to be paid to questions of inter-sectoral planning, and the bigger role assumed by intensive factors of economic growth dictates an improvement in planning scientific and technological progress.

Each of these trends in the advance of planning was discussed at the 24th CPSU Congress. In substantiating plans the task is to improve the methods of determining the needs of the economy in means of production and elaborating technically sound input norms of raw and other materials, fuel and electric power and also normatives of the use of plant and particularly to ensure the fuller co-ordination of the volume of production and construction and other plan targets with the material, technical and financial resources. For these purposes economico-mathematical models, modern computers and means of communication are to be em-

ployed in formulating plans at all levels in 1971-1975.

Work of developing and introducing automated planning and management systems for sectors, territorial organisations, production associations and enterprises will be conducted on a wide scale during the current five-year period. The ultimate aim of this work is to create a nationwide automated system of collecting and processing information for planning, management and statistics. It will be based on a state network of computation centres and a unified automated communication system.

The 24th CPSU Congress devoted much attention to problems of ensuring the implementation of economic development plans, specifically questions of economic incentives to plan fulfilment, stimulation of scientific and technological progress, the provision of a system of economic stimulation at all levels, from the enterprise to the ministry, to achieve the best results and efficiently utilise material resources and investments. Wider use is to be made of the financial and credit mechanism for accelerating technological progress and intensifying production.

Management of enterprises will be improved, and direct ties between them will spread. Transfer to the new system of planning and economic stimulation will be completed at all enterprises in all sectors of material production, research and design organisations and service establishments. The state planning system will exercise stricter control over plan fulfilment and elaborate measures for the timely coping with the plan targets.

Greater efficiency of current and mid-term planning hinges on an improvement of long-term planning. The Directives of the 24th Congress provide for the formulation of a long-term national economic development plan of the USSR; forecasts of scientific and technological progress, growth of population and natural resources are to be utilised in preparing this long-range perspective of the country's advance in every sphere of life.

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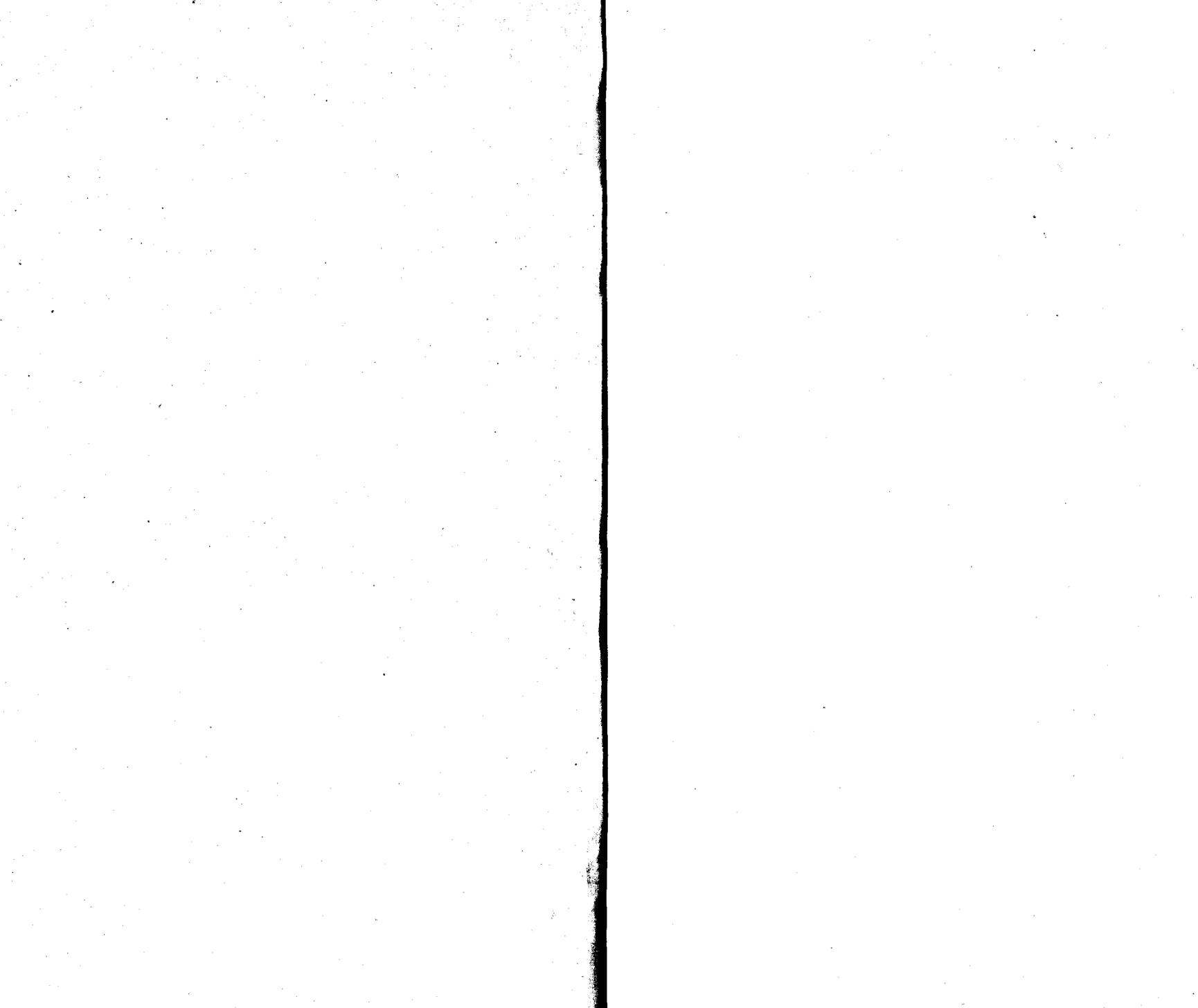
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## INTRODUCING THE AUTHORS

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All the authors have been working for a long time on the methodology of planning and have participated in many international seminars and symposiums.

This monograph expounds in brief and lucid form the principles of scientific planning in the Soviet Union. The authors outline the basic theoretical postulates of socialist planning and the practical techniques of formulating national-economic plans. They trace the progress of planning in the Soviet Union and its ties with the solution of definite social and economic problems, and describe its present level and trends. The subject matter is presented in a sequence which follows the logic of the planning process as such.



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