

**SOVIET  
ECONOMIC  
REFORM:  
PROGRESS  
AND  
PROBLEMS**

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- This book, written by a group of prominent Soviet economists, sums up the experience of work in the new conditions introduced by the economic reform. The authors examine questions of further improving the forms and methods of organisation, planning and economic stimulation; they lay emphasis on the most general, global questions of the mechanism of the economic reform.

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**ЭКОНОМИЧЕСКАЯ РЕФОРМА В СССР:  
ЕЕ ОСУЩЕСТВЛЕНИЕ И ПРОБЛЕМЫ**

*На английском языке*

First printing 1972

*Printed in the Union of Soviet Socialist Republics*

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A deep-going all-round economic reform has been under way in Soviet industry since 1966. Its main purpose is to raise still higher the efficiency of production and the people's standard of living. The means for accomplishing this task are an improvement in the organisation of management, planning and economic stimulation, proceeding from the demands of the scientific and technological revolution and the achievements of economic science and practice.

Most of the industrial enterprises have been working in the new way since 1967-1968. A generalisation of the experience of this work makes it possible definitely to state that the reform has justified itself and that the Communist Party has correctly assessed the situation and charted the true course. Labour productivity and accumulations have begun to increase more swiftly and greater attention is paid to the quality of output. One important result of the reform is that it develops in the people a sense of greater responsibility for their work, for the activity of their enterprise as a whole; the reform is a new step in enrolling the masses in managing production and improving the entire system of social relations.

The reform is a prolonged process and not a single action. Hence it is natural that not all the questions have been solved so far.

Decisions of the 24th CPSU Congress point to the need for further improving the system of planned guidance, extending the economic methods of management and raising the efficacy of material and moral stimulation. Soviet economists are engaged in extensive exploration of ways for developing the reform, making production collectives more interested in promoting scientific and technological progress.

The development of the reform demands theoretical studies of a global, systemic nature.

The monograph describes the new mechanism of the functioning of the socialist economy, including a general characteristic of the main principles of management, the place of planning and stimulation in management, an analysis of the problems of long-term sectoral and territorial planning and the policy of technological progress and investments.

The book naturally does not lay claim to a final solution of the problems raised in it. The authors will consider their task accomplished if they succeed to some extent in contributing to the further development of the new management methods.

## CHAPTER 1

### MANAGEMENT OF THE SOVIET ECONOMY TODAY: BASIC PRINCIPLES

The interconnections between society as a single entity, on the one hand, and enterprises as parts of this entity, on the other, which arise in the process of production, distribution and exchange of material goods are a major part of the socialist relations of production. The development and improvement of these ties helps fuller to realise the tremendous advantages of planned economy and to set into motion socialism's inexhaustible creative forces.

Hence the great importance acquired by the relationship of state planning and the economic independence of enterprises. The purpose of the measures to improve management, now being effected in the USSR, is to elaborate such a system of planning and stimulating production as would contribute to the utmost to applying the principles of democratic centralism in managing the socialist economy.

#### **1. Leninist Principle of Democratic Centralism in Managing the Socialist Economy**

The joint labour of many people inevitably gives rise to the function of managing it. The management methods are of an historically concrete character: they change depending on the mode of production, reflecting the nature and level of the productive forces and the production relations. The Leninist principle of democratic centralism is the basic principle of managing the socialist economy: it provides for the organic combination of centralised guidance of the economy with maximum stimulation of the initiative of enterprises and the constructive effort of the people.

The objective need for centralised management of the national economy follows from the present state of the productive forces. Large-scale specialised and integrated enterprises which serve a broad market play now the leading part in the economy of highly industrialised countries.

Modern social production does not brook fragmentation, although the latter does exist under capitalism. Today the production process is marked by a high degree of socialisation, internal cohesion and the interconnection of many enterprises scattered over vast territories. It is made up not of a sum of isolated units of a natural economy and not of a totality of enterprises engaged in small-scale commodity production which need coordination only within the bounds of the local market, but of production on a national and partly on an international scale with its own specific features and demands.

The law that a whole is bigger than the sum of its component parts operates in the economy, just as in nuclear physics. In other words, a national economic, centralised approach yields a higher economic growth than the autonomous development of units or the resultant effect of the spontaneous operation of a mass of production cells. Moreover, the objective demands of centralisation, which stem from the present state of the means of production, are becoming ever stronger and inexorable. The imperative force of the objective need of society in the unity of economic management and its planned development grows correspondingly.

In developed capitalist countries the socialisation of production has reached a level which requires general guidance. Big factories have become part of the even larger corporations and trusts. Sectoral associations of capitalists have arisen, international monopolies and international associations of capitalists have spread. They draw up recommendations for the expansion of separate corporations in the light of the general forecasts of the dynamics of industry and the entire economy. But the initial information received from separate corporations actually conceals more than reveals their resources and aims. Under capitalism, economic development forecasts are little grounded, they are not binding and are of a consultative, optional nature.

Enhancement of the economic role of bourgeois states

has become a natural tendency. The traditional tasks solved by them, reduced to the protection of capitalist property, to augmenting it within a country and beyond its bounds, have been supplemented by new ones. They consist in ever more direct intervention by the state in the economy, which reflects the gigantic socialisation of production. Concentrating in their hands huge money resources received from taxes and other revenue, bourgeois states are able to finance many spheres of research (especially military), develop spheres whose effect is quite remote and involves a big risk, and to nationalise some sectors. The state tries to regulate the market by its orders, public works, and to accelerate the renewal of fixed capital with the help of its taxation policy.

The views of many bourgeois economists have noticeably changed. While formerly they advocated non-interference in the economy, "improved competition" based on the spontaneous market, and pictured the socialist state as a violator of the "freedom" of economic activity, now it is fashionable to expound ideas of state regulation of market spontaneity, and conclusions are drawn about the "similarity" of the capitalist and the socialist systems.

In the light of the distinct tendency to increase state-monopoly interference in the economy of bourgeois countries, the views of some theoreticians and statesmen who attack centralised management of the economy under socialism are strange, to say the least. This in effect is a defence of positions which have been discarded not only by socialism, but partly also by contemporary capitalism.

Capitalism, of course, has changed appreciably since the 18th and 19th centuries. It is not the capitalism of the local market, of "pure" competition, local stock exchanges and direct ties between producers and consumers. But the new phenomena in the economy of capitalism, specifically the modification of the functions of the bourgeois state, by no means abolish the general laws of capitalism's development. Capitalism has been, and remains, a system of non-controllable private interests in which the state plays a secondary part. This follows from the very essence of the capitalist system—private property in the means of production, with its "sacred" right of independence from social aims and tasks.

The contradiction between the social nature of the production process, which demands centralised guidance, and the

private ownership of the means of production, which precludes such guidance, is one of the paramount intrinsic vices of contemporary capitalism, characterising it as an economic system that is outliving its age. The productive forces as such negate capitalism and demand the transition to a new society. The prophetic words of Karl Marx about the revolutionary role of technology in materially preparing the overthrow of capitalism, "well grubbed, old mole!", are coming true.

Only the replacement of private ownership of the means of production by social ownership creates the objective possibility of managing the economy on the basis of a national economic plan which binds into a single whole the activity of separate enterprises and organisations, sectors of production and economic regions.

Planned balanced development of socialist society ensures the possibility of making and implementing the most economical decisions from the viewpoint of society as a whole. This is displayed in many ways. Thus, the planned management of the economy makes it possible to set and achieve the necessary proportions between the production of different goods, to prevent a costly duplication of capacity intrinsic in spontaneous production. Socialist enterprises do not know the excessively diverse assortment of output inherent in capitalist enterprises which seek in this way to "cushion" the impact of unforeseen market fluctuations on their incomes.

Socialist society considers in a planned way its current and future needs and ensures them with the necessary resources. The big investments it plans do not give rise to the problem of eliminating disproportions which systematically arise. Socialist planning makes for an incomparably deeper strategic approach.

The development of the economy according to plan relieves society of the inordinate expenditure for advertising,<sup>1</sup> dictated under capitalism by the keen rivalry of private manufacturers competing in the market. In the United States the vast expenditure for advertising turned it into the twelfth largest sector of the economy.

<sup>1</sup> Advertising as a means of informing consumers about the real significance and quality of new articles is needed under socialism, and will be required even in communist society.

Planned balanced development is an obligatory condition of optimality, i.e., the most efficient use of the available resources. The category of an optimum is inherent only in the planned, socialist economy; it is in principle incompatible with capitalism with its disproportions, parasitic nature and squandering of the productive forces.

That is why centralised guidance of the economy which ensures harmonious and balanced development, the work of the huge and intricate production machine at clockwork precision, is one of the primary advantages of socialism.

The need and possibility for planned balanced development give rise to the organisational-economic function of socialist society. This function reflects the progressive process of the social division of labour, the branching out of managerial labour at all levels. The labour of people in managing the economy is productive labour which must be added to the expenditure of enterprises, associations and other economic management agencies when calculating the national economic costs of production. Ultimately, centralised guidance of the economy only reduces the cost of goods.

For its very essence the organisational-economic function of socialist society comes within the sphere of production relations, although it is effected by state agencies, by institutions of the superstructure.

Under communism there will be no state. But planned guidance of the economy will become even more important and necessary, because the socialisation of production will be further intensified. The organisational-economic function will be performed by agencies of associated producers which are not of a state character. These agencies will arise from the system of economic management which socialist society and its state created, developed and brought up to communism.

Socialist centralisation of economic management, far from precluding, on the contrary, necessarily presupposes the economic operational independence of enterprises and territorial agencies. Centralised economic management affords full scope for the development of the productive forces, including the main productive force, man, thanks to the stimulation of initiative at all levels of economic management—the State Planning Committee (Gosplan) of the

USSR, ministries, central boards, associations, enterprises, shops, sections and teams.

Production has now reached a high stage of socialisation, but relations between enterprises have not become as "rigid" as under the continuous production process within an enterprise. Collectives depend on each other, they operate within a ramified and extending division of labour which does not preclude relative independence of every production unit endowed with a right, within the bounds of its competence, to make decisions on different matters. This objective "discreteness" of production at the present stage, determined by the attained level of socialisation, dictates the need for giving the enterprises definite rights, demands organic unity of centralisation and economic operational independence of production units and regions.

The dominance of social ownership of the means of production makes every member of socialist society feel that he is a co-owner of these means of production, fosters an interest in the common cause and a striving to raise the efficiency of management. This constructive attitude to everything that takes place and the consequent mutual assistance are one of the main driving forces of socialism.

Under socialism, besides the general interests of the people as co-owners of the means of production which belong to society as a whole, there exist the interests of separate collectives and workingmen, group, and personal interests. They do not stand opposed to the social aims, but facilitate them, giving rise to additional stimuli to efficient operation of the economy, namely, cost accounting,<sup>1</sup> wage systems and moral encouragement of good work.

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<sup>1</sup> Cost accounting (*khozraschot*) is a method of management applied at socialist enterprises which is based on measuring in money terms their inputs and results of their operation, on enterprises covering their expenditure with their own income, on ensuring profitability, on the material incentive to, and responsibility of, an enterprise and its personnel. The covering of expenses linked with the operation of an enterprise with money received from the sale of its output and also the obtaining of a profit, distinguish an enterprise operating on a cost-accounting basis from an enterprise or organisation which is financed by the state budget. In cost accounting relations are established 1) between individual enterprises and the socialist state; 2) between enterprises themselves, and 3) between an enterprise and members of its collective.

The existence of general, group and personal interests in the progress of society is a primary factor in the activity of every workingman, in contrast to capitalism with its destructive antagonism between labour and capital. The interest of every member of the socialist association of producers in the progress of the country, area, enterprise and section is the well-spring of the huge stream of rationalisation proposals made by the working people, of their lively interest in the world around them and their irreconcilable attitude to shortcomings.

A general meeting of the members of a working collective is the elementary form of joint management of common property. But to arrange a general meeting as the agency which operationally manages the country's economy is practically impossible even with the use of the latest equipment and means of communication. The joint owners of contemporary means of production can exercise collective management of their property on a countrywide scale only by creating a central managerial agency responsible to them.

Guidance of the socialised means of production is effected by the people themselves, represented in the state bodies elected and controlled by them. The socialist state carries out the will of the people. It guides the country and its economy. It, far from restricting the people's initiative, constantly creates conditions for stimulating it.

While centralisation based on the dominance of private property results from the competitive struggle, the absorption of the relatively weaker capital by the stronger one and is directed against the exploited masses, centralisation of production and management based on the dominance of social property is established by the people themselves and is aimed at raising the efficiency of production in the interest of the selfsame masses. Under capitalism, centralisation is implanted by force from above. Under socialism, it is established from below, voluntarily, not in a bureaucratic way, by government officials and the military, but by the working class, the masses who have taken over power and united to run the economy on a countrywide scale. Thereby centralisation in socialist society, being democratic, is diametrically opposed to centralisation under capitalism which is bureaucratic in content.

Democratic centralism is a system of division of respon-

sibility between different links of economic management, a system of distributing the rights, duties and tasks as applied to each managerial link. Such a system of management gives to separate levels of this system independence in making decisions both horizontally and vertically within the bounds of its general unity and integrity. Such an organisation of the economy proceeds from centralism, but also includes initiative.

Socially organised labour and the people's initiative have enabled the first socialist country in history to score achievements in economic development as no capitalist country has ever attained. In individual capitalist countries there have been periods of favourable economic activity when high industrial growth rates have been maintained for a few years. But no capitalist country has secured high growth rates over long periods.

Guidance of the economy based on democratic centralism steeply sends up the role of science of economic management. Generally speaking, this science does not arise simultaneously with the singling out of the managerial function. It, like every science, arises only when society begins to need it in practice. This is linked with the conversion of large-scale social production into the rule of economic life. Such a conversion has occurred within the bounds of capitalism. In these conditions the empirically discovered methods of managing production units become inadequate and a practical need arises for their scientific understanding.

Under capitalism, the science of management encompasses only questions of managing separate capitalist enterprises and then associations (monopolies). Although under capitalism, especially state-monopoly capitalism, a need arises for coordinating the operation of separate economic links, actually capitalism is unable to create a science of economic management as a whole and to abide by its demands. This is prevented by the dominance of capitalist private property with its intrinsic antagonism of economic interests.

A scientific basis for managing the socialist economy is elaborated by the entire system of economic sciences—political economy, economic statistics, science of planning, financial science, sectoral economics, and others. The political economy of socialism specifically sums up and studies economic processes at the highest level of abstraction, which

makes it possible to see the mechanism of objective economic laws in its entirety as an intricate dynamic unity with all its intrinsic dialectical contradictions.

At the same time an essential part in the development of the Soviet economy undoubtedly has to be played by the science of management in the narrower sense of the word, as the science of the specific sphere of society's organisational activity for coordinating the efforts of all the links, all the cells of the national economy and individual workmen in achieving the common aim of socialist production. The subject matter of this science is the theory and methods of planning, principles of economic stimulation, the organisation system of economic management, the development of information and of its material basis, elaboration of the methods of reverse influence exerted by managerial agencies on social production based on new information, and also a number of other fields in the functioning of the socialist economy.

## 2. Distinctions of the Present Stage in Managing the Soviet Economy

At different stages of socialist construction in the USSR the principle of democratic centralism was applied with the help of different forms and methods of management, planning and stimulation. This was determined by the specific conditions of every stage and the features of the problems being solved.

Specific forms of management were characteristic of transitional period from capitalism to socialism when a struggle was waged against the temporarily preserved elements of capitalism, when the country was industrialised and agriculture was collectivised. The Civil War, the Great Patriotic War and the years of economic restoration were marked by specific forms of economic management.

The present stage in managing the Soviet economy essentially differs from the preceding ones.

Prior to the economic reform relations between enterprises and higher agencies were based on decisions adopted primarily in central bodies. Not only the aggregated, general targets, but also the more detailed assignments were passed

down to enterprises from above. The nomenclature of output, for instance, was planned in detail. Almost all the investments were centrally allocated (only resources from the fund of an enterprise were spent independently; the enterprises received credits for minor mechanisation and disposed of other resources which made up an insignificant share of the total investments).

Such a system of guidance presupposed that central agencies must know all the aspects of operation of every enterprise and, as a result, were able to set it proper plan assignments from the positions of society as a whole.

But as time went on shortcomings in the operating managerial system came to light. Some enterprises sought to minimise their production potentialities and to get an under-rated assignment for total production.

The new conditions of production were noticed in time by the CPSU which adopted a decision to carry out an economic reform essentially altering the forms and methods of management and planning. *The essence of the reform* consists in concentrating centralised planning on formulating the most general indicators of national economic development, extending the independence of enterprises, providing greater material stimuli to raising the efficiency of production and developing cost accounting.

What are the conditions which have made it possible and necessary to introduce the new management system?

Today the national economy of the USSR is a gigantic productive system which includes tens of thousands of industrial enterprises and hundreds of thousands of other economic units—collective farms, state farms, building organisations, trading establishments, transport enterprises, design and research institutions, and so on. Numerous economic relations exist between them. The number of possible combinations in the country's economy is now measured by astronomical figures. According to some calculations it runs into millions of millions. It is economically inexpedient to establish these detailed relations and find their best combinations from one centre. The demands of such an intricate economy are best of all met by a management system which consists of a number of links possessing independence. These links are at the following levels—central

planning, ministerial, associations, enterprises and regional institutions.

It is not by chance that improvement of the structure of managerial agencies has become particularly important now. It is a question of enhancing the role of ministries and departments, of extending the rights of territorial agencies engaged in planned guidance. Small enterprises are being enlarged, reorganised into big ones. Production associations of several types are increasingly spreading. At times associations include enterprises linked by consecutive production. Such associations, as a rule, assume a considerable part of the cost-accounting activity, converting enterprises into kind of shops. They, in effect, are a form of an enlarged enterprise. There are also associations of another type, for example, sectoral or territorial associations of enterprises of one type. They are in the nature of trusts where the leading agencies have more restricted rights, while cost accounting is concentrated in the main at individual enterprises.

The scientific and technological revolution which creates a material basis adequate to the new system, is a salient feature in the present stage of the Soviet economy's development. In the past one feature was sufficient for characterising a period: there was the Stone Age, the Bronze Age, the Iron Age. What age do we have now? Some call it the Atomic, others the Space Age. It is also called the Age of Artificial Materials which release man from primary natural restrictions. Perhaps it is the Age of Automation, TV, Aviation, or Computers? The time we live in is the age of swift and sweeping progress of science and technology. It is the age of automation and electrification, cybernetisation and chemisation, biologisation and the use of atomic energy.

Discovery follows discovery and leaps in one sphere cause and accelerate leaps in another; cardinal and avalanche-like changes, and not the traditional lines of production, are becoming the rule. Several revolutionary upheavals in the development of the productive forces take place in the lifetime of one generation. Many developments no longer cause a surprise.

Such stormy technological progress lays its imprint on the planning process. Attempts at all-encompassing regu-

lation can only cause harm. The initial outlines of a plan have to be operationally adapted to the new conditions.

The dynamism of present-day development is most strikingly displayed in the engineering industry where new designs are constantly produced, the types of raw materials and their suppliers are changed, equipment and production methods are renewed and personnel is retrained.

As the living standard of the people rises, higher demands are made as regards renewing the output of light industry, extending its assortment, considering the demands of fashion. The share of TV sets, refrigerators, motorcars and other durables, which demand swift renewal and modernisation, is rising in consumer goods. This, in turn, dictates the need for flexible, operational replacement of old raw materials by new ones, the introduction of the corresponding equipment to produce goods of higher quality and to reduce costs.

In the Soviet Union the engineering industry contributes about one-third of all industrial output. The production of consumer goods is also developing at an accelerated pace. Such a structure of production dictates particularly frequent and deep changes.

Dependence on science is an essential factor making for changes in the economy. This is expressed not only in the stream of discoveries but also in the mobility of the production demand of scientific institutions themselves. This demand, whose scale is mounting as the role and place of science in society's development are enhanced, cannot fit into the Procrustean Bed of processes which can be precisely foreseen in advance. Scientific discoveries blast old notions. Science is the ability to perceive the hidden. Researchers deal only with new, inimitable tasks which have no analogues. This demands new kinds of raw and other materials, the building of special pilot plants, the manufacture of new laboratory equipment. The productive needs of science include many sophisticated machines, units, reactors, accelerators, electronic instruments, modern telescopes, super-durable and heat-resistant materials and other means produced by industry on orders of research institutions, considering their constantly changing needs. Mobility of demand is most characteristic of fundamental studies in physics and chemistry. But even the applied sciences which do the "finishing" work produce many unexpected solutions and approaches.

The scientific and technological revolution under way in the USSR promotes the development of the human personality, stimulates the creative activity and initiative of the individual. Capitalist mechanisation of the production process leaves to the worker the operations which cannot be performed by the machine, which turns him into an appendage of production, into a partial worker. Under capitalism the worker is a passive factor of the production process, an animated tool.

Socialism changes the position of the workingman. It replaces forced labour by labour for oneself, for one's society. Under socialism the aim of production is to satisfy the reasonable needs of society, without which there is no, and there cannot be, the all-round development of the personality. Not only the nature of distribution of the created product is changed, but also the productive conditions of labour themselves. Special measures of industrial safety and labour hygiene are carried out, new bright and spacious factory buildings are erected, production noises and harmful evaporations are reduced, and so on.

The contemporary scientific and technological revolution takes the worker out of the production process and places him next to it. The place of labour power as a factor of production is being taken by knowledge—an ever more important resource of society. Today "labour is not contained in the production process; it is such in which man is a supervisor and regulator of the production process itself".<sup>1</sup>

Man is increasingly engaged in such types of activity as science, the preparation of production, management, and serving society's cultural and other needs. The sphere of science, as pointed out earlier, is particularly extended.

At the initial stage the share of operatives rises directly in industry. But subsequent automation will cut the number of operatives, while a rise in the reliability of equipment will reduce the need in maintenance men. Industry will be increasingly managed with the help of automatic devices, and simple low-skilled labour will be ousted.

A rise in the technical level of production, in the education and culture of the workers will make labour more

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<sup>1</sup> "From the Unpublished Manuscripts of K. Marx", *Bolshevik* No. 11-12, 1939, p. 62.

creative which, in turn, will stimulate initiative and this will further accelerate progress. We are contemporaries of this process, its participants and eyewitnesses. This demands timely reforms in the management system which accelerate and extend the people's creative attitude to labour.

It is a matter not only of the general mechanism of planning and stimulation, extension of the rights of enterprises, but also of fully considering in planning the fact that satisfaction of the needs of the people leads to a steady rise in their labour activity. The aim, the motive cause of socialism's development (satisfaction of the people's needs) is becoming a consequence (a factor of the rise in labour productivity), which again influences its prime cause.

The investments in "serving man" are not only an expenditure. They are also an income which, moreover, steadily grows. While under capitalism restriction of consumption by the masses is a requisite for the viability of capital, under socialism, on the contrary, an increase in consumption by the masses, the development of the personality, is a primary prerequisite for the victory of communism. "...Development of the social individual," Marx wrote, "—it is this that acts as the main well-spring of production and wealth."<sup>1</sup>

And so, in the course of plan fulfilment situations demanding new decisions inevitably arise. Their cause is not only the possible inaccuracies in plan computations. It is rooted above all in the nature of the economy as a superintricate system characterised by a gigantic multiplicity of alternatives of behaviour and development which cannot be fully predicted. Of course, planning must be improved in every way, and it is necessary to strive for its precision and the reduction of possible errors. However the centralised plan is improved, it must not be turned into a fetish, into an absolute, and regarded as a plan that must be carried out in every detail. Certain deviations from the original plan are dictated by new situations.

A sound economy is not the one which follows a programme set once and for all, contrary to the new conditions. Such an economy would prevent the tapping of potentialities

<sup>1</sup> "From the Unpublished Manuscripts of K. Marx," *Bolshevik* No. 11-12, 1939, p. 62.

in production, the satisfaction of unforeseen needs by new progressive decisions. A sound economy is one that operationally reacts to desirable social shifts and reflects their rhythm. The system of managing socialist production is called upon to ensure conditions for the display of the creative endeavour of people, of the inimitable gifts and abilities of every individual. In this situation guidance of the economy must correspond to the dynamism of development and give collectives greater independence.

How is the idea of operational flexibility realised within the framework of centralised planning? One way is at every change in conditions to recalculate anew the entire national economic plan, acting on the presumption that the economy is an interconnected complex where any change in one link, and even more so in a number of links, dictates a change of all relations, negates the old optimum, demands a new calculation. With such an approach even reciprocally cancelling small shifts would lead to a tremendous expenditure in recalculating the plan. As a result the expenditure could exceed the effect produced by the new specification.

Another way is to make obligatory only the most general targets and proportions of the centralised plan which, as a rule, do not demand a radical change. In everything else enterprises should be independent. This will ensure a primacy of the global approach over the local realisation of national economic optimality, and a simultaneous display of flexibility, manoeuvrability and a creative attitude to the plan. "The unity of essentials, of fundamentals, of the substance," Lenin emphasised, "is not disturbed but ensured by variety in details, in specific local features, in methods of approach."<sup>1</sup>

The result society needs is achieved by extending the rights of enterprises in specifying the assortment, making investments, in matters of supply, and so on. Simultaneously, centralised planning is reconstructed: it determines the most general proportions in which the mass of opposite partial changes are neutralised and which, owing to this, possess sufficient stability and durability. Transition from the former to the new management methods, metaphorically speaking, may be compared with the development of New-

<sup>1</sup> V. I. Lenin, *Collected Works*, Vol. 26, p. 413.

tonian mechanical physics into the physics of elementary particles.

The economic conditions of socialism determine the great importance of the material interest of every workingman, production collective and the entire society in efficient management. The personal and collective material interests are embodied with the help of a system of objectively determined forms and methods, above all the mechanisms of wages and cost accounting. The record of economic development of the USSR for more than half a century and the successes of other socialist countries fully demonstrate the correctness of Marxist-Leninist economic science and the statements of Lenin about the tremendous role of material incentives, wages and cost accounting in the period of socialism.

A major distinction of the present period in the development of the Soviet economy is greater material stimulation of a higher efficiency of labour. This distinction is dictated by the fact that present possibilities enable society to assign substantial resources for rewarding collectives for the general results of their work. Practical management and economic science have played a considerable part in preparing the conditions for raising the role of stimulating collective labour. In Soviet times a whole army of economists has been trained able independently to analyse economic questions correctly in the localities. Hence it is possible to extend the rights of enterprises and materially stimulate those which achieve the best results. Such is the sum total of the conditions which make it possible to raise the efficacy of material incentives at the present stage.

### **3. Centralised Guidance of the Economy Under the Reform**

Improvement of centralised guidance of the economy is a major element of the economic reform. Since enterprises are given a considerably smaller number of directive assignments and their powers are extended, a balance of economic relations can be ensured only if these targets are strictly, scientifically based.

A plan is correct if the resources are utilised with maximum efficiency, and consistency between all its sections and

targets is ensured. In designing such a plan central agencies have to set substantiated well-grounded aggregated assignments for economic sub-divisions. Their range must be adequate for achieving the main tasks of the national economic plan and at the same time afford enterprises and their collectives the necessary scope for displaying initiative. Excessive narrowing of the range of targets set for enterprises from above weakens the role of centralised planning, while its artificial expansion limits the independence of collectives. Ascertainment of the optimal range and methods of calculating aggregated directive targets is one of the cardinal tasks of centralised planning. Another important task in present conditions is to establish the place of incentives in the system of planned management of the economy, substantiate their qualitative parameters and quantitative characteristics. Without this prerequisite incentives may begin to work not "for the plan" but to its detriment. Only if the rules and normatives of stimulation meet the tasks of the centralised plan, if they are calculated with an eye to "orienting" enterprises on achieving the proportions set by the plan is it possible to expect the "link-up" of independence with centralisation, their development in one key, in unison. The concrete economic model which is called upon to coordinate economic instruments with plans, to make these instruments a key in realising plans, is now being developed.

Centralised planning in conditions of broad independence of enterprises is also faced with the need of elaborating methods of managing the economy marked by growing indeterminance, probability (stochastics) of its processes. This essential feature of the contemporary economy is determined by a number of factors, including the increased role played by science and technological progress in the development of society, with their intrinsic elements of probabilistic implementation; higher share of sectors with exceedingly fluid, constantly changing working conditions; extension of the range of substitute goods and the bigger possibilities of consumers to choose one or another combination; further concentration and specialisation of enterprises, which makes it necessary to serve a wider range of consumers whose behaviour must be foreseen; greater scale of investments and the consequent necessity of increasingly foreseeing the consequences of the remote future.

The new management system intensifies these processes. It extends the rights of enterprises in furthering technological progress, studying the demand and changing the assortment, increases the chances of new situations arising, unforeseen by the original plan. It grants collectives the right independently to spend the stimulation funds, giving rise to new alternatives of the demand for means of production and consumer goods. The reform presupposes the development of credits for improving the quality of output, the creation of new equipment, which leads to changes in the demand for raw and other materials, and so on.

The new problems facing centralised planning and the need to improve it are accompanied by active exploration of adequate solutions and material resources for resolving the consequent contradictions. The development of economic science and practice furnishes a rich arsenal of planning techniques which make it possible to consider the probabilistic nature of economic processes. Of great significance among them is the free sale of means of production instead of their rigid allocation and the modelling of long-term development, long-term forecasting of the needs of the population, the main trends of technological progress, and so on.

Special mention should be made of such an instrument for adjusting unexpected situations as reserves. If the extension of the rights of enterprises is not reinforced by reserves discrepancies might arise in the economy which it would be difficult to eliminate. And conversely, if a system of reserves is set up in the economy the appearance of discrepancies will be efficiently neutralised by the operational employment of these reserves. Deviations from the norm at the level of enterprises and associations could be compensated from their reserves, and at the level of ministries and the USSR Gosplan, from the reserves of these organisations.

The formulation of scientifically-based plans, their dovetailing with economic instruments and manoeuvring with reserves call for the swift receipt and processing of a vast volume of information. This presupposes the development of electronic computery. The employment of such equipment resolves the contradiction between the vast scale of information needed for efficiently managing the gigantic national economy and the unsuitable manual methods of receiving it

which prevailed in the past. A possibility arises to reduce to a minimum the time gap between a phenomenon and its reflection in accounting and statistics, to process at once the obtained data in different aspects and make the best decision on the basis of a representative totality of factors. The speed and correctness of reactions is a primary condition and demand for a system of efficient management of the national economy.

The employment of computers also releases man from uninteresting office work involved in primitive accounting and calculations and facilitates the ever greater concentration of managerial personnel on the solution of intricate creative problems.

The socialist state also exercises important functions in protecting the interests of the people as workers (guarantee of a basic wage, establishment of the duration of the work day, and the working conditions); as buyers of goods (the obligatory certification of the quality of many goods, restriction or prohibition of the production of definite articles, strict control of prices); of the population in different regions (protection of the air, forests, waters, nature and the environment, technical supervision over air traffic, rail transport, weights and measures, fire fighting); the population of formerly economically backward areas (accelerated development of the respective regions).

Accomplishment of the enumerated and other tasks of centralised economic management makes up the "macroclimate" which predetermines the general line in the advance of the national economy. The independence of socialist production units is developed within the framework of the main proportions envisaged in the national economic plan.

Since the study of society's needs is the point of departure in designing a scientifically-based plan, and a requisite for its efficacy, let us examine some questions associated with this problem.

Production serves consumption both through the output of traditional goods and the shaping of new needs. If we trace the change in the structure of output over a long period, we will find that it is quite considerable. And it is production, its active role, that matters here.

New needs arise and spread in society not at once, not immediately after they appear. Qualitatively new needs

spread gradually, step by step, until they become ordinary for all and spread everywhere.

Qualitatively new needs, which are engendered by production and spread in society, in turn, stimulate the further development of production, set before it new tasks, determine the appearance of new equipment and the need for reconstructing enterprises.

Study of the totality of social needs and ensuring the conditions for their utmost satisfaction represent a cardinal and constant task of scientific centralised planning. This task is primary because of the specific nature of the socialist mode of production and the essence of its basic economic law. This task is constant because the needs of society are steadily developing, above all under the influence of the improvement of socialist production. The necessity of a concrete approach to the composition of different needs is also engendered by the fact that they are differentiated depending not only on the time but also on the place, national distinctions, climatic conditions, and so on.

Socialist society is interested in the correct ascertainment of both the qualitative composition of its needs and their quantitative changes. It is qualitatively important to bring out the objective needs of society, to determine those which facilitate the all-round harmonious and sound development of the personality. The quantitative approach to needs signifies their measurement, the finding of the exact magnitude of each one. Hegel wrote that quality and quantity are in direct unity, that the measure and truth of quality itself are discovered in quantity.<sup>1</sup>

In view of the qualitative and quantitative ascertainment of the composition and volume of socialist society's needs it is necessary first of all to differentiate between the concepts of ideal and real needs.

The ideal needs of society do not depend on the concrete production potentialities of a country. They are based on what is ultimately needed for ensuring the free all-round development of the personality of every member of society. Their material basis is provided above all by the real achievements of scientific and technological progress of

society as a whole, that is, the really possible technological application of the conclusions of natural science. That is why they appear as ideal needs for every socialist country taken singly and become a controlling guidepost for determining the real ways of the quantitative growth of the socialist economy. Finding the level of ideal total needs and their dynamics, is thus a primary necessity for the coordinated management by the associated producers.

The real total needs of socialist society directly depend on the development level of a country's social production. These needs rest on the actual state of production which determines the volume of needs that it is possible objectively to satisfy at a given moment. On the basis of the development level of social production existing in a country planners determine the real possibilities and bounds for a foreseeable period of time in which the technical composition of the given social production can change. The real total needs oriented during plan formulation on the ideal total needs draw asymptotically to the latter. The degree of approximation of the real total needs to the ideal depends on the available potentialities for the development of the given country's social production.

The relationship of the ideal and real total needs, given the optimal use of the productive forces, demonstrates the optimal degree to which, at each given moment, society satisfies its total needs. The actual degree to which society satisfies its real total needs can be below the optimal if the plan is not sufficiently precise, if it does not consider in time new processes and phenomena.

Going over from the ideal structure of needs to their actually planned magnitude within the bounds of the available resources, society has to take into account the different social significance and comparative usefulness of individual products which correspond to different needs.

Different needs are of unequal importance or different intensity for society. There are needs in prime necessities or in goods of prime social usefulness and there are less essential needs of second, third, or other degree of social utility.

Marxist-Leninist political economy has always resolutely exposed the fallacies of the bourgeois concepts of "marginal utility". At the same time it attaches great importance to

<sup>1</sup> G.W.F. Hegel, *Sämtliche Werke*, 4. Band, Stuttgart, 1928, S. 219, 225.

social utility as a category of economic life under socialism.

In the capitalist world the utility of a thing is determined not with regard to man but to profit (surplus value), and consequently it appears in a distorted way. In socialist society, in which material and spiritual goods are created to secure a steady rise in the welfare of all members and the free, all-round development of every individual, the utility of a thing is determined only from the benefit it really brings to people.

The division of commodities by the degree of their utility is of a historically concrete nature. What at one stage was considered a prime necessity, in time may disappear as a need. Simultaneously what was the object of second- or third-degree utility may become a prime necessity with the growth of needs. Only at every given moment and given place is it possible to fix the utility of separate commodities as primary, secondary, and so on.

Within the bounds of commodity-money relations, the concept of preference for goods, proceeding from their utility, is changed into the relatively independent form of money demand. The magnitude of any need, expressed on the basis of the demand, depends on factors like population income or the level of prices. This, however, does not mean that the magnitude of a need should be determined proceeding from the available incomes and the previous prices, in other words, to regard these factors as given, as immutable.

Population incomes depend on the allocation of the national income for accumulation and consumption. Prices are also changed under the influence of new proportions in the distribution of the national income, the ratios in the output of different goods.

Uneven distribution of incomes between different sections of the population results in that the groups in the lower brackets do not fully satisfy their prime needs, while groups in the higher brackets are able to satisfy less essential needs. That is why the general measure of satisfaction of social needs is lower than if there had been no differences in the distribution of incomes.

Socialist society does not allow such a situation as regards the most important needs of the population. It adjusts the

mechanism of preference given to utilities with the help of social consumption funds, the introduction of additional incomes for large families, social policy of prices, and so on. Thanks to these measures the totality of social preferences draws near to the optimum. Study of the needs of socialist society and an analysis of their comparative utility provide a starting point for the distribution of resources between different lines of production. "The social need, that is the use value on a social scale," Marx wrote, "appears here as a determining factor for the amount of total social labour-time which is expended in various specific spheres of production."<sup>1</sup>

It should be noted that the determination of society's ideal needs, calculation of the comparative utility of different goods in real production conditions, planning their output proceeding from such calculations, are very difficult national economic problems, especially if we consider the scale of a huge country like the USSR, the need to coordinate its national economic plans with those of other socialist countries, and the expansion of foreign trade. But these difficulties are surmountable and are eliminated through the gradual improvement of centralised planning and the entire system of managing the socialist economy.

Construction of a model for the allocation of resources between different types of activity which ensures maximum social utility also demands the wide development of economic-mathematical methods based on cognition of the mechanism of formulating an optimal national economic plan. Ascertainment of the required range of produced goods proceeding from minimum inputs for their production, offered by some economists, in our opinion, does not accomplish the task of finding the structure of social needs, because it orients production only on the manufacture of the cheapest goods and precludes the output of costly use values society objectively requires for satisfying a number of needs. The principle of minimising inputs is suitable for choosing goods of analogous designation or substitute products. But it is inadequate for planning the production of articles which satisfy qualitatively different needs. There is an opinion that the needed range of goods should be re-

<sup>1</sup> K. Marx, *Capital*, Vol. III, Moscow, 1966, p. 636.

garded as given. The task of planning agencies is to minimise inputs for its production. Under such an approach it is unclear on what basis this range is given. If it is set on the basis of earlier experience and then adjusted proceeding from obvious deviations of the plan from real needs, this path involves superfluous costs.

Worthy of attention is a different approach to determining the composition and the volume of the goods to be produced. It is based on ascertaining the degree of social utility of each of them in the given plan period, on the principle of priority and the fullest satisfaction of the most important needs. The useful effect obtained from satisfying each need must be compared with the inputs of materialised and living labour, the latter being the sole producer of new value. If the effect from the use of some or other goods is less than the inputs for their production (during the entire period of production of the given article or products created on its basis) this means that the production of these goods is unprofitable. If, on the contrary, the effect exceeds the inputs, this means that production is profitable.

Satisfaction of needs on a scale conforming to the optimal size of each of them and in their totality, provided the costs of producing the entire output and of any unit are only inputs which are optimal, makes it possible to say that the inputs are equal to the socially necessary ones. If actually the produced output is bigger or smaller than the need (here we ignore the requirement to set up reserves) the socially necessary inputs do not change. What is changed is only the prices which balance demand and supply, the incomes of producers of the given goods, while the total degree of satisfaction of society's needs is reduced.

Under the spontaneous capitalist economy, in conditions of the artificial barriers to the free flow of resources erected by the monopolies, the operation of monopoly prices, the restriction of consumption by the masses to the narrow bounds of the value of labour power and a number of other factors, the optimal use of resources is impossible. Only socialism can so allocate resources as to obtain, under given conditions, a maximum satisfaction of social needs, including in the latter the production of consumer goods, the building of houses, cultural and service establishments, an increase in the free time of the working people, the render-

ing of assistance to other countries, reinforcement of the country's defence capability, and so on. To accomplish all these tasks, it is necessary to have appropriate means of production.

It should be borne in mind that an increase in the output of the means of production, on the one hand, leads to the introduction of new equipment which makes it possible to raise the living standard in future, and, on the other, diverts resources from current consumption. The proportion between the manufacture of consumer goods and means of production must be such as to satisfy to the maximum the needs of the working people.

If the period covered by the plan is too short, the maximum objective function, from the viewpoint of this period, is not the maximum from the positions of a plan for a longer period. Moreover the resources of a short-term plan are bound to a high degree, while only a comparatively small free part can be allotted for the solution of new problems—starting the building of factories, and so on. This is explained by the fact that at the time a short-term plan is drawn up, the economy has many uncompleted construction projects which must be continued and finished, that the existing material structure of production cannot be regarded as absolutely elastic, allowing a rapid reorientation to the production of other articles. This does not mean that the past by inertia determines the future, that the past can be automatically extrapolated into the long-term future. There are always certain resources in a form which allows their use for new construction projects, for changing proportions, and so on. The tied-up resources at times can be reoriented, especially if they are invested in initial stages of construction. This, true enough, leads to an additional expenditure, but in some cases it is rational and useful.

The longer the plan period, the wider the possibilities society has for accomplishing new tasks. But it must be borne in mind that a plan period has an optimal magnitude, and it should be set accordingly.

**1. Economic and Administrative  
Methods of Management**

The socialist economy is managed above all with the help of economic and administrative methods. Both of them must be equally scientific for their content. As a rule, this has been the case at all stages in the development of the USSR. The new element introduced by the economic reform consists not in a transition to correct methods from wrong ones, but in enhancing the role of economic methods at the present stage.

Is it correct to consider that economic methods are those which help to realise the demands of the law of value that are supposedly of a purely current nature, while administrative methods proceed from other (non-value) considerations, including those of a long-term character?

No, it is incorrect. First, demands of the law of value, realised through economic methods, reflect not only the current but also the long-term tasks of the economy. To impute to the law of value the attributes only of a current guidepost would mean to disregard the distinctions of the socialist economy. Long-term national economic plans are always based on considering the operation of the law of value in the long-range perspective. This is expressed specifically in the choice of a structure of production for the coming period, taking into account the interaction of the material and commodity-money aspects of centralised planning; the setting of long-term prices; determining normatives of the efficiency of investments which are dovetailed with the volume of investments allotted for the plan period; the fixing of interest rates for bank credits which balance the

need in the efficient application of credit resources with their availability.

Second, it is wrong to picture administrative methods as allegedly opposed to the demands of the law of value. Let us take an administrative method like setting assignments for the major nomenclature of output for each enterprise and association. The essence of administrative planning of the major nomenclature consists in selecting an enterprise where the production of the given goods is most expedient, in suggesting to the collective what it has to produce to satisfy the social needs with the utmost total gain on the scale of society.

Another administrative method is the allocation of centralised investments by ministries, associations and enterprises. This process is based on the centralised determination of the best alternatives of investments, on instructing enterprises where to invest resources so that society should receive the maximum effect.

One of the main methods of administrative management of the economy is the attaching of supplier enterprises to enterprises consuming their goods. This attachment is based on a solution of the so-called "transportation problem" which results in optimising inputs from the viewpoint of society as a whole. The administrative attachment of suppliers to consumers is in principle a method of increasing the degree of observing the current and long-term demands of the law of value on a social scale.

It may seem that economic methods are those which do not bear the nature of an order, while administrative methods are directive methods of enforcing economic discipline.

A binding nature, force of law, connection with the superstructure (law, politics, and so on) are characteristic of both economic and administrative methods. The administrative-legal form is inherent in all methods of state management of the socialist economy. Centralised prices, the payment of interest for credits and other elements of the economic methods of management are of a directive nature and binding just as administrative instructions concerning production, supply and investments. An unjustified increase in prices is as impermissible as a willful change of the set trend of work by an enterprise.

Similarly unjustified is a delimitation of economic and

administrative methods under which the former are linked with material incentives, while the latter are divorced from this factor. The material incentive principle forms the basis of all methods of management. To ensure the production of new goods society sets for them higher prices than for old goods. Thanks to this, enterprises manufacturing new articles receive a comparatively higher profit and set up greater stimulation funds. Thereby an economic instrument like price helps to dovetail the interests of society and the material interests of the personnel of enterprises.

The carrying out of administrative instructions, in turn, is based not only on their directive nature but also on material incentives. Let us take, for example, the assignment for the production of major goods. Its fulfilment is an obligatory condition for the setting up of economic stimulation funds by an enterprise. If this assignment is not fully met, the volume of the stimulation funds is substantially reduced.

Here is another example. Let us assume that an enterprise, in accordance with administrative instructions, has to manufacture a machine new in principle. To do so it has to make big outlays which will increase profit only in the distant future. At the beginning of manufacturing the new equipment, the economic stimulation funds of the enterprise may be considerably reduced. To avoid this and make the personnel economically interested in the manufacture of the new model, the additional expenditure is covered not by the given enterprise but from a special fund for the development of new equipment. Thereby the administrative order to produce new goods is reinforced by financing the bigger outlays for this purpose, which links it with material stimulation.

It should be noted in general that if management methods are not combined with material incentives this reduces their efficacy and, therefore, is undesirable. Better results are achieved when all methods of management are organically linked with the provision of incentives to the collectives.

Is it possible to delimit methods of managing the socialist economy into temporary and constant, to consider administrative instructions as temporary and economic methods as constant? All management methods reflect the historically concrete conditions of each plan period and

are of a more or less temporary nature. Thus, assignments for the major nomenclature, investments and other administrative indicators operate only for a definite period. The operation of certain prices, rates of pay for assets, interest rates for credit and other economic instruments are also designated for a certain time.

All methods of economic management consider the specific features of a given moment because they are designed to promote the fulfilment of the centrally formulated national economic plans and the latter, as is known, set different tasks before society, allocate unequal resources and provide for changes in proportions.

It is also necessary to examine the following distinction between administrative and economic methods: is it correct to bind the administrative methods to the plan and to assume that the economic methods are independent of it?

If this distinction were accepted, it would be necessary to renounce economic methods. They would run counter to the plan and tune the economy to an entirely different key. Economic methods, just as administrative ones, are methods of planned guidance, are instruments of plan fulfilment, are derivatives of the plan, the "transmission belts" from macro-economics to micro-economics.

What is the distinction between economic and administrative methods? It consists in a whole system of interconnected features. To begin with, economic methods are general rules of behaviour for all economic units, rules linked with commodity-money relations, while administrative methods have definite addresses, are differentiated for each enterprise, association and ministry.<sup>1</sup> Thus, prices of produced goods are the same for all collectives which produce them. If the goods are of an improved quality, higher prices are set or special additions are introduced. This does not imply the differentiation of prices for definite producers, because the right to additions is enjoyed by any enterprise which makes similar improvements.

The interest rates for bank credit are also the same. Their

<sup>1</sup> There are also general administrative methods but they are not directly linked with commodity-money relations. For example, the establishment of the duration of the working day and week, holidays, rules for the catching of fish, felling of trees, laws on the conservancy of nature, and so on.

differentiation, depending on the work of production units, is designed to compensate for the danger of failure to meet obligations by poorly operating collectives and not to place them into particularly rigid conditions.

There is a single wage system in the Soviet Union. Earnings are differentiated depending on the complexity and arduousness of the work, the location of enterprises and the importance of sectors, but all this does not run counter to the general principles of the wage system.

All enterprises have the same rates of depreciation which are differentiated not according to the results of their operation, but depending on the types of fixed assets and the need in thorough repairs.

The single approach to managing the economy is displayed in standard rates of taxes on wages, in uniform allotments for social insurance, in the tendency to institute uniform normatives for setting up the economic stimulation funds; in granting enterprises equal rights to concretise the assortment of the goods they produce, to buy means of production by concluding detailed contracts with suppliers, at wholesale centres and in shops; in establishing general principles of material responsibility for violating contract terms—compensation for the caused damage, and so on.

The making of definite assignments and an individual approach are reflected in planning for each enterprise and association the major assortment of the produced goods, in allocating centralised investments, setting the main plan of material and technical supply, centrally determining the share of profit left with economic units, and so on.

Proceeding from the above composition of economic and administrative methods we may try to furnish an answer to the question as to what methods the setting of centralised plan indicators belongs. To the extent to which centralised planning accomplishes its tasks with the help of prices, interest and similar instruments it is an economic method; to the extent to which definite assignments are set, it represents an administrative method.

It is easy to notice that there is an interconnection between economic and administrative methods. This is the case as regards the right of enterprises to specify the assortment. Guiding themselves by the prices set from above, production costs and the possibilities for the sale of the finished out-

put, enterprises independently decide on the concrete, detailed assortment of output. But to reduce the probability of mistakes which separate enterprises might make, they are given administratively, as an initial basis, an assignment as regards the nomenclature of major output.

Administrative methods of planning the supply consist in global schemes of linking suppliers and consumers. The influence of economic methods is displayed in the possibilities of concretising economic relations between enterprises on the basis of direct contracts.

The same combination of administrative and economic methods is characteristic of the allocation of big credits. Interest for credit, as an economic method, is set at a level which ensures the use of the planned credit resources with optimal efficiency. Enterprises where loans do not promise the required return, as a rule, are not eligible for these credits. The demand for credit is concentrated on sections working to ensure society the necessary gain. At the same time separate collectives may make mistakes in planning measures for which they want to receive loans. It is not precluded that part of the credits may be requested for less efficient measures, while more efficient ones may be ignored. To ensure the most expedient allocation of credit resources a broader horizon is needed than the one which individual enterprises have. This is achieved with the help of centralised planning and administrative allocation of credit quotas by separate sectors and with a strict bank check of the credit applications.

In a number of cases the definite individual approach determines the main part of activity of collectives, while the general approach concerns the remaining part. A case in point is centralised and non-centralised investments. Investments of the first type bring about substantial shifts in the economy, in the sectoral and territorial structure of production and are evaluated with an eye to national economic ties. Applications for these investments are made by enterprises but the higher agencies have the final, decisive say concerning their use. As for non-centralised investments, they are of local significance. They are made by the enterprises themselves which are guided by their own calculations. In this case no direct administrative instructions are required and for efficient operation it is enough to make

the enterprises interested in the best use of production development funds or credits for non-centralised needs.

Many concrete aspects of the economic activity of enterprises are now determined by higher agencies and cannot be regarded as dependent on the direct operation of the enterprises. Therefore the scale of applying general rules of behaviour, naturally, is limited and part of them are transitional in form—group and even individual norms. This applies to so-called calculation prices, group and even more frequently individual normatives for the setting up of economic stimulation funds, and so on. A big part in financing centralised investments is played by the national budget, the inter-departmental reallocation of resources from some enterprises to others. Part of these investments is financed from the resources of enterprises, the volume of which is individually regulated by the budget.

Such a situation has not arisen accidentally. First, the economy has a number of partial discrepancies which arose in the past and therefore must not influence the assessment of an enterprise's operation at present. Some collectives produce extremely scarce and costly goods, while others produce less scarce goods and sell them at lower prices. Different enterprises are unequally provided with raw materials. As a result, one group of collectives has an incomparably bigger profit than another. But because this is a consequence of historically shaped conditions (and not of different results in the operation of enterprises since the reform) it would be wrong to approach the assessment of these results from the angle of providing equal incentives from the obtained profit. That is why fixed payments have been introduced, which are made by highly profitable enterprises, while privileged normatives are used for encouraging enterprises with a low profit, and an individual approach is applied as regards collectives in allotting resources for centralised investments and other purposes.

The creation of an equilibrium in the economy is a requisite for the wide employment of economic management methods. The gradual reinforcement of these methods, in turn, will accelerate the achievement of an equilibrium. Naturally the point is not that owing to equilibrium all economic discrepancies will disappear. New goods will always be scarce and old ones in comparative surplus. This is

an inevitable phenomenon. But it is necessary to differentiate it from a lack of coordination, the elimination of which requires considerable time. The removal of non-coordination leads to the desired relative equilibrium in the economy.

Proper determination of the quantitative magnitude of prices, interest rates for credit, and so on are another condition for the wide use of economic management methods. Indeed, if prices of some articles are unjustifiably high (above the demands of the economy) or unjustifiably low, the profit of enterprises will reflect not only the results of their operation but also the price-formation conditions. So far the operating prices are not free of shortcomings. This is reflected in the performance indicators of collectives and demands individual norms of stimulation, of fixed payments, and the allocation of resources for planned needs in an individual way.

The more developed the general methods of planned guidance, the wider the scope which enterprises, associations and ministries have for economic manoeuvring. Extension of the boundaries of independence of economic units on the basis of economic management methods enhances their ability operationally to react to new situations in renewing output, helps technically to improve production, which is particularly important in a period of accelerated economic growth, the spreading of the scientific and technological revolution and the flowering of the tremendous constructive capabilities of man.

Since economic methods allow for alternative economic decisions, they in a number of cases lead to new processes which somewhat differ from the planned ones.

The economy is a living organism in which changes in one place inevitably give rise to gaps in a number of related links. To eliminate them it is advisable to utilise the system of reserves and only in extreme cases to revise the entire plan. That is why development of economic management methods presupposes the setting up of reserves, "shock absorbers", which take care of small deviations. The existence of such reserves is one of the prerequisites for the extensive employment of economic instruments.

Another distinction of economic management methods is that they, while giving enterprises extensive rights to display useful initiative, simultaneously hold them fully responsible

for the making of a number of decisions, for their choice and consequences.

There is a close link between the scale of rights, on the one hand, and the development of duties, on the other. If collectives are given broad rights, responsibility devolves upon them for the results of exercising these rights. If collectives act on orders from above, only the observance of these orders can be demanded of them.

Could we consider that prior to the present reform collectives had more duties than now? No, the list of duties has increased because now enterprises are responsible not only for the fulfilment of concrete assignments set from above but also for many spheres of economic life which in the past were in the competence of leading management agencies. Enterprises cannot appeal to anyone if due to a fault of their own they made wrong decisions. They have no right to ask for a subsidy if the efficiency of production declined, while there were objective prerequisites for rational operation under normal management conditions.

At the same time society has no right to deprive collectives of advantages in stimulation if they improve their production and economic performance thanks to more rational use of objectively equal economic possibilities.

In future the role of economic methods will rise. It is contemplated specifically to extend the composition of the output planned by enterprises themselves, to increase the scale of direct contracts and trade in means of production. The influence of credit relations on the economy will be substantially raised. Prices of new goods will be set with increasing consideration of their economic efficiency. Besides economic and administrative methods of management there are also educative methods. They consist in fostering a communist world outlook among the people, in raising their consciousness and constructive initiative, in morally stimulating high labour results.

Moral stimuli to labour are distinguished in that they are not directly linked with material incentives. "Communist labour in the narrower and stricter sense of the term," Lenin wrote, "is labour performed gratis for the benefit of society, labour performed not as a definite duty, not for the purpose of obtaining a right to certain products, not according to previously established and legally fixed quotas, but

voluntary labour, irrespective of quotas; it is labour performed without expectation of reward, without reward as a condition, labour performed because it has become a habit to work for the common good, and because of a conscious realisation (that has become a habit) of the necessity of working for the common good—labour as the requirement of a healthy organism."<sup>1</sup>

Many people already now work not only to gain the means of livelihood but also because they cannot conceive their life without labour, because labour itself has become a prime requirement for them. This is displayed in different forms, including the striving of people to do more interesting, creative work even if it pays less than little attractive or an arduous job. The great striving for a higher education is a fact, although earnings after acquiring it are not always higher. What is the point then? In the desire to become a graduate engineer, economist, lawyer, or agronomist? This is the case, but it tells only part of the story. What is much more essential is that work is regarded not only as a means but as part of the purpose of life itself and that labour is gradually turning into life's prime requirement.

With the building of communism the role of the moral factor will steadily rise. The future belongs to it. That is why the Communist Party and the Soviet state have attached, and will attach, ever greater significance to the development of moral stimuli, to educating the masses in the spirit of the communist ideology.

## **2. Prices as an Instrument for Fulfilling the Centralised Plan, and Pay for Resources**

Correct evaluation of the results of an enterprise's operation is an important element of managing production. This is achieved with the help of scientifically based prices. It is not accidental but fully natural that one of the first steps of the reform was to set up the State Committee on Prices at the USSR Gosplan which in 1970 was reconstituted into the State Committee on Prices of the USSR Council of Ministers, and that new wholesale prices of manufactured goods were introduced in 1966-1967.

<sup>1</sup> V. I. Lenin, *Collected Works*, Vol. 30, p. 517.

Further improvement of price formation is facilitated by the elaboration of long-term prices by groups of goods and correspondingly by industries for 1971-1975. The point is that enterprises are able to make correct current decisions orienting themselves on proper current prices. As for long-term questions—the making of substantial investments, research and development work, training personnel, change in the assortment of output—their solution demands knowledge of the prices in the period when the new productive capacity will be commissioned, new goods will be produced, and so on. If long-term decisions are based on current prices, at the moment they are implemented losses might arise because of the operation of lower prices than was expected. It may turn out that investments had to be channelled not into the given but a different line of production, that not the planned but other goods had to be produced. The expenditure for research and development may prove to be fully or partly ineffective.

Transition to long-term prices is designed to eliminate the limited nature of current price formation. But it is a difficult task, the accomplishment of which demands the linking up of the material and value aspects of long-term national economic planning. It is necessary not only to “deduce” prices from the plan but also to elaborate principles for their disaggregation for each concrete type.

The simplest way of establishing long-term prices is not to revise current prices but to extend their operation to the future period. But such simplicity would be worse than making many mistakes. Let us assume that the plan calls for the production of new articles while prices remain at the old (high) level. These prices would economically keep the demand within the old bounds and the plan could be fulfilled only by administratively compelling the consumers to use the new articles. This would have to be followed up by introducing subsidies for buyers. Simultaneously the supplying enterprises would receive excess profits. These profits would have to be removed. All this would weaken the cost-accounting system of both the consumers and producers of the new goods.

Nor would old goods fare any better. The preservation of the old prices would stimulate the further production of unnecessary goods. This could be prevented only by new

administrative restrictions with all the inevitable consequences in the form of subsidies to the consumers and the removal of the excess profit from the producers.

These are the reasons why long-term prices cannot be based on extrapolation, on the freezing of current prices. They are called upon to reflect the new conditions, to ensure the attainment of the plan objectives set before the economy.

Measures to increase the flexibility and operational nature of price formation have also been adopted recently. This is displayed in a fuller application of the principle of the obligatory reduction of prices per unit of useful effect (step-like prices), in extending the application of normative-parametric methods of forming prices of new industrial goods. According to these methods, enterprises themselves change prices of their output on the basis of price normatives conforming to each magnitude of the main parameters of the produced goods.

Enhancement of the role of the consumers in forming prices, attainment of equilibrium in the economy, an increase in state reserve funds capable of eliminating unfavourable dynamics of prices of definite articles will make it possible, in our opinion, further to extend the rights of enterprises in price formation. This will make prices even more flexible and raise their role in economic management.

At the same time we must not forget that many goods are bought even at high prices (specifically, prime necessities). Here it is absolutely necessary strictly to apply centralised prices. There are sectors of the economy where changes in production and consumption are quite slow and where it is also in place to apply only stable prices (specifically in a number of branches of the extractive industry).

But the mechanism of price formation under socialism is based on the centralisation of prices both in case of certain independence of enterprises in setting prices and of the strictest regulation of the latter from the centre. Only such prices can indicate to enterprises the correct trends of current and long-time development. This cannot be done by any spontaneous prices. Planned price formation is an important advantage of the socialist system, enabling it to make the most justified economic decisions.

Correct evaluation of the results of operation of economic

production units creates prerequisites for the proper calculation of profit but does not yet turn the latter into a precise criterion of the efficiency of production. For this purpose it is necessary to deduct from profit the parts created through the socially necessary use of the available productive assets, credits, natural resources, and so on. The scale of these deductions is set in a centralised way and forms part of planned guidance.

The nature of pay for assets must be examined not in isolation but by considering the sources of financing investments, and so on.

Society furnishes enterprises with money for the purchase of means of production: they come from the budget and the production development fund set up at enterprises from part of the social resources. Only the purchase of means of production by enterprises with the income received as a result of improving their work as compared with the socially necessary inputs can be regarded as a form of spending "their own" resources.

It goes without saying that all the enumerated methods of financing are based on social property in the means of production and only reproduce it. After the repayment of a credit, just as after creating productive assets with the resources of enterprises—from part of the socially necessary results and the "super-profit"—the assets remain the property of the entire people, as in the case of budget sources of their reproduction. The mechanism of financing productive assets is merely an instrument of rational operation, a cost-accounting form which helps to raise the efficiency of socialist production.

When society places money at the disposal of an enterprise, this is accompanied by strict social control over its efficient use. The return from the money resources, as from any other resources, is expressed in the duty of achieving the set normative of efficiency. The effect from the use of the same article differs among various consumers, but its price is the same. If an article is bought by enterprises in different sectors, i.e., if it is designated for inter-sector consumption, the price is the same.

The situation is similar as regards money. Although the effect of their use in various sectors and enterprises is not the same, the norm of efficiency has to be equal. On receiving

money resources, a collective has to work so as to achieve this norm as a minimum.

If these resources were returned at once, evidently no pay could be charged for their use. If they are returned later, in parts, in the form of depreciation, this is tantamount to paying in stages for the bought commodity, to failing to pay the full price at once. In this case society bears definite losses as compared with the immediate return of the money; the losses are the bigger, the longer the period between the provision of the money and their return.

It is this lost effect that society takes as a basis of pay for resources furnished for the creation of productive assets and embodied in them.

If investments are made with a received credit, enterprises, in addition to the interest rate, have to repay the loan. This repayment is made by handing over to the bank depreciation allotments for renovation. In this case the repayment of the credit comes from a source which is in line with the nature of the cycle of the value of the created assets and does not affect the other reproduction expenditures. The period of repaying the loan is equal to the period of depreciation of the built project. Thus, the sources of the credit and the repayment period depend on the production process and are determined by the actual return of the productive assets.

Can there be a situation when a credit is repaid, while the project created with it continues to function? Yes, if the conditions of operation of the given project have been exceedingly rational and it continues to function beyond the limit set by the depreciation period. If the credit was repaid by earlier accumulated resources or the income of other projects, in that case the means of labour bought by the loans will continue to serve when the credit has already been repaid.

The objective parameters of new equipment are the initial point in forming the interest rate of credit. The more efficient the commissioned machines, the higher, all other conditions being equal, the interest rate can be. In this case the rate of interest is equal to the socially necessary increment of the profit of enterprises through the use of credit resources. If it exceeds this level the use of loans inevitably leads to losses. If it is below this level the enterprises using credit resources are in a better position than those which

do not get them. Thus there is only one magnitude of interest which may be considered correct—it is equal to the socially necessary increment of profit obtained through the use of credit.

The degree of efficiency of new equipment also influences the scale of resources allotted for its development. The more additional goods can be obtained owing to scientific and technological progress, the more willingly society diverts resources from direct consumption in order to make a substantial gain in future. This increases the scale of investments, extends the sphere of their application and reduces the interest rate.

Differences in the size of profit obtained by different enterprises are often caused by the fact that some of them have more favourable natural conditions than others. Thus some enterprises extract coal by the open-cast method, while others have to resort to underground mining. With equal inputs for current needs and investments, there are oil wells with big and low yields. Individual enterprises extract raw material with a high useful content, while others obtain materials of inferior quality sold at a relatively low price.

Special rent payments made by enterprises to the state budget have been introduced to stimulate the full use of natural resources and to even out the income of collectives operating in different natural conditions. Their level cannot exceed the objective size of rent; otherwise it will undermine cost-accounting self-sufficiency. But rent payments must not be set too low, otherwise this will tend to show an improvement in the operation of enterprises on account of factors not linked with the quality of their work.

While interest is charged for money resources not yet embodied in concrete projects, rent expresses relations between society and a collective pertaining to the use of definitely attached natural resources (which come into monopoly possession of the given enterprise) that determine objective differences in the efficiency of production. That is why the interest rate is uniform, while rent differs in principle.

The calculation of rent must not be understood in the sense that an enterprise must pay for each ton of the resources placed at its disposal. A certain part of the resources de-

mands for their extraction an expenditure which exceeds the effect society receives. This is true of ores with a low content of useful components, of the deepest seams which demand big investments in fixed assets and so on.

If rent is collected in these cases, too, the collectives would spend their resources irrationally. To make them interested in efficient work society would have to introduce subsidies or give them privileges. Why? Society gains nothing in this case. The magnitude of rent must be calculated not on all resources but on the efficient ones.

In fixing rent it is also expedient to take into account the location of deposits. This task is very important because the transport component is weighty in the price and greatly influences the financial results of production. The problem of rent determined by the fact that "better methods of labour, new inventions, improved machinery, chemical manufacturing secrets, etc. . . . are used"<sup>1</sup>, has not been sufficiently elaborated.

Differentiation in the profits of enterprises may also be linked with the fact that they take up unequal land plots. If there is no valuation of land, alternatives of construction under which enterprises take up larger areas are possible; the erection of buildings with fewer storeys leads to a saving of expenses since the cost of construction rises disproportionately after a certain height. If the factor of land value is introduced in the calculation of efficiency it may be more advantageous to increase the number of storeys.

The Fundamentals of Land Legislation of the USSR and the Union Republics envisage that enterprises given land plots sown to crops have to compensate for the losses in agricultural production. This makes them confine the territory of an enterprise to the area really needed and helps save the best lands. For this purpose a correct economic valuation of land plots is needed. It is even more necessary for agricultural enterprises in which land is the main means of production and where the introduction of rent for it is the main factor in creating equal conditions of operation.

Fixed payments designated for removing high incomes of enterprises if they are not connected with their operation have been introduced under the new management methods.

<sup>1</sup> K. Marx, *Capital*, Vol. III, Moscow, 1966, p. 644.

It seems that fixed payments should be set not on the basis of the actual or planned profitability of enterprises but the objective conditions of operation. By the objective conditions we understand the output of highly profitable goods, the surplus profit of which results from conditions that do not depend on the enterprise. In the case of such goods the minimum absolute magnitude of fixed payments for the enterprise as a whole should be set to preclude the possibility of a reduction in budget revenue if the economic indicators of its operation deteriorate.

It is possible that there will be no fixed payments in the case of some highly profitable enterprises if their big incomes are a result of greater efficiency of labour and, on the contrary, will be extended to some low-profit enterprises which, owing to a fault of their own, did not utilise the advantages of their position. From this viewpoint there are sufficient grounds for applying fixed payments not only in the manufacturing but also in the extractive industry (even if there are rent payments in the latter).

Improvement of price formation, elimination of the considerable scarcity of certain types of goods, the setting up of adequate centralised reserves to ensure the maintenance of an optimal relationship between the demand and supply and also a number of other conditions will make it possible gradually to narrow the sphere of operation of fixed payments. But they are needed now. That is why it is important not simply to introduce them but also to determine the period of their operation.

### 3. Main Features of Cost Accounting

The new conditions of management have introduced serious changes in the cost-accounting system.

The rights of enterprises and associations have been substantially extended, which made it possible to bring them into line with the requirements of the economy today, its increased dynamism, bigger scale and trend towards intensive development, with the advance of economic executives in the localities and the need to raise the responsibility of production collectives to society. This specifically determined the need for transferring to enter-

prises rights to plan the concrete assortment of output, to specify in detail the needed materials and technical supplies on the basis of direct contracts, to set up and spend economic stimulation funds, determine the normatives of their own circulating assets, etc.

At the present stage of the Soviet economy—huge in scale, dynamic and multi-alternative—it is difficult to formulate a national economic plan without making the production collectives materially greatly interested in high (but real) plan assignments. Central agencies can and should correct plans of enterprises, but it is the enterprises themselves that can and must draw them up originally. Moreover these must be high and well-substantiated plans.

Prior to the reform the work of collectives was assessed by plan fulfilment. This approach was determined by the fact that almost all the parameters of their activity were centrally regulated. The assortment of output was rigidly fixed, almost all investments were allocated centrally (they were not to be repaid), the material and technical supply was fixed in detail. This practice made the leading agencies above all responsible for drawing up a correct plan. At a small scale of the economy, with the necessity of extensive redistributive processes and the insufficient training of local personnel and comparative stability of economic situations, this was justified.

What are the criteria for assessing the operation of an enterprise?

Collectives can increase labour productivity, save wages, raise the efficiency of investments, improve the output-asset ratio, accelerate the renewal of their output, improve its quality, introduce automated management systems, cut production costs, raise the level of profitability, obtain a bigger total profit, improve safety, ease working conditions and register achievements in many other comparatively general and specific indicators.

Let us assume that the operation of an enterprise is assessed by the level of each of these indicators separately. Then contradictions arise. First, at a different level of the various indicators (moreover, if there are no achievements in some of them) it becomes unclear how the personnel work, which of the indicators should be given preference, how they are to be compared. Second, many of the separate

aspects in the operation of an enterprise are reflected in the more general indicators. That is why the evaluation of every one of them separately and additionally according to the general results leads to duplication, to repeated encouragement or penalising, to attaching greater importance to the effect of some measures as compared with others. The way out of these contradictions is to elaborate an overall indicator for assessing the operation of an enterprise, reflecting in an integrated way all the aspects of its activity.

A single criterion does not preclude a system of specific indicators. This follows from the very concept "system". In a system specific indicators are part of the general result, strictly subordinate shares of it, they make up its "components". In this case the general is composed of the particular, the particular forms the general and there is no contradiction between them.

Formerly the indicator of fulfilment of the plan for the cost of production and in a number of industries for gross output was the chief criterion in assessing the activity of collectives. The profit indicator was used in planning but its fulfilment affected mainly the fund of the enterprise which, as a rule, was small and did not exert a serious influence as regards the material stimulation of the personnel and the development of production.

The bulk of the bonuses was given for fulfilling the assignments for inputs per ruble of commodity production, or the plan for gross output. In approving these targets the higher agencies envisaged a reduction in production inputs as compared with the preceding year or an increase in gross output. In the first case an improvement in the quality of goods was impeded because that required additional inputs as compared with the basic cost of production. The second case tended to stimulate a growth of the material intensity of output, artificial extension of co-operation in production and the reorganisation of combined works into separate enterprises which increased the gross output of every consecutive link.

Under the new management system the operation of enterprises is assessed, alongside other indicators, by the criteria of profitability and an increase in output sold (or profit). Profitability depends above all on the level of profit. Profit rises if the additional expenditure for improving the

quality of goods rises slower than the wholesale prices at which these goods are bought by consumers.

When the work of a collective was assessed by the fulfilment of plan assignments, it was held that the distinctions of its work were considered in the assignments themselves. An enterprise with big capacities received a higher plan. If it received more credits it was also given comparatively higher targets. Enterprises which were in more favourable natural geological conditions, in principle, were set bigger targets than those which operated in worse conditions.

Now the work of enterprises is assessed by indicators linked with profit. But profit greatly differs. To a certain extent this is determined by differences in the quality of labour. But that is not the only thing. Some enterprises have more productive assets than others. Individual collectives receive large credits, others get smaller credits. There are enterprises which bring in rent and there are some which have no rent. Rather high prices are set for some articles and their sale yields a considerable profit; other goods are sold at extremely low prices and at times they do not bring in a due profit.

If these differences are ignored, if the full profit is to be the criterion in evaluating the operation of enterprises, it will turn out that collectives which have big assets, extensively use credits, and so on, will be in a better position than those with fewer of these resources, although perhaps they utilise them more rationally.

Such an approach clearly would be wrong. It would orient enterprises on increasing the available resources and not on their efficient employment, on the development of extensive factors of production to the detriment of intensive factors. Socialist society is interested in something else, namely that all resources should yield the socially necessary return, that enterprises given bigger resources should produce a bigger effect. To this end enterprises have to make normative payments for resources which are deducted from profit. The resultant, calculated (net) profit (profit minus pay for assets, interest for credit, rent and other payments), is an indicator showing that the enterprises have achieved the social efficiency of production and obtained an additional profit above that.

At present cost accounting has essentially widened the

sphere of self-sufficiency. Self-sufficiency means that an enterprise itself finances its current and long-term expenditures and obtains a profit on a scale which ensures extended socialist reproduction. Self-sufficiency creates a regime of strict material responsibility, enhances discipline and stimulates production collectives. Expansion of the rights of enterprises and the development of self-financing relations make up two sides of one phenomenon, they determine each other. The connection of these processes consists in that self-sufficiency makes an enterprise economically interested in the best employment of the obtained rights, encourages good work and punishes negligence.

The development of self-sufficiency is displayed in the creation of substantial economic stimulation funds at enterprises.

The scale of production development funds has especially increased. This is determined in the main by granting enterprises the right to utilise part of the depreciation allotments for renewal.

In future, as the resources of society increase, cost-accounting associations are set up better able to make investments than individual enterprises, as the economy grows intensively and the replacement of old equipment is extended and accelerated, the rates of allotments to production development funds will further rise.

The new element in extending self-sufficiency of enterprises is the use of long-term credits for financing centralised investments. Credits have also been introduced for the renewal and improvement of the quality of goods. It is important that interest on all types of loans is paid from the profit of enterprises prior to establishing its calculated magnitude which affects the size of the stimulation funds. Thereby collectives are directly interested either in reducing the sum of credits or in raising their efficiency.

Cost-accounting self-sufficiency is displayed in the introduction or specification of pay for resources: pay for productive assets, as a result of which they are no longer free of charge, pay for natural resources (rent payments) and increased pay for felled trees. In the course of the reform of wholesale prices, the composition of inputs included in the cost of producing goods has been widened. In particular, part of the expenditure on geological prospect-

ing work has been included in the wholesale price. Enterprises which buy goods, the price of which covers part of the geological prospecting expenditure, in effect finance it, which is tantamount to further extending self-sufficiency.

It has been established that the shortage of circulating assets is covered by enterprises not through the state budget, as was the case previously, but on account of the income of the enterprises themselves.

The development of self-sufficiency in industry has also been expressed in increasing the size of fines and in obligating the guilty enterprises fully to compensate for the caused damage with their own cost-accounting resources. The same procedure has been introduced for losses which arise owing to the fault of transport organisations. The responsibility of supply agencies has been raised for violating contract obligations to deliver to construction sites equipment, instruments and other articles in complete sets.

An important distinction of cost accounting now is that it has to spread both "horizontally" and "vertically".

This implies the gradual transfer to cost-accounting methods of large economic associations and in a number of cases also entire ministries which guide enterprises and associations.

And so, the transition to the new management system has brought about serious changes in planning, enhanced the role of economic methods of management and determined the need for utilising new categories. This serves as the basis for reinforcing cost accounting and extending the rights and duties of production collectives.

LONG-TERM PLANS  
AND SCIENTIFIC FORECASTS

The economic reform in the USSR aims to improve the methods of socialist management. It presupposes the organic combination of two elements: general state planned guidance and the economic initiative of enterprises.

This demands the raising of the scientific level of planning and the economic substantiation of plans as an indispensable condition for the rational operation of the economy.

Planning encompasses a wide range of political, social, economic, scientific and technical problems. Planners are faced with the most diverse tasks, beginning with general questions of transforming social relations and ending with concrete problems of modernising and building individual enterprises. This determines the different aspects of the plan (national economic, sectoral and territorial), different periods of planning (long-term, mid-term and current plans).

*In conditions of the reform special importance attaches to long-term planning. Normatives of long-range action which make it possible to interest enterprises in carrying out essential measures for improving the use of productive resources, hold a major place in the general system of the economic mechanism.* Such normatives can be established only on the basis of long-term economic development plans brought down to every enterprise. Long-range normatives which regulate the relations of enterprises with the national budget, the distribution of intra-enterprise accumulations, and so on, are shaped in accordance with such plans.

The economic reform which enhances the role of long-term plans makes new, higher demands on planning agencies. They have to master thoroughly the art of exerting able and flexible influence which, by virtue of economic necessity, will impel enterprises constantly to utilise the productive resources more efficiently.

1. Long-Term Plans, Scientific Forecasts  
and Hypotheses

Throughout the history of the Soviet state its economy has been directed and regulated by long-term plans. They have played a tremendous organising part in the growth of the Soviet economy, in the historic changes effected by the Soviet people under the leadership of the Communist Party.

A distinctive feature of the present epoch is swift technological progress in the course of which traditional methods of production are radically broken up, the structure of society's needs sharply changes and economic relations become broader and more intricate. These changes are expressed in the building up of new sectors and lines of production, the tapping of ever new natural resources, essential shifts in the location of the productive forces, and so on. All this enhances the role of long-term projections.

In conformity with the specific features of the reproduction process *several levels of a long-term plan* are distinguished. The first level covers a period of five years. For this period a long-term plan preserves many features of an annual plan: precision in determining sectoral proportions; plan assignments addressed to definite enterprises; a concrete scheme of the location of new lines of production, and so on. A five-year plan with a breakdown by years is the basic form of long-term planning.

At the same time the experience of planning in the USSR has demonstrated the expediency of ascertaining the contours of economic development also for more distant periods, for 10-20 years ahead. The formulation of such long-term plans ensures continuity of five-year planning from one five-year period to another, makes it possible to guide in a planned way the solution of problems which go beyond the bounds of five years and raises the degree of scientific substantiation of the national economic plans.

The need to see distant horizons of economic growth is dictated by the sweeping scale of economic-political tasks. The formulation of long-term plans is determined by the duration of cycles in building up modern, large industrial complexes. Thus, the development of new areas, the drawing into national economic circulation of new deposits (for

example, oil and gas in Tyumen Region) usually demands 10-15 years. The approved complex of measures for land improvement and irrigation is designated for 15 years. Not less than ten years are usually needed for big construction programmes in industry and in the transport system.

Long-term plans linked with the solution of such cardinal socio-economic problems as the complete mechanisation of labour-intensive and arduous jobs, and so on, also encompass a period of 10-15 years. Town-development plans are usually drawn up for 20-25 years because only by considering the distant perspective is it possible to develop cities in a planned way. That is why plans of different duration—from 10 to 20-25 years are practically possible for separate national economic problems.

In the context of the development of social production in present-day conditions, the question was raised at the 24th CPSU Congress of formulating a long-term national economic development plan for 10-15 years. Practical preparatory work of designing such a plan has been started. It was emphasised at the Congress that long-term planning must rest on scientific forecasts of the dynamics of population, society's needs, scientific and technological progress, the country's economic potentialities, and so on.

In socialist conditions, forecasting represents the first stage of planning, scientific foresight of the future. And the plan is the law, the directive as regards the nature, ways and periods of economic actions.

A forecast is called upon to reveal the internal relationships and origin of economic phenomena, to consider major factors which determine the dynamics of national economic growth in future.

It is the logic of forecasting to bring out the most essential factors influencing the development of the national economy and establish possible economic situations in future.

In Soviet society a forecast not only registers the tendencies of growth but also orients planners on the search of constructive decisions ensuring optimal development. One of the most efficient concepts of economic growth is built into the plan. Moreover, the main features of this concept follow from the essence of the economico-political tasks for the given period.

Thus, while a forecast shows what can happen and under

what conditions, the plan determines what should happen and what measures should be taken.

The range of tasks accomplished in a long-term plan predetermines the type of problems for which forecasts and hypotheses of economic development should be elaborated. Conventionally they can be divided into three big groups: *socio-economic problems, scientific and technological problems and problems of structural shifts in social production.*

Socio-economic problems cannot be elaborated in isolation from the material conditions of production and, consequently, from technological progress and structural shifts. But these problems also are of independent importance because the strategy of economic growth proceeds from political principles.

Thus, the prewar five-year plans solved the problem of industrialising the country—that was the cardinal goal of society at that historical stage. In the postwar period the Soviet Union restored the wrecked economy, surpassed the prewar level of production and entered a new stage of economic development. Now the chief economic task is to build the material and technical basis of communism. Simultaneously the raising of the Soviet people's living standard is put forth as the most urgent task of our time.

It is necessary to bring out the achievements of scientific and technological progress whose application in production will make it possible to raise the national economy to a qualitatively new stage technically and, consequently, in economic efficiency. Today we must already visualise fundamentally new solutions to such cardinal problems as methods of producing energy, the synthesis of materials with pre-set properties, regulation of biological processes, tapping the wealth of the ocean, and so on. It may seem to short-sighted people that it is hardly worth while to pay so much attention to problems which at present do not promise considerable immediate results. But actually the pace of scientific and technological progress is such that by losing time today it may not be possible to make up for it in future or to do so but at a huge additional material cost. That is why the elaboration of scientific and technological forecasts acquires particular significance.

Contours of new discoveries are already discernible in science in the next few decades, while the steadily mounting

practical experience in fields like petro-chemistry, quantum electronics and laser techniques, study of plasma, semi-conductors, microbiology and other fields will involve new deep-going changes in industry, transport and communications, agriculture and other sectors of the economy.

Some views about fundamental scientific and technological problems whose solution will essentially change production are voiced in Soviet and foreign literature. For example:

between 1972 and 1977 the process of improving new superlight synthetic materials will be completed, which will bring about their widest use not only in the production of parts but also in the construction of buildings;

the industrial production of fresh water from salt water will be organised prior to 1980. It will be possible to obtain huge quantities of fresh water so needed for developing industry and irrigating big deserts;

controlled thermonuclear reaction will be achieved between 1980 and 2000, in other words, it will become possible to generate electric power by controlling the processes which occur during the explosion of a hydrogen bomb;

the industrial working of offshore mineral deposits and the vast reserves of manganese and copper at great depths will be organised between 1980 and 2000;

production of inexpensive edible synthetic protein will be arranged on an industrial scale between 1985 and 2010.

We mention these hypotheses only as an illustration. The task is to systematise available data and bring out the most essential features of scientific and technological progress at the present stage, and also to assess its influence on the cardinal economic indicator—rise in the productivity of social labour.

Another complex of questions is linked with the forecast of resources. It includes a demographic forecast, valuation of natural wealth and a forecast of reproducible material resources.

A demographic forecast first of all establishes the natural movement of population. The most intricate and responsible task is to ascertain the birth rate. The reproduction of population depends on many economic and social factors. Moreover, the selfsame factors—living standard of the population, education, employment of women by age groups, and so on—exert a different impact on the birth rate in

various conditions. Data of the forecast of the natural movement of the population is the basis for ascertaining the influence of demographic changes on shaping the major indicators of the national economy.

For example, the size of population predetermines a definite volume of production and the consumption fund. A change in the age composition demands an alteration in the structure of the consumption fund and the assortment of services. An increase, for example, in the share of children and the aged in the total population dictates an increase in the share of milk products in the output of all foodstuffs. A change in the age composition of the population also affects the nature of the distribution of the consumption fund into the funds of personal and social consumption.

The sex and age composition of the population determines the possible manpower resources. It also affects the nature of the distribution of the population by types of employment (the social economy and the household) and by sectors, and above all, between the material and non-productive spheres. Ascertainment of the main migration streams is likewise of great importance. The problem of raising efficiency in the use of manpower under full employment is a central element in the manpower resources forecast.

The forecast of natural resources covers all the main types of natural energy sources (of the sun, wind and water), all the main types of fuel (coal, oil, gas, shales and peat), ores of ferrous and non-ferrous metals, non-metallic raw materials (potassium salts, apatites, limestone, fire-proof clay, quartz sand, building materials, asbestos, and so on), vegetation resources, especially forests (by types of timber) and also, in the long-term perspective, marine plants, fresh water, fish and marine animals and other zoological resources, especially in the World Ocean.

A forecast of the natural resources should include:

- valuation of the volume of the given type of resources;
- determination of the inputs needed for their tapping;
- relative valuation of natural resources making it possible to establish the sequence of their use.

Initial studies have to cover a minimal range of natural raw materials which are of decisive significance for developing the national economy. This includes not only bulk raw materials like coal, oil, iron ore, raw material for mineral

fertilisers, but also resources which are extracted in small quantities and play an important part in technological progress.

With our tremendous resources it is of great significance not so much to ascertain the forecast reserves as economically to valueate what has already been prospected at least up to 1980. On the whole, it is expedient to specify and economically valueate the forecast reserves of the main types of natural resources and determine the need in them up to the year 2000.

For agriculture it is necessary first of all extensively to valueate the potential fertility of the soils, and also the long-range potentialities of utilising surface and subterranean water sources. Valuation of the water resources is no less important than the valuation of soils because a shortage of water may impede economic development.

Valuation of zoological resources should be made in agriculture and in the food and especially the fish industry. The fish resources have so far been studied insufficiently and are little exploited. A fundamentally new revaluation of marine resources as a practically unlimited source of proteins must be made for long-term planning.

A forecast of fixed assets and investments holds the decisive place in the forecast of reproducible material resources. In an overall forecast of national economic dynamics, planners study dependencies of the rate and structure of socialist reproduction under different scales of investments, different investment-intensity, gestation period (i.e., a different lag), and the material composition of investments.

Considerable attention is paid to forecasting the volume, structure and degree of utilisation of productive circulating assets and bringing out progressive tendencies in the consumption of raw and other materials and power.

The value of a forecast consists not so much in precisely predicting the magnitudes of economic growth, but rather in revealing the tendencies and logic of development and establishing alternative solutions to economic problems. The trustworthiness of a forecast depends on the extent to which the laws governing the forecast object or system have been ascertained, and, naturally, on the reliability of the research methods.

The future can be judged, without becoming utopian, only through a study of the present. Phenomena which at least in an embryonic form are displayed in the present and understanding of the laws of their development—all this provides a reliable basis for scientifically foreseeing social processes. Let us recall what Lenin wrote as to how Marx approached foreseeing the future: "There is no trace of an attempt on Marx's part to make up a utopia, to indulge in idle guess-work about what cannot be known. Marx treated the question of communism in the same way as a naturalist would treat the question of the development of, say, a new biological variety, once he knew that it had originated in such and such a way and was changing in such and such a definite direction."

*Forecasting the development of economic sectors and industries holds an important place in the system of economic forecasts.* The basic problems in forecasting work by sectors are questions of scientific and technological progress, ascertainment of the cardinal economic problems of a sector which have to be solved in the foreseeable future to ensure progress and a rise in the efficiency of all social production.

Alongside an analysis of the technico-economic problems of a sector, global dependencies between sectoral and aggregated indicators of the national economy are established, for example, the relationship of the dynamics in the output of a sector or group of sectors with the dynamics of the total product, the national income, compensation fund and the gross output of all industry.

Sectoral problems of economic forecasts should be elaborated both according to the accepted, traditional classification of sectors and lines of production and by big groups which characterise the connection with the main types of society's needs. Among such groups, in our opinion, are:

constructional materials (the output of the iron and steel and non-ferrous metals and chemical industries and also non-metallic building materials;

the fuel and power group, which includes all types of fuel and power;

engineering;

consumer goods.

These groups are constructed not only by types of needs,

but also considering the most essential production relations, for example, of the food industry with agriculture.

The possibility of synchronising sectoral, local forecasts, their balance co-ordination, appears after a forecast of overall indicators of national economic dynamics is made. This can be done at later stages of forecasting.

*A forecast of social needs is a major aspect of long-term economic forecasts.* They are made up of productive and non-productive needs. It is in place here to remark that a real basis for a practical solution of this problem appears for the first time under socialism in view of the planned management of the economy.

*The entire system of long-term forecasts is consummated by socio-economic conclusions,* which characterise the socio-political results of the foreseeable development of the national economy.

A forecast of the development of the social and economic conditions has to characterise the influence of scientific and technological progress, the growth of the productive forces and the ever fuller satisfaction of needs exerted on the forms of social life and the relations of people in separate social groups.

The general line of social changes is determined by the programmatic propositions of the CPSU concerning the development of socialism into communism. The forecasts, on the other hand, contain the concrete indicators of this process in the studied period. They ascertain the main stages and sequence in accomplishing major social tasks, developing the forms of social property, changing the class structure of society and in the political, economic and cultural development of all the peoples and nationalities of the USSR.

An economic forecast must provide a scientific substantiation of the expected changes in economic relations between the state and socialist enterprises, between groups of producers and individuals within the bounds of an enterprise. This is especially important because of the economic reform which enhances the role of economic methods in guiding the national economy. A forecast must also touch upon the expected changes in the system of cost-accounting relations and in the forms of materially stimulating the producers.

## 2. Macro-Economic Models of a Plan

Accomplishment of the cardinal task of the economic reform, raising the efficiency of social production, first of all presupposes ascertaining and quantitatively expressing the principal ties of the socialist reproduction process and finding optimal national economic proportions. These aims are served by a macro-economic model of the plan.

Construction of a macro-economic model of a national economic development plan presupposes calculation of the major economic indicators which characterise the development of the economy on a national scale. The *national income (D)* is the main overall indicator reflecting the results of society's economic activity in production, consumption and accumulation. The produced national income represents the net product of the sectors of the national economy and thus accumulates the value newly-created by society in a definite span of time ( $t$ ). In planning and accounting an annual cycle of reproduction is taken as a unit of time but other time spans are also utilised. The per capita national income makes it possible to judge the economic development level of a country as compared with other countries.

The structure of the utilised national income gives a precise idea of the nature of society's needs. All the diverse needs of society are internally connected and make up a single system of needs. This system covers various needs: material and spiritual, personal and social, current needs and accumulation needs.

The utilised national income is divided into two main parts: 1) the consumption fund ( $C$ ), personal and social, and 2) the accumulation fund ( $A$ ), i.e., net investments. Investments ( $I$ ) are differentiated into fixed assets ( $I_h$ ) and circulating assets ( $I_s$ ).

The relationship of the consumption and accumulation funds in the national income and especially the share of productive accumulation are the most fundamental questions in constructing a macro-economic model and formulating a national economic development plan.

It is under socialism that planning an optimal ratio of *consumption and accumulation*, which ensures a swift growth

of the people's welfare, arises for the first time as a scientific problem. Such an approach to the development of the economy directly stems from the historical mission of socialism which is called upon to build the material and technical basis of communism and achieve, on this foundation, the highest living standard for the people.

The correlation of consumption and accumulation exerts a tremendous influence on the growth rates of individual sectors and the national economy as a whole. An increase in the share of accumulation, especially in productive assets, all other conditions being equal, accelerates the development of sectors which produce the means of production. On the contrary, an increase in the share of consumption in the national income involves greater development of the production of consumer goods. At the same time shifts in sectoral proportions under the impact of technological progress change the sectoral structure of the consumption and accumulation funds, determine a rise in the efficiency of productive accumulation and thereby make it possible to change the ratio between accumulation and consumption in favour of the latter.

A close link and interdependence exist between economic growth rates and the efficiency of social production. Acceleration of economic growth rates increases the mass of the national income. A bigger mass of national income makes it possible, with a stable share of accumulation in productive assets, to increase the mass of the means of production. These means ultimately are materialised chiefly in fixed productive assets which leads to a rise in assets per worker.

The growth of assets per worker exerts a determining influence on the growth rates of labour productivity—the cardinal factor for accelerating the development of social production. Annual growth rates of the national income ( $r$ ) are found from the following ratio.

$$r = \frac{\Delta D_{t+1}}{D_t}$$

Knowing the base magnitude of the national income, the average annual growth rate and the duration of the plan

period ( $t$ ), we find the volume of the national income at the end of the period:

$$D_t = D_0(1 + r)^t.$$

High and stable rates of extended reproduction are characteristic of the Soviet economy. The national income increased in all years, except the war period.

Alongside the national income, there is the concept of the *final social product*. The final product differs from the national income by the magnitude of replacement of retired fixed assets and their thorough repairs and by the magnitude of the export-import balance. Thus, the main elements of the final product are: 1) the consumption fund; 2) the accumulation fund; 3) replacement of retired fixed assets and their thorough repair ( $R_k$ ) and also 4) the balance of exports and imports. The correlation of the national income and the final product is illustrated by data of the following table:

*The Final Product and the National Income for 1959-1963*  
(million rubles, in actual prices)

	1959	1960	1961	1962	1963
Final product	146,400	160,700	170,300	184,300	192,800
National income	136,200	145,000	152,900	164,600	168,800
Difference	10,200	15,700	17,400	19,700	24,000
Final product, per cent of national income	107.0	110.8	111.4	112.0	114.2

The cardinal place in the final product is held by the consumption fund<sup>1</sup> which makes up approximately three-fourths of the total, and within it, the personal consumption of the population comprising nine-tenths of the entire consumption fund.

Economic growth rates are shaped under the influence of a number of production factors, the most important of which are labour resources, the skill of the labour force and technological progress. On close examination we find that techno-

<sup>1</sup> Non-productive consumption.

logical progress and the consequent rise of labour productivity are summed up in the efficiency of productive accumulation, while economic growth rates are a function of the share of productive accumulation and the number of persons engaged in material production.

Construction of a macro-economic model of development of the national economy is based on the results of analysing the factors of production and considering the degree of their influence on economic growth rates during the plan period. At the initial stage a hypothesis is elaborated of the growth of the national income depending on the expected efficiency of productive accumulation and its share in the national income. Finding the optimal share of productive accumulation is ultimately linked with ascertaining the maximum possible and stable growth rate of the accumulation fund in the plan period.

The volume of the national income obtained by calculating the share and efficiency of accumulation of fixed productive assets is specified by calculations of the factors of labour. A hypothesis of labour resources is based on demographic data about the probable change in the size of the able-bodied population in the plan period. Taking as a basis the existing structure of distribution of manpower by spheres of social production, or introducing into this structure necessary adjustments considering the aims of the plan, the total possible number of employed in the sphere of material production ( $L$ ) and also its growth rate ( $l$ ) are ascertained. Knowing the duration of the working week we find the total possible fund of working time.

Parallely a hypothesis of labour productivity ( $P$ ) is also elaborated. The possible rise in labour productivity is substantiated by different methods. We know the correlational ties between the growth in assets and power capacity per worker, on the one hand, and the rise in labour productivity, on the other.

Power capacity per worker is one of the basic factors in increasing labour productivity. The dynamics of labour productivity for big periods is closely linked with the dynamics of power capacity per worker. This is taken into account in substantiating the possible rise in labour productivity.

By multiplying the index of the number of working people or the possible fund of working time by the labour produc-

tivity index we obtain the growth rate of the national income for the plan period. Since  $D=P \times L$ ,

$$\frac{D_{t+1}}{D_t} = \frac{P_{t+1} \times L_{t+1}}{P_t \times L_t}$$

$$\text{or } (1+r) = (1+P)(1+l) = 1+P+l+Pl.$$

Since  $Pl$  is a very small magnitude, the formula can be simplified and denoted as follows:

$$(1+r) \approx 1+P+l, \text{ i. e., } r \approx P+l.$$

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

Another calculation of the magnitude of the national income is linked with an analysis of the movement of fixed assets and the efficiency of their use. The original hypothesis of the rates of extended reproduction of fixed assets can be made on the basis of the existing tendencies and also the use of the methods of demographic statistics, i.e., considering the age of the equipment, the accepted periods of its replacement, modernisation, and so on.

The simplest method of calculation is based on the use of the output-asset ratio. Knowing the sum of fixed productive assets and the output-asset ratio, i.e., the output of goods per ruble of assets, it is possible to calculate the gross social product and from it obtain the national income.

The use of the output-asset ratio, of course, does not mean that the national income is created by fixed assets. In reality, living labour is its source, and the magnitude of the national income depends on the quantity of labour expended in material production and on labour productivity. Nevertheless the output-asset ratio is used in planning the national economy because it expresses an important qualitative side of the reproduction process.

The hypothesis of the dynamics of fixed assets is coordinated with the possible scale of investments. Their sum for the needs of production depends on the total magnitude of productive accumulation and the sum of depreciation

allotments for renovation. It should also be noted that the rate of economic growth depends on the efficiency of investments which is expressed in the magnitude of investment per unit of capacity (unit investment).

The increment in output during the entire plan period is established on the basis of output indicators for the last year of the plan calculated on an aggregated model. These increments in output and the coefficients of unit investment (per unit of increment of gross output) enable planners to ascertain the necessary volume of investments which ensure the planned level of production. The balancing of the investment resources with the need in them, which follows from the planned growth rates, is also checked in the process of elaborating the aggregated model.

Accumulation resources may be ascertained as a result of using the first method of calculation in combination with a preliminary valuation of the volume and dynamics of the consumption fund. In this case the valuation of the consumption fund should be regarded not as an independent method of calculation but as an approach to establishing the ratio between consumption and accumulation, as a step in calculating the possible investments.

Ascertainment of the possible scale of accumulation makes it possible to link the dynamics of the national income with the movement of accumulations, investments and fixed assets. Let us introduce the following additional symbols:

$K$  — volume of fixed productive assets,  $m$ —their annual retirement,  $l = \frac{D}{K}$ —output-asset ratio (similar to the indicator of the productivity of living labour  $P = \frac{D}{L}$ ). Since

$$D = eK \text{ and } \Delta K = I - m$$

$$\text{with } e = \text{const. } \Delta D = e \Delta K = eI - em = e(I - m) = eA,$$

$$\text{or } \frac{\Delta D}{D} = e \frac{A}{D}, \quad r = l \times a,$$

where  $a$ —share of productive accumulation in the national income. Consequently, the increment rate of the national income equals the asset-output ratio multiplied by the share of productive accumulation in the national income. Thereby

the general formula of determining the planned volume of the national income is presented as:

$$D_t = D_0(1 + ea)^t.$$

The described methods of constructing a macro-economic model of national economic development give only a general, simplified notion of the scheme of calculations. Real designing of a model involves exceedingly intricate work linked with processing a vast amount of statistical information, analysing the existing tendencies of economic growth and considering the principal trends of technological progress and many conditions and constraints. It entails a large number of reciprocally crossing calculations, each of which specifies or supplements another calculation. These computations are of a multi-alternative nature not only because different aims of the plan are set, for example, a different structure of the national income (ratio of the accumulation and consumption funds), but also because planning economic growth rates presupposes the reciprocal dovetailing of different hypotheses and a consecutive approximation of the calculations of economic growth rates by different methods.

### 3. Economic Substantiation of a Plan

The general idea of the economic substantiation of a national economic plan above all resolves to ascertaining the volume and structure of social needs, to evaluating the available and foreseeable material and manpower resources and then determining the most efficient ways of satisfying society's needs. This idea, expressing the essence of the scientific substantiation of plans, acquires still greater importance now because the main task of the Ninth Five-Year Plan is to secure a considerable rise in the living standard and cultural level of the people on the basis of high growth rates of socialist production, increase in its efficiency, scientific and technological progress and accelerated rise in labour productivity. This line signifies a deep turn of the entire Soviet economy towards implementing an extensive social programme and determines the policy of the state

not only for the current five-year period but also serves as the long-range general orientation of the Soviet Union's economic development.

The planning system is faced with the task of arranging all analytical, balance and organisational work so that plan assignments stem from scientifically-based needs of society and an objective evaluation of productive resources and reserves and determine the ways for the most efficient development of the national economy.

The needs of society in an individual product cannot be established in isolation, without a link with the production and consumption of other goods. From this follows the need of organically linking sectoral projections of production with aggregated national economic calculations and such general proportions as, for example, consumption and accumulation. Sectoral projections represent a kind of skeletal and muscular system of the national economic plan. In them the plan finds its concrete material embodiment. At the same time these projections are completely pointless in isolation from the general economic proportions. The latter reflect the cardinal economic-political tasks of the plan period, set the boundaries of the real possibilities for the expansion of production in separate sectors and the main trends in the development of the national economy as a whole.

The modern methodology of plan designing takes into account the need for enhancing the role of *aggregated calculations* at the preliminary stage of elaborating a long-term plan. It proceeds from the principle that before undertaking detailed sectoral projections it is necessary to construct a preliminary aggregated model of a plan which encompasses only the main indicators of the rates, factors and proportions of extended socialist reproduction. This enables planners to determine the main parameters of the future plan, taking into account the attained level of development and the economic-political tasks of the forthcoming period and to mark out with sufficient precision the area of real possibilities, within the bounds of which the exploration of planning decisions, including sectoral calculations, is to be made.

As soon as the aim of production becomes known, the main thing in planning is to organise most efficiently social production and to ensure the attainment of the set goal in the possibly shortest period with the least inputs of labour

and material resources. The more rationally labour resources are utilised, the more economically raw material, fuel and electric power are consumed, the lower the unit investments and the higher the labour productivity, the fuller the social needs can be satisfied. If accounting and planning of social needs furnishes the answer to the question as to what should be produced, planning of the utilisation of resources indicates how to produce, i.e., how to manufacture certain goods in the most economical way.

A primary task of the economic substantiation of a plan is to evaluate the efficiency of structural shifts in the economy and to determine the most rational proportions in the development of the economy.

In the course of socialist construction the Communist Party of the Soviet Union has elaborated a number of fundamental propositions which laid the theoretical and methodological basis for solving questions of proportional economic development. Of special interest in this respect are the Directives of the 15th Congress of the Communist Party of the Soviet Union for the First Five-Year Plan. To ensure high stable rates it was proposed in the Directives to proceed not from maximum accumulation rates for the next few years, "but from such a correlation of the elements of the national economy which would ensure the fastest growth rate over a long period".<sup>1</sup>

The Directives of the Congress pointed to the necessity for higher growth rates in the output of means of production for the technical reconstruction of the national economy, but at the same time emphasised the need for an optimal combination in the development of heavy and light industries. Considering it correct to shift the emphasis to the output of means of production, the Congress drew attention to the point that it was necessary "to consider the danger of excessive tying up of state capital in large-scale construction which will be realised in the market only after a number of years; on the other hand, it is necessary to bear in mind that the swifter turnover in light industry (pro-

<sup>1</sup> *KPSS v rezolyutsiyakh i resheniyakh syezdov, konferentsii i plenumov TsK* (The CPSU in Resolutions and Decisions of Congresses, Conferences and Plenary Meetings of the Central Committee), Part II, State Political Literature Publishing House, 1954, p. 454.

duction of prime necessities) makes it possible to utilise its capital also for construction in heavy industry provided light industry is developed."<sup>1</sup> These and many other recommendations of the 15th Party Congress have preserved their importance to this day.

Consistent application of the principle of the accelerated development of economical sectors and lines of production which promote technological progress, an improvement in quality and a reduction of costs, is a major requisite for creating the most advantageous proportions from the economic viewpoint. The economical nature of a line of production is brought out by comparing its performance indicators with similar lines.

The economically expedient boundary of replacing some goods by others is regulated in the plan by accelerating the growth rates of the economical, i.e., progressive lines of production and slowing down the rate of, or fully curtailing, the production of less economical goods. Different growth rates of separate sectors and lines of production change the sectoral structure of the economy. Priority growth of economical sectors brings about a general rise in the efficiency of production expressed in accelerated rates of increase of the national income and ultimately in the expanded volume of material goods society receives.

*To extend the economic independence and initiative of enterprises the number of plan assignments set to enterprises by ministries and departments has been reduced to a minimum. In these conditions the demands made on the substantiation of plans and the balancing of plans of individual sectors and spheres of the national economy are particularly raised.* Further improvement of the balance method of planning is one of the effective ways for attaining the necessary balancing of national economic plans and for setting rational national economic proportions.

*The inter-sector balance of production and distribution of the social product, which represents an economico-mathematical model of the reproduction process, usually within the bounds of an annual cycle, is one of the modern methods of balance calculations based on a mathematical apparatus and electronic computery. It is a kind of overall material*

<sup>1</sup> *KPSS v rezolyutsiyakh i resheniyakh...*, p. 454.

balance which ensures the reciprocal dovetailing of production and distribution of goods between all sectors of the economy. The inter-sector balance is not confined to the sphere of production and records its connection with consumption and accumulation and also characterises the re-allocation and use of the national income.

The inter-sector balance combines quantitative proportions with their qualitative characteristics. Economic information, which makes it possible to calculate the total inputs of labour, assets and materials for each alternative of the structure of production, is introduced in the balance.

Coefficients of total inputs play a special part in calculating the volume of production by sectors of the economy. Total inputs of the output of one sector for the production of goods in another sector are obtained by adding the direct and indirect inputs for the entire cycle of social production.

For example, the total inputs of electric power for the production of one ton of aluminium consist not only of the consumption of electric power directly for electrolysis and the production of alumina and cryolite but also the consumption of electric power for the production of materials received from other industries, specifically, chemicals, fuel, and so on in the part that is used for producing aluminium. The coefficients of direct and total inputs differ greatly in most cases. For example, while the direct coal inputs for the manufacture of an automobile are 1.4 tons, the total inputs reach 10.1 tons, because they include the inputs of coal for the production of the metal used in an automobile, coal consumed in generating electric power for the manufacture of an automobile and electric power used in the production of the metal for an automobile, and so on and so forth.

Elaboration of the plan coefficients is the most labour-consuming part in the compilation of an inter-sector balance. The total number of coefficients equals the square of the number of sectors in the balance. For example, a balance of  $120 \times 120$  sectors should contain more than 14,000 coefficients. But actually in such a balance there are only 7,000 coefficients because the others have a zero value. Of these 7,000 approximately 15 per cent of the coefficients (about 1,000) are of decisive importance since they cover more than eight-tenths of all the material flows.

Coefficients of direct inputs are planned by designing

institutes and organisations which set these coefficients in accordance with the technical policy in each sector, the plans of introducing new equipment, new production methods, and so on. For example, about 100 scientific and designing institutes took part in elaborating the coefficients of direct inputs used in the planned inter-sector balance of the USSR for 1970.

Present balance calculations ensure quantitative conformity between production and consumption of a definite type of goods. But this is only a part of the problem which is being solved in ascertaining the sectoral structure and national economic proportions. The main thing is to establish the most efficient proportions in the development of the economy under which society's need for one or another product would be satisfied with the least inputs.

A long-term plan can be designed along scientific lines only if it is based not on the attained level of equipment but on tendencies of future development, if it solves long-range problems. Even when formulating a five-year plan its second horizon stretches some 10-12 years ahead. Enterprises the building of which will begin, say, in 1975, will be commissioned some three or five years later, that is, in 1978 or even in 1980. Investments in such factories (which had to be planned in 1968 or 1969 for the current five-year plan) must be oriented on the equipment of the future. Otherwise even at the designing stage they may already become obsolete.

Technological progress in many respects determines the major distinctions of the extended reproduction process in the future period: the possible construction dates, the ratio between new building and reconstruction, scale of production concentration, sectoral structure of production, and so on.

Revolutionary changes in the methods of manufacturing many goods, connected with the development of petro-chemistry, semi-conductors, the electric power industry, new discoveries in quantum physics, microbiology—all this causes deep-going changes in industry, agriculture, transport and communications.

The development of new equipment is not an aim in itself, but a decisive means for attaining a higher level of productivity of social labour. Only the economically efficient application of scientific and technological achieve-

ments exerts a real influence on the development of the productive forces and improvement in the living standard of the people.

In present-day conditions the highest efficiency of technological progress can be attained through the intensification of social production. Putting to the fore the problem of intensification, we want to emphasise the significance of qualitative shifts in the economy, the need for more efficient use of raw and other materials, an improvement in the quality of goods, the introduction of technical innovations which, with the available material and labour resources, would comprehensively satisfy the needs of society. Only by intensifying production is it possible to utilise most fully the tremendous potentialities of the socialist economy.

The accelerated development of progressive sectors and the building up of new economical lines of production promote an improvement in the structure of industry. This applies above all to the manufacture of new products which embody scientific and technological progress in chemistry, electronics, the peaceful uses of atomic energy, and so on. The experience of industrially developed countries shows that in the engineering industry, for example, faster rates are set in the economically advantageous production of lasers, fuel elements, semiconductors, space equipment, computers, machinery for purifying water and air, vacuum and oxygen equipment, machines for the extraction of minerals from the sea and ocean bed and biotherapeutical equipment.

The concept of a long-term plan and the means for attaining the goals it sets are constructively embodied in a change of the structure of social production, in new economic proportions. This determines the importance and role of the structural policy of the state.

Achievement of the necessary structural shifts presupposes large investments. In the USSR they exceed one-fourth of the national income.

New problems of planning investments arise under the economic reform. It essentially changes the correlation between centralised and decentralised investments. The setting up of a production development fund at enterprises and the transfer of part of the depreciation allotments to this fund enhance the economic role of decentralised investments.

According to our estimates, they will amount to about 20 per cent of all investments.

In the new conditions the main designation of centralised state investments is to ensure the accomplishment of the cardinal tasks of the proportional development of the national economy and the solution of big problems of technological progress. The efficiency of these investments is largely determined by the general concept of the investment plan which encompasses major national economic complexes.

We refer to the drawing up of long-term programmes for the development of new territories and natural resources and the accomplishment of fundamental technical and scientific tasks. These include the building up of new sectors and lines of production, the development of power and irrigation systems, communications, and so on.

The general state plan of investments will represent, as it were, a complex of big construction programmes which establish strict co-ordination of the commissioning of individual productive and non-productive projects by dates and capacities.

We refer to big general programmes which cover the development of many industries, power and transport systems. Such programmes are especially needed for power systems. They demand consideration of co-operation among electric power stations, proper co-ordination with the development of the fuel industry, the transport system and consumer sectors. But the matter is not confined to the construction of electric power stations. Big investment programmes are also needed for developing new gas and oil areas and for building up complexes which include a number of manufacturing industries.

In conditions of extensive development every expansion of production demands a corresponding increase in the output of raw and other materials and fuel. In present-day conditions the problem of eliminating scarcity and strain in supply should be solved above all by creating technical devices which save primary and other materials, and not through a simple quantitative expansion in the extraction of raw materials. Its solution also demands a change in the economic relations of enterprises. Directly linked with the problem of eliminating the scarcity of resources is such a primary condition for intensification as the setting up of

reserves, moreover, not only of raw materials and finished goods but also of productive capacity. Without this it is impossible flexibly to reorganise production in accordance with the changing social needs, with the demands of the contemporary scientific and technological revolution.

The striving at every given moment to utilise to the utmost all resources hampers the pursuance of a flexible economic policy and hinders the attainment of balance. Moreover, alongside the shortage of planned reserves, there are immense hidden potentialities within production (surplus manpower, low coefficient of shifts, losses of raw materials and finished goods, and so on).

One of the major problems of intensifying social production is a rise in the efficiency of the use of the country's labour resources.

The problem of intensifying production is particularly important for agriculture.

The carrying out of programmes for intensifying agriculture should ensure an expansion of output without a substantial increase in acreage and with a minimal rate of increase in the head of livestock.

Such a way of developing agriculture naturally demands the creation of the necessary material and economic prerequisites. It is a matter of completing overall mechanisation in crop and animal husbandry, the large-scale construction of agricultural-industrial complexes, poultry factories, livestock fattening units and other projects characteristic of the industrialisation of production, fuller satisfaction of agriculture with mineral fertilisers, pesticides, herbicides and vitamins, and of a precise production specialisation of collective farms and state farms.

A wide complex of measures which greatly raises the material and technical provision of agriculture, elaborated in 1970-71, is swiftly being applied by the joint efforts of agriculturists and the personnel in related sectors—the engineering and chemical industries, construction, transport, and others.

The solution of big problems of popular consumption, acceleration of the rates of technological progress and a radical modernisation of the country's production apparatus through the intensive development of the economy demand substantial changes in national economic proportions. The

trend of structural shifts in the Soviet economy can be envisaged as follows:

reallocation of the social resources which ensures the accelerated development of agriculture, the consumer goods industries, the service sphere and some other sectors linked with carrying out the social programme of the Ninth Five-Year Plan;

priority development of the most efficient lines of production corresponding to the latest scientific and technological achievements which ensure a rise in the technical level and efficiency of all sectors of the economy;

further industrialisation of all sectors of material production and the non-productive sphere, elimination of arduous, unskilled types of labour on the basis of mechanisation and the wide introduction of economically efficient forms of automating production;

accelerated development of the lines of production and technical facilities which ensure a more thorough and high-quality processing of raw materials, an improvement in the quality of goods and elimination of losses during transportation and storage;

high growth rates in the production of consumer goods based on a technical advance and consolidation of the material basis of the respective industries;

rise in the share of investments in building non-productive projects, above all houses and public utilities, an increase in the share of the non-productive sphere which serves the population;

priority increase in current and investment inputs for the systematic renewal, modernisation and reconstruction of the production apparatus and renewal of the assortment of the produced goods.

Elaboration of problems of further developing the Soviet economy will make it possible to substantiate in greater detail the long-term structural policy.

## CHAPTER 4

### TERRITORIAL PLANNING AND THE ECONOMIC REFORM

The comprehensive development of economic regions is of great importance under the sectoral system of planning and management. The territorial aspect of the plan has always been, and remains, an integral part of the state planning system in the USSR.

In pursuance of this important principle, a number of measures has been taken in recent years. It has been decided to extend the rights of the Union Republics. Enterprises and ministries now have to submit their draft plans not only to the higher Union, but also to republican agencies, so that the republics should be able to exert greater influence on the comprehensive nature of the development of the productive forces in their territory.

A special decision has been made concerning an improvement in the work of local planning agencies—planning commissions of territories and regions, Gosplans of autonomous republics, and city and district planning commissions. Enterprises and organisations located in an administrative region or territory, irrespective of their departmental subordination, have to inform the respective local agencies about their development plans, which enables planning commissions to draw up overall indicators of the development of their regions, regional balances of labour, and so on.

Measures to improve long-term planning of the location of the productive forces have also been effected recently. Work is under way on a general scheme for the location of the productive forces by economic regions and Union Republics with detailed indicators for 1971-1975 and main indicators up to 1980.

Of fundamental importance is the decision of the Central

Committee of the CPSU and the USSR Council of Ministers on the further development of the productive forces in the Far East. This decision instructed the USSR Gosplan annually to draw up a plan for the development of the large Far Eastern economic region. The first such plan was prepared and approved for 1968.

At the same time the further development of the country's economy demands a *serious improvement of territorial planning, its organic tie-up with sectoral planning and the use of cost-accounting indicators in the territorial organisation of social production*. These questions are the subject of lively discussions in economic literature and periodicals.

### **I. Combination of Sectoral and Territorial Planning**

In designing a national economic plan there is a certain freedom of choosing directions for the use of resources and satisfaction of needs. This determines the multi-alternative nature of the national economic plan. It is very important to examine the degree of independence required by different levels of management. At the level of overall national economic planning where sectors and lines of production and also economic regions are the objects of planning, possible alternatives in economic development may arise under the influence of a change in the ratio of accumulation and consumption in the national income, different growth rates of output in separate sectors and satisfaction of separate kinds of needs, under the influence of general shifts in the location of the productive forces, and so on. At this level of planning the possibility of choosing different sites for new enterprises and different technological schemes for obtaining a homogeneous product are not considered; nor can the substitution of individual goods be examined here in a concrete form.

All these concrete parameters are analysed in formulating plans of sectors. Here first place is taken by questions of choosing the most efficient technical and economic solutions, combining reconstruction and new construction, choosing optimal capacity and specialisation of both operating

and new enterprises, selecting the sites for building new enterprises, and so on.

In addition to all this, possible alternatives of economic decisions are also linked with consideration of regional factors. In developing and locating enterprises of every sector, it is necessary to take into account the conditions that are general for all enterprises situated in the given territory and may vary. Among these general conditions are: the possibility of the comprehensive use of raw materials by enterprises of different sectors, the existence of a single construction base in the region, unity in the use of labour resources, the available transport network in the region, its location, the service sphere regardless of the sectors in which the people work, and so on.

Non-consideration of regional conditions, even from the purely theoretical viewpoint, makes impossible the formulation of an optimal plan or approximating it. Their non-consideration may even make a plan unfeasible. If, for example, in accordance with sectoral plans it is necessary to concentrate in a given territory a number of enterprises for which in this region there is no sufficient manpower (considering possible recruitment), service establishments, housing, etc., this means that the given sectoral plans, each of which separately may be locally correct, in their totality cannot be carried out in the periods envisaged in the plan. Non-consideration of regional factors makes the plan unreal. Needless to say that such a built-in discrepancy has far-reaching adverse consequences. An enterprise not commissioned in the specified time fails to produce goods, which disrupts the plan of consuming sectors, and this, in turn, by a chain reaction, will influence sectors of a third group. This will upset the manpower balance and from this will follow changes in the planned size of the wages fund, then in money circulation, trade, and so on.

*Regional conditions of the development of social production are objective conditions.* They are of an inter-sector nature because they unite objects of different sectors which have to be located in the territory of the given region. At the top, national economic level of planning, these conditions which are specific for each region, naturally cannot be considered in any concrete way. Nor can they be taken into account in sectoral planning because objects of only the

given sector are considered and only in exceptional cases of related sectors, but in no way of all sectors.

Thus, we arrive at the conclusion that *regional factors can be considered only in the course of territorial planning*. It consists in the joint examination, from regional positions, of all economic objects situated in the given territory in order to formulate, on this basis, proposals for the comprehensive development of the region.

Let us examine in greater detail major regional factors whose consideration is a specific feature of territorial planning. We shall take as an example the regions of Siberia and the Far East.

### **1. Comprehensive Use of the Able-Bodied Population in Regions Through Proper Planning of the Development of Sectors of Social Production**

Enterprises of various sectors present a different demand for manpower—as regards the correlation of skilled and unskilled workers, male and female labour, age and vocation. Yet the structure of the able-bodied population, typical of many regions, is largely homogeneous, particularly as regards the proportion of women. One-sided development of the productive forces in a region, for example mainly of the primary sectors, results in an irrational use of the manpower resources: hand in hand with a shortage of male labour, goes a surplus of female labour.

Let us examine some examples in Siberia. On the whole Western and Eastern Siberia are regions short of manpower resources and for their replenishment it is necessary to recruit labour from other regions. In view of this, it may be surprising that in towns and industrial settlements of these regions, the share of the able-bodied population not employed in social production is higher than in regions of the European part of the country where in a number of cases there is a surplus of labour resources as compared with the needs of social production. Yet of all the big

regions in the country it is Eastern Siberia that has the most swiftly developing economy.

This situation is explained by the somewhat one-sided structure of the economy of Siberia, particularly in its eastern part, and the low development of the service sphere.

In many cities of Siberia—with a population of from 50,000 to 150,000—the extractive industries prevail (Leninsk-Kuznetsky, Kiselevsk, Anzhero-Sujensk and Mezhdurechye of Kemerovo Region, or Cherekhovo, Usolye and Tulun of Irkutsk Region), which restrict the employment of women workers.

The existence of a considerable number of industrial settlements which rise up near cities and timbering enterprises is also characteristic of Siberia. In view of the insufficient development of other spheres of work in these settlements the share of the able-bodied population not engaged in social production is twice as high as the average figure, and this goes parallel with a big shortage of manpower at the mining and timbering enterprises.

In small Siberian towns, many of which are district centres (towns with a population of less than 50,000), the problem of rationally utilising the labour resources is acute. In them mainly local industry is developed, which cannot utilise fully the available labour resources. That is why a bigger percentage of the entire able-bodied population is engaged in the household and in personal subsidiary farming, and the share of able-bodied women not employed in social production is even higher.

To prevent the one-sided development of industry and other sectors in towns and urban-type communities, it is necessary to draw up in every region a single comprehensive programme of economic development. This programme must be of a regional nature. In principle it cannot be carried out by one or several sectors. Here it is necessary to consider not only the development of industry, transport and construction, but also the entire non-productive sphere. To choose the best economic aspect for every town and industrial settlement, considering the rational use of labour resources—this can be done only by taking into account the location of this town, the natural conditions, the existence of agricultural zones, and other regional factors.

## **2. Optimal Territorial Organisation of Production Through the Wide Development of Territorial-Production Complexes**

Territorial-production complexes are a progressive form of organising the economy, especially in newly-developed areas. These complexes represent a totality of interconnected lines of production, which ensure the most efficient utilisation of the natural and labour resources in the given territory. Experience in planning and building such complexes in Siberia shows that the purely sectoral approach to planning these complexes restricts the advantages of this progressive form of the territorial organisation of production. Only a general regional solution of planning economic tasks in shaping a territorial-production complex can ensure high efficiency in the development and location of the productive forces.

The territorial-production complex must be a specific form in which a single plan will unite into an integral economic organism enterprises of the extractive and manufacturing industries, the power industry, and production services of regional importance.

## **3. Comprehensive Use of Natural Resources, Choice of the Most Efficient Alternatives of Their Exploitation**

Technological progress multiplies the use properties of natural resources utilised in industry. Efficiency of the production of raw materials increasingly depends on their comprehensive use, degree of processing, utilisation of byproducts, and so on. Frequently enterprises of different industries arise on the basis of one deposit of natural resources. Thus, in using nepheline for the production of aluminium, besides mines, an alumina factory and an aluminium plant (all are part of the non-ferrous metals industry), it is necessary to build a large cement mill for

utilising the wastes of alumina and a large soda factory. Without these additional lines, the utilisation of nepheline is little efficient economically.

Another important question in the comprehensive use of natural resources is consideration of the limited scale of certain resources utilised by enterprises of different industries. The most typical example is fresh water.

There is a pressing need for elaborating a single scheme for the comprehensive use of rivers and other water sources in the interest of all sectors, taking into account the national economic significance of every source. Rational use of fresh water sources, considering the interests not only of the present but also of the long-term prospects of Siberia's economic development, is an integral part of the comprehensive development of its regions. In this respect it is difficult to overestimate the role of territorial planning which takes into account the inter-sector interests.

## **4. The Link-up of Sectoral Construction Plans; Ensuring Synchronous Building and Commissioning of Productive Capacities in Related Sectors of the National Economy**

At the present level of the productive forces the production interconnections between sectors have greatly expanded. The size of construction projects has grown substantially. The capacity of modern electric power stations is measured in millions of kilowatts; steel works, in millions of tons; timbering complexes, in millions of processed cubic metres, and so on. In these conditions special importance attaches to ensuring the synchronous building and commissioning of productive capacities in interconnected industries.

The organisation of construction in a given territorial complex is a decisive factor which determines the interconnection of the commissioning of productive capacities in related sectors. For its nature the building process makes

the distribution of investments in a big project by years extremely uneven. Yet the capacities of building organisations are utilised most efficiently when they are loaded up relatively evenly in point of time. For this it is necessary to combine the construction of different projects. But the accomplishment of this task runs up against two limitations. The first is the need for the synchronous commissioning of enterprises interconnected by production ties; the second is preventing the scattering of investments over many projects and the need to concentrate manpower and resources on projects due for early commissioning, with a maximum reduction of the period for putting capacity into operation. The complexity of this task becomes even clearer if we also consider the specific difficulties of setting up and expanding the construction industry, the recruitment of manpower, the need evenly to load up the building equipment and the different vocational groups of building workers by seasons of the year. This is a comprehensive task tied to the territory in which the given construction organisation operates.

The time factor plays a special part in all this work. At present, in view of the long periods of building industrial projects (selective data show that the average period of commissioning new fixed assets in the USSR is 5-6 years), it is especially important to foresee for 5-10 years in advance the consequences of allocating investments by projects, the possible periods of commissioning new enterprises, the dovetailing of capacities in related sectors, and so on. A considerable reduction in building periods will create greater elasticity in allocating investments and will, in addition to everything else, be of great importance in preventing disproportions between the volume of building and assembly work and the potentialities of the construction industry, and also between the enterprises of the extractive and manufacturing industries under construction, and so on.

Co-ordination, at the inter-sector level, of the development of separate sectors and also their co-ordination with the expansion of the construction industry, is a major task of long-term territorial plans at the present stage.

## 5. Planning the Living Standard of the Population as a Comprehensive National Economic Task

Regional differences in the living standard and factors determining these differences must be studied and taken into account in the process of planning. Evening out the living standard of the population by regions cannot be effected solely on the basis of average indicators. Evidently this problem also cannot be solved by taking a country's average complex of living conditions as a yardstick for evening out the living standard in different regions. This is explained by the fact that in each economic region, alongside the general national economic and social factors which influence the shaping of the living conditions in all regions, there operate factors of a regional nature inherent only in the given economic region or a part of it (this especially applies to districts inhabited by small nationalities).

Planning of the living standard must be dovetailed with the general scheme for the development and location of the productive forces of a region and the country as a whole. Here it is important to analyse all the aspects of the development of sectors, the service sphere, and social and cultural development. Nor must this study be limited to one indicator, for example, the incomes of the population, without considering the social consumption funds, the level of consumption of food and non-food goods, the housing conditions, the public utilities and other services. All these indicators must be closely linked together and examined as a complex, as a single section of the plan of an economic region. Such an approach presupposes that planning of this sphere must be a matter for territorial planning agencies and not for separate departments and enterprises. Centralisation of planning of the living standard in territorial agencies is particularly important now in view of the formation at enterprises of funds designated for building houses and social and cultural establishments. These funds must be utilised most rationally in the interest of the entire population.

Since this chapter deals with territorial planning, naturally, main attention is paid to regional factors. But we would not want the reader to understand the author's posi-

tion in the sense that priority must be given to the territorial approach over the sectoral approach. We proceed from the premise that the sectoral plan is a basic link in the system of national economic planning. It considers the main part of the factors connected with machinery and production methods, with determining the size of enterprises, their location, and so on, which dictate the choice of the best alternative of the plan. The sectoral plan takes into account many factors, but as shown earlier, not everything. That is why the sectoral approach must be supplemented by a comprehensive analysis of the conditions for the development and location of production, which are determined by regional factors. The dovetailing of sectoral plans into a single territorial plan presupposes their reciprocal adjustment aimed at examining the respective alternatives so as to arrive, by a successive transition from the less suitable to the more suitable decisions, to an optimal comprehensive plan.

In our opinion, some of the functions of territorial planning in central agencies should above all apparently consist of: a) influencing the formulation of plans of research, in the first place long-term forecasting of scientific and technological progress, the growth rates and improvement of the economic structure of regions and zones; b) ensuring the dovetailing of the sectoral and territorial approaches at the stage of drawing up long-term (10-15 year) schemes for the development and location of production; c) control over such dovetailing at the stage of pre-project work and designing; d) dovetailing of sectoral projections at the stage of planning investments, interregional distribution of labour resources, and so on, and respective control in the process of construction.

In most of the Union Republics the connection between the lower and the USSR planning agencies and co-ordination of sectoral plans with the territorial approach can be apparently efficiently achieved through the Republican Gosplan. The initial point must be the drawing up of a long-term investment plan which unites all the interconnected construction projects in the given economic region or territorial-production complex. Moreover, such a plan should encompass not only industrial projects, but also the building of houses, public utilities, service establishments, and so on.

Methods of network planning, already tested in building a number of projects, can be utilised for the efficient fulfilment of the construction programmes ensuing from such a plan. The drawing up of overall network schedules of financing, construction and commissioning of interconnected production capacities both in a regional and interregional aspect does not present special technical difficulties. Such schedules should express the rational sequence and time-co-ordinated volumes of financing different construction projects, their provision with material and manpower resources and also envisage the synchronous commissioning of capacity of co-operating enterprises.

Special attention should be paid to newly-developing regions which possess scarce natural resources that have to be tapped with all possible speed.

Planning commissions of economic regions could be the middle link in territorial planning. At the present level of the territorial division of labour and scale of development of new regions, many long-term problems of economic development go far beyond the local bounds of administrative regions, territories and autonomous republics in the territory of which separate projects of a complex of interconnected lines of production are located. Moreover, the siting of a group of large enterprises in a certain place gives rise to such intra- and inter-sector and also territorial relations which often do not fit into the bounds even of a large economic region or a Union Republic. Thus, the development of the oil and gas and forest resources of the West Siberian lowland, of the Angara-Yenisei and Aldan-Chulman-Udokansk complexes cannot be efficiently arranged from local positions. Experience shows that local initiative by far is not always capable of formulating a solution most acceptable from the national economic aspect. Local agencies practically cannot take into account all the information needed for making an optimal decision.

To enable the planning commission of an economic region to exert tangible influence on shaping the region's economic pattern, growth rates of sectors, siting of enterprises, and so on, it should, in our opinion, be vested with rights of a department of central planning agencies. The functions of the planning commission of an economic region (as applied to its territory) should be as follows: a) influence on

formulating the plans of research and geological prospecting work; b) examination and endorsement of the plan of designing work for future years; c) basic balance calculations of production, labour resources and formulation of a single (i.e., non-departmental) plan for raising the living standard of the population (the results of this work must be taken into account by sectoral institutes in their projections); d) examination of plans and recommendations of lower territorial planning agencies, located in the region.

As for local planning agencies, in our opinion, their functions should consist of the following. The planning commission of a district executive committee of a Soviet of Working People's Deputies decides all questions pertaining to the development of the local economy of the district: it draws up current and long-term plans for the development of agriculture, motor transport, housing and public utilities, cultural and health services; studies the effective demand of the population and the sources for forming the consumption funds; makes balance calculations of the use of the land, forests, and water resources, and also balances for the provision of the district with building materials, fuel and electric power.

A city planning commission should handle problems organically linked with town development. It draws up a single plan for the development of the public utilities, urban transport, town improvements, location of industrial and transport projects and residential blocks. A master plan of the city must be the basis of all planning projections.

In view of the transition to the new procedure of planning and economic stimulation enterprises will accumulate large funds for the building of houses, social, cultural and service establishments. The question of providing this construction with material and technical resources has not been fully solved as yet. Hence the urgent need to draw up for every city an overall (non-departmental) plan of building houses, public utilities and cultural and service establishments. These plans should be prepared with the participation of local agencies, factories, ministries and departments and be examined and approved at sessions of city Soviets.

Definite experience in comprehensively planning the resources allotted for building houses and cultural and service establishments has been accumulated in recent years in

Moscow, Leningrad, Novosibirsk and other cities. Since this procedure of planning has justified itself, it should be extended to town improvements, the building of public utilities, children's and other institutions in all middle-sized and big cities.

## **II. Interaction of the Centralised Plan and Cost-Accounting Indicators in the Territorial Organisation of Social Production**

The transition to the new system of planning and economic stimulation creates favourable conditions for the wider use of economic cost-accounting indicators in the territorial organisation of production too. In our opinion, the logic of the development of the economic reform is as follows: first main attention was paid to extending the economic independence of the lower economic units—enterprises, building organisations, state farms, and others; then the cost-accounting principles of organisation, to one or another degree, are to be extended to the higher organisations—associations, central boards and ministries (this is a mature question and it is widely discussed in the press); simultaneously, cost-accounting principles should be introduced in territorial planning; lastly, the question will arise of creating an interconnected and organically uniform cost-accounting system of planning in the USSR from the bottom to the top, which optimally combines the central element of the socialist economy with the extension of the economic independence at all levels of the economic hierarchy (sectors, regions, enterprises and organisations).

The introduction of pay for natural resources is of primary significance in applying cost-accounting indicators for considering regional conditions. At present natural resources with few exceptions are actually free of charge. A certain exception is the payment for felled trees, restored in 1949, which was set at 46 kopeks per cubic metre and compensates only 25-30 per cent of the expenditure involved in forest management and, naturally, in no way stimulates thorough processing of the timber.

Pay for natural resources in effect represents differential

rent, the size of which is optimally determined from the position of society's national economic interests. This differential rent now, too, to a certain extent, is considered in price formation, inasmuch as wholesale prices are differentiated by regions and in a number of cases also by individual extractive enterprises considering the technico-economic indices of the deposits and the differences in natural productivity determined by them. Ever greater significance in this respect is acquired by the so-called system of differentiated calculation prices which are in force, for example, in the oil-extracting industry.

The existing system of purchasing prices in agriculture also takes into account the difference in the natural fertility of the soil and, therefore, the level of these prices is differentiated by agricultural zones. Under this method of regulation, the differential rent created in using the best, and in a number of cases also the average natural resources, as compared with the worst used, is removed proportionally to the quantity of the goods produced. If, say, there are two deposits and at one of them, with the worst conditions, the price is set at 10 rubles per ton and at another, better deposit, owing to the lower production costs, the price is fixed at 7 rubles, the differential rent per ton will be 3 rubles and its total will depend on the output at the second enterprise. However intensively the better deposits are utilised, the state receives 3 rubles per ton. It is clear that such a system will not stimulate the more intensive use of these favourable natural resources.

The situation is different if the resources themselves are valued and pay has to be made for them irrespective of the volume of production. Let us assume that the rent from the favourable deposit is fixed at 300 rubles which is repaid from the price of the goods. In this case the price per ton at the best enterprise has to be not 7 but 10 rubles per ton. If production amounts to 100 tons the rent per ton would be the same 3 rubles. But if this favourable deposit is worked more intensively and production, say, reaches 150 tons, the rent per ton will be already 2 rubles and correspondingly the enterprise will receive an additional profit of 1 ruble per ton. This additional profit resulting from the intensification of production will not be obtained if rent is collected in a different way, for example, with the help of calcula-

tion prices. This shows that the introduction of pay for natural resources in the form of a fixed rent is the best way as regards material stimulation and the use of this deposit.

This, however, does not exhaust the importance of such rent payments. What is also important is that they represent an evaluation of the economic efficiency of using the given resources from national economic positions and as such influence all calculations of economic efficiency affecting the utilisation of these natural resources. This is of particular significance for natural resources which now have no valuation and are used free of charge, for example, fresh water resources.

Rent payments as applied to different reservoirs depending on the quality of the fresh water, its scarcity, and so on, will make it possible to solve more correctly problems of siting water-intensive lines of production. Correspondingly, the rent valuation of land depending on its fertility and potentialities of use will make it possible to solve in a more substantiated way the question of the expediency of flooding lands during the building of hydroelectric stations, and so on. Rent payments for oil resources will help raise the efficiency of the technological alternatives of working these deposits which lead to a greater percentage of oil extraction from underground. The additional extraction of oil entails an added expenditure for pumping water into the seam, which in many cases raises the production cost, although from the national economic view this method is highly efficient.

Another important advantage of introducing pay for natural resources is that in this case unity of the price of production and consumption can be ensured. It is perfectly clear that for the consumer the price of goods of equal quality must be the same, irrespective of the cost of production. Under the existing system of rent removal it is impossible to set such a price for producers without resorting to subsidies to enterprises which utilise relatively worse resources and to the removal of profit without any compensation from enterprises which use comparatively better resources. The system of calculation prices leads to the existence of two prices: one for the producers and the other for the consumers. Such a situation, naturally, complicates

direct economic relations between the producer and the consumer and their interaction.

Rent payments for natural resources also have the advantage of being a more flexible form of removing differential rent than prices. Prices at which the calculations of economic efficiency and settlements for goods are made must be comparatively stable. But the natural conditions for the extraction of minerals in many cases are subject to rapid changes in view of the discovery of richer deposits or the swift exhaustion of better seams, and so on. This particularly applies to individual districts and individual deposits. In such cases rent payment can be changed more often than prices. In general, it is possible to have group rent payments and arrange a scale of their size depending on the characteristics of the minerals. For this purpose multi-factor correlational models can be successfully applied. In particular, the Institute of Economics and Organisation of Industrial Production, Siberian Division, USSR Academy of Sciences, did work to bring out the dependence of the technico-economic indicators of coal production in collieries on different natural factors (the depth, thickness of seams, angle of slope of the seam, and so on). These studies make it possible to establish a scale of rent payments for different collieries, taking into account the objective factors.

So far we discussed the advantages of a fixed pay for resources, in the given case natural resources, as compared with the removal of differential rent, through the system of calculation prices. But this also has a profound substantiation in the theory of optimal planning.

In introducing pay for natural resources in the form of rent payments, two types of natural resources should be differentiated. The first is the natural resources during the working of which differential rent is already removed, in full or in part, through the system of calculation prices. This above all concerns mineral wealth and also applies to forest and fish resources, inasmuch as prices for their goods are differentiated by regions. The second type of natural resources is of a somewhat different nature. These are resources which are free and are not considered either directly or indirectly in setting prices and calculating economic efficiency. This applies to resources of land utilised by industrial, building and transport organisations,

resources of fresh water and pure air. All of them are of importance for different sectors and their use directly influences the efficiency of production.

The real difference in economic efficiency of the respective lines of production must somehow be taken into account, if we want to manage the economy rationally and comprehensively consider economic efficiency.

How essential is the influence of fresh water on the economy is seen from the fact that already now fixed assets of water economy are estimated at 47,000 million rubles, which is 8-9 per cent of all the fixed assets of the country or 15-16 per cent of the value of the fixed productive assets. Under the general scheme for the comprehensive use and conservation of the water resources of the USSR, investments in all these measures up to 1985 will amount roughly to 169,400 million rubles, including 50,100 million rubles up to 1975.

A number of specialists estimate that the share of investments allotted for the water economy installations to meet the needs of irrigating agricultural lands and the expansion of water-intensive industries and the necessity for fuller purification of water will even further rise in total investments in the next 15-20 years. It will be even bigger than total investments in all branches of the engineering industry.

Greater attention is now being paid in the USSR to the protection of fresh-water reservoirs, the building of sewage-treatment installations, and a complex of measures is being carried out to prevent the pollution of reservoirs. But all these measures are almost exclusively of an administrative nature. This administrative responsibility for the rational use of fresh-water resources should be reinforced by material responsibility.

From the position of the country's entire economy the fuller purification of fresh water is undoubtedly advantageous, despite the need for additional investments in individual sectors. These additional investments in the timber processing, chemical, metallurgical and some other industries will be compensated by the saving in other spheres of the economy: the fishing industry, public utilities, and so on, especially when considering future periods. The introduction of pay for water, differentiated depending on its quality and scarcity in some or other regions, will be of great importance along several lines. First, it will exert an influence

on the more correct consideration of this factor, from the national economic viewpoint, in locating the respective enterprises; second, it will economically stimulate a rational attitude to the use of fresh-water resources. Third (this sums up the first two points), pay for fresh water will make it possible to calculate more correctly, from national economic positions, the efficiency of the most diverse economic measures linked with the use of fresh water.

In other socialist countries a system of pay for the use of water resources is already gradually emerging. Pay for water by industrial enterprises has been introduced in Czechoslovakia and Poland; in Hungary payment is made not only by industry but also agriculture and public utilities.

To prevent the pollution of water reservoirs it is important not only to limit the size of water consumption and to stimulate the repeated use of water, which may be done by introducing pay for fresh water, but also to encourage the fuller treatment of sewage waters. For this purpose it is also expedient to establish pay for each cubic meter of sewage water released into fresh-water reservoirs; moreover, this pay should be differentiated, depending on the degree of treatment of the sewage waters. The economic nature of pay for sewage water consists in compensating for the damage, above all to fishing, resulting from the release of untreated sewage water. Similar pay should also be introduced for the pollution of air by industrial enterprises, boiler rooms, and so on.

The introduction of pay for natural resources will be all the more important for improving territorial planning, inasmuch as the comprehensive rational use of national resources is a major regionalisation factor in the development and location of the productive forces. These measures, if carried out, will signify a new approach to territorial planning, the employment here, to a very considerable degree, of economic cost-accounting indicators which reinforce directive planning decisions on the location of the productive forces, the building of new enterprises, and so on.

It should be noted at the same time that it is not so simple to introduce pay for natural resources. This measure should inevitably be linked with a definite revision of wholesale prices of the means of production. The scale of the price revision will above all depend on the principles for deter-

mining rent payments, or more concretely, on setting the base level of inputs in utilising the relatively worse natural resources for calculating rent payments.

Many voice the apprehension that in orientation on the marginal inputs it will be necessary to raise wholesale prices of means of production two or three times, which cannot be done without affecting retail and purchasing prices. We share the view that it is practically unreal to raise wholesale prices two or three times. But it is necessary to point out that at times marginal inputs mean the highest actual inputs. Hardly anyone will agree that it is necessary to tie all prices in industry to the very worst level.

In valuating natural resources it is really necessary to orient oneself on the marginal alternatives in the use of natural resources. But the marginal alternatives should be considered, proceeding from calculations of the optimal plan and dynamic calculations for at least five-ten years in advance. In the fuel industry such marginal inputs were quite thoroughly computed for 1975 by the Siberian Power Institute and the Council for the Study of the Productive Forces at the USSR Gosplan. The level of these marginal inputs in the optimal dynamic plan as a whole proved to be even lower than the average wholesale prices in force in the USSR. It is in relation to this level of outlays which include not only current inputs but also investments, inputs for geological prospecting and so on, that rent payments should be calculated.

Other important rational resources which underlie territorial planning are the *resources of labour*, which are of an inter-sector nature.

At present tasks of the rational use of labour resources are solved chiefly in a directive manner. In examining the location of one or another project, after calculations of economic efficiency are made, the question of providing the given district with labour resources is taken up, and to some extent this is considered in the development and location of the productive forces. Of the economic indicators which are taken into account mention could be made of the regional level of wages which is shaped under the influence above all of regional coefficients and northern privileges.

Let us mention that the regional coefficient and the northern privileges do not reflect fully the real inputs in the

use of labour by the country's regions. For example, the total annual expenditure for one worker in Magadan Region, according to calculations of the Economics Laboratory, Northeastern Complex Institute, Siberian Division of the USSR Academy of Sciences, is much higher than the average wage there—an almost sixfold difference. This difference is explained by the fact that the recruitment of one worker to this region demands the building of the respective housing (and the cost of building here is three times higher than in developed areas), big expenses for the delivery of foodstuffs and manufactured goods to these regions which are not covered by the addition to the price of these goods, higher expenditure for the creation of the service sphere and the enlistment of additional personnel (workers in trade, public utilities, cultural, educational, medical and other establishments). In other regions, for example, in the southern zone of Siberia, the difference between the full inputs per worker and the sum of his wages will not be so striking. But even here the difference is substantial and it would be wrong not to consider it in calculating the efficiency of developing and siting the productive forces, the efficiency of introducing new equipment.

Sufficient material stimulation is needed to reduce labour and additionally raise labour productivity in regions where this labour is particularly expensive. To be more exact, this material stimulation should be oriented not only on regional differences in wages, but also on regional differences in the actual national economic expenditure. It is clear, for example, that the introduction of modern labour-saving equipment in the Magadan Region is several times more efficient than in developed areas. The scale of this effect can be judged by the following example. If bulldozer T-100 (with a capacity of 100 hp) utilised in the gold fields is replaced by a bulldozer with a capacity of 380 hp, during the operation in three shifts it would be possible to release nine operators per one powerful bulldozer. This will yield a saving of about 150,000 rubles annually. Moreover, this bulldozer will not require any thorough repairs for a minimum of three seasons, while the repair of a 100-hp bulldozer costs about 10,000 rubles annually. This is an additional saving of 90,000 rubles. The release of a definite number of repair-

men and mechanics will also yield saving of up to 50,000 rubles annually. With such an overall calculation it is clear that a powerful 380-hp bulldozer, even if its price is 100,000 rubles (the price per hp is considerably higher than of a T-100 bulldozer) is highly efficient. If this calculation were made only from the viewpoint of saving wages, the more powerful bulldozer would not pay for itself.

How can enterprises and economic organisations be made interested in considering the real labour inputs? Worthy of attention in this context is the question raised by a number of economists of introducing special pay for labour, collected from enterprises. Differentiating the rate of pay for labour by regions and types of labour (male, female and so on), it will be possible to influence in a planned manner the structure of utilising labour resources.

The regional policy of forming prices of consumer goods sold to the population also plays an important part in the territorial organisation of social production. At present there are three belts of retail prices and also a special addition to retail prices in northern areas. The difference in the level of state retail prices of foodstuffs is 15-20 per cent and less for manufactured goods. These differences in the level of retail prices are one of the reasons for introducing regional coefficients in wages.

The decision of the Central Committee of the CPSU and the USSR Council of Ministers on the development of productive forces in the Far East envisages the gradual abolition here of the higher, third belt of retail prices and transition to the prices of the second belt as one of the important measures.

As for Siberia, here the total inputs for the production of consumer goods on the average are lower than the social production inputs for the country as a whole. This is due to the higher level of labour productivity in Siberian agriculture.

This applies both to Western and Eastern Siberia. But that is not the only point. The new development regions, which are of great national economic interest, need definite privileges, a kind of policy of regional protectionism. The establishment of a privileged level of retail prices can be one of the important instruments of this policy.

From national economic positions the accelerated devel-

opment of the productive forces in Siberia and the Far East is highly efficient. It is highly efficient first of all from purely economic positions thanks to the presence of cheap fuel and power, large resources of fresh water and cheap sources of raw material for many industries.

The Economics Institute (Siberian Division of the USSR Academy of Sciences) has constructed an experimental optimal interregional model for the development and siting of productive forces by big economic regions of the USSR. It is oriented on saving social inputs on the scale of the entire national economy and ensuring, as a result, the maximally possible high living standard for the country as a whole with the available resources. From these purely economic positions the calculations show how advantageous it is to attain the swifter growth of the productive forces in Siberian regions. Here power-intensive production complexes are drawn as though by a magnet. In turn these complexes necessitate the building up of allied sectors, and so on. From the positions of a national economic optimum, growth rates of the productive forces in Siberia should be approximately 50 per cent higher than the figure for the USSR as a whole.

It is planned to build up a powerful economic potential in Siberia and the Far East in a historically brief period and to ensure, on this basis, the accelerated settlement of Siberian and Far Eastern regions.

The subject of this chapter, naturally, predetermined the emphasis on cost-accounting indicators, questions of material stimulation and the enhancement of the independence of local agencies. But from this in no way follows a belittling of the role of centralised planning for the national economy as a whole or its replacement by the cost-accounting mechanisms functioning in individual regions. It is a matter of rationally combining the centralised plan in the aspect of economic regions with the material stimulation and the evaluation of the activity of a given region, from cost-accounting positions, in fulfilling the national economic tasks facing it. Moreover, the cost-accounting indicators for regions are set in a centralised way and actually are instruments of centralised planning.

## CHAPTER 5

### ECONOMICO-MATHEMATICAL METHODS IN PLANNING AND MANAGEMENT

The advantages of the planned socialist system are not displayed automatically. The half-century experience in the planned guidance of the Soviet economy conclusively demonstrates that these advantages are increasingly realised as society masters the laws governing economic growth, accumulates experience and improves the planning and analysis of economic processes.

The present achievements of the socialist economy are not the ceiling, there are great potentialities for the further rise in the efficiency of social production. But they can be translated into reality only if the concrete forms of managing the economy are brought into full conformity with the country's growing productive forces and also with the changes in the system of social relations. These changes actually occur. They do not and cannot affect the nature of the socialist system. Their essence consists in that new conditions inevitably give rise to new forms of display of the socialism's economic laws and, consequently, to new methods of meeting their requirements.

The Communist Party and the Soviet Government are steadily doing much work along these lines, bringing the system of managing and planning the national economy into conformity with the new conditions of its operation, with the new tasks that arise in the course of development.

It was pointed out at the 24th CPSU Congress that the present period in the development of the Soviet Union, marked by the exceedingly increased scale and complexity of the national economy and extension of its possibilities for the simultaneous solution of big economic, social and other problems, greatly enhanced the demands made on planning, management and methods of economic activity. The Soviet Union which marches in the van of the contemporary scien-

tific and technological revolution is faced with the task of combining the latter's achievements with the advantages of the socialist economic system.

In this sense the economic reform now under way in the USSR should be regarded as a natural stage in improving the system of economic management. The successful implementation of a whole range of measures envisaged by the reform is of great importance for the building of communist society.

The reform lays main emphasis on enhancing the role of economic methods of management; it has extended the cost-accounting rights of production units, without which it is impossible to tap all the sources for steeply raising the efficiency of socialist production. The reform proceeds from the principle that the present stage in building the material and technical basis of communism demands that every working-man and every production collective be interested to the utmost in the results of their labour for the good of society. Account is also taken of the need to enhance the responsibility of every person for his job, to consolidate labour and production discipline.

A qualitative improvement of the methodology of national economic planning is a requisite for the effective development of the economic operational independence of individual production cells of society, for the purposeful orientation of the labour and production activity of the people. Planning must ensure above all the choice of optimal directions in the use of the productive resources of the socialist economy in the interest of the entire society.

That is why improvement of centralised planning as a decisive means for securing the proportional and efficient development of the national economy should be considered a paramount feature of the economic reform. The reform in no way reduces the role of centralised planning, as is often claimed in the West, but it essentially alters the forms and methods of planning.

The substance of these changes consists, first, in improving the quality of the centrally formulated economic development plan and, second, in raising the role of the general rules of the behaviour of economic units which follow from the centralised plan (these rules in a larger measure possess the nature of economic stimuli). The changes found and

introduced at this stage are far from final. The reform is not a single action, but a process. Details of the new economic mechanism are being perfected and specified and economic studies and exploratory experiments are conducted which open up prospects of further progress in this sphere so vital for society. On the whole the trend of this work has been crystallised. Its purpose is to raise the scientific level of national economic planning and management. In present-day conditions this is possible only through the wide, comprehensive use of mathematical methods, cybernetics, system analysis based on the use of modern computers and taking into account the vast store of know-how in socialist planning. Such is the natural requirement of the contemporary scientific and technological revolution.

Modern methods of economic-mathematical modelling are increasingly applied in the USSR on the basis of the accumulated experience in planning. Important results have been registered in recent years in formulating the theory and methodology of studying inter-sector relations and constructing inter-sector balances of goods production and distribution, solving problems of optimal development and location of separate productive sectors, in organising the supply of materials and equipment, studying incomes distribution and consumer demand and in solving other planning problems with the use of mathematical methods and computers. Science has substantially enriched the theoretical arsenal of planning, having elaborated methods of economic modelling, system analysis, and so on. The 24th CPSU Congress put forward the task of utilising these methods on a wider scale. A broad programme was outlined for introducing automated management systems based on electronic computers and modern economic-mathematical methods in all sectors of the Soviet economy and especially in planning. In the long-range prospect it is contemplated to establish a country-wide automated system for the collection and processing of information. It is clear that the accomplishment of such a task, without precedent for its scale and complexity, will demand a wide scope of research, development, manufacture and introduction of diverse computation and other technology and also the training of personnel. Let us examine some trends of research in this sphere.

## 1. Some General Questions of Optimising Economic Decisions

The process of socialist extended reproduction is planned and organised in conformity with the basic economic law of socialism—the law of maximum satisfaction of society's material and spiritual requirements.

This lays its imprint on the evaluation criterion for national economic plan alternatives. It is clear that the plan that ensures the maximum satisfaction of society's needs is the optimal one. Yet it is generally known that at every moment society has limited material, labour and natural resources and scientific and technical know-how which it could utilise for the set aim. Naturally one must not confuse the limited nature of resources at a given moment with the possibilities of changing them in the course of extended reproduction. The point is that at every moment not only the non-reproducible resources (for example, minerals, fertile lands) but also reproducible ones (machines, tools, fuel, materials) and also manpower and technical know-how are limited, fixed magnitudes.

The socialist economy is a hierarchically organised (multi-level) system. From the viewpoint of practical expediency in setting the problem of optimal operation, the national economy in the first approximation may be regarded as a system with three levels of management: 1) national economic level; 2) sectoral level which includes the main group of ministries in industry, agriculture and transport; 3) the level of enterprises and their associations.

Prices of consumed resources and produced goods must be calculated as a result of solving the national economic problem of maximising the people's living standard (global criterion of optimality). The obtained prices are major economic parameters needed for solving optimisation problems at lower levels of the national economic hierarchy. But besides prices, use must also be made, as controlling parameters, of aggregated indicators of the output of major goods and resources which each sector will produce and consume (and at the next hierarchic levels—production associations, enterprises, and so on).

The optimal plan at any link of the national economy is the one which best of all determines the trend for the devel-

opment of this link, taking into account national economic interests, in other words, makes it possible, while observing the given constraints, to obtain the maximal increment of the objective function for the entire economy.

This result is obtained when the plan of a separate link is found in the process of calculating the optimal plan for the development of the national economy as a whole. At each stage of this process it is necessary to maximise the optimality criterion of the respective link of the national economy obtained in evaluations of the last optimal plan of the corresponding higher-level link. If decisions are made in the given link and its activity is assessed and stimulated in conformity with this criterion, unity of interests of the given link and the entire national economy is attained.

Methods of optimal planning and management, based on the employment of economico-mathematical models, open up new possibilities for formulating plans of the development and location of production, calculating and comparing many alternatives of plans, obtaining in the process an objective evaluation of every alternative, for examining the system's development in its dynamics and considering in one problem the influence of major economic factors.

It will be recalled that in the existing planning system the resources principle often prevails, inasmuch as actually the initial point in plan formulation is the sectoral projections of the production of goods, resources, and the balance calculations of providing production with material and labour resources. The resources-sectoral principle almost fully determines the administrative and the internal structure of the planning apparatus. In the past such a situation was fully permissible and even necessary. The goals were comparatively simple. The consequences of decisions could be seen sufficiently well and swiftly. All attention had to be concentrated on planning production, control over the fulfilment of decisions, which was consolidated by the organisational structure not only of management but also of planning.

At present, owing to the shifts in social production, linked with both its general growth and the scientific and technological revolution, and also to the greater degree of mutual influence of production and a number of socio-economic factors, and to the gigantic expansion of information pro-

cessing, it is becoming increasingly evident that questions of society's development as a whole must be examined and solved comprehensively.

In view of this, the Central Economico-Mathematical Institute of the USSR Academy of Sciences (CEMI) has undertaken studies linked with the elaboration of what is known as the target principle of decision-making.

As for the highest level of management, in accordance with this principle the initial point in the decision-making process at the highest level is the determination of the aims in the development of the country (general aims), while resources and their alternative uses and expansion are regarded as possible ways and means of achieving these goals.

Given such an approach, national economic planning is a limited part of social planning in the broad sense; it represents the economic securing of the society's development. The national economic plan must fix such a production and distribution of resources which would most effectively ensure the achievement of the country's development goals.

The same principle, as studies show, is widely applicable in decision-making at all other management levels, down to the enterprise. The state national economic plan of the USSR determines the development directions not only of material production, but also of all spheres of society's life—public health, education, culture, science, and so on. The designing and adoption of general programmes, far from abolishing unified state planning, on the contrary, consolidate its unity and comprehensive nature.

Mutual co-ordination, the elimination of bottlenecks, the securing of balanced proportions and growth rates, and, what is most important, the shaping of an efficient and dynamic structure of the national economy are also possible only within the bounds of a unified national economic plan. Lastly, this plan must also ensure a strict correspondence between the mechanism of fulfilling the plan assignments and an internally consistent system of prices, tariff rates, normatives, allotments and other incentives.

It should be noted that the Soviet Union has considerable experience in formulating and carrying out national economic and social programmes. In the past such a truly great programme was the GOELRO Plan, drawn up under the direct guidance and with the participation of the founder of

the Soviet state V. I. Lenin. The electrification of the country, effected under this plan, laid the economic foundation for the biggest social changes in the USSR.

Recent years have witnessed the elaboration and implementation of big comprehensive national economic programmes, for example, the programme for the advance of agriculture, the programme for tapping the vast oil-bearing area in Western Siberia, the space exploration programme, and others.

Development of the target principle will promote continuity of planning, an organic co-ordination of long-term and current plans. Current plans will largely be "designed" in accordance with the general programmes adopted at the beginning of the period (in which the needs in resources and the implementation of separate stages of the programme are determined by years). The availability of reserves makes it possible to effect, within the framework of current plans, the necessary economic manoeuvres, to ensure the attainment of short- and mid-term targets, to parry unexpected developments. Possibly this will create conditions for changing the nature of current plans which will be drawn up not for the entire national economy, but only for the adjusted objects and directions in the use of resources.

The optimality principle, recognition of the single global criterion of the social evaluation of decisions underlie the target principle. And this is understandable: negation of criteria would mean the full incomparability of targets, programmes and alternatives of the plan and thereby imply the impossibility of making a more or less justified choice. In their activity socialist planning agencies are always guided by the necessity of satisfying the society's needs. It is these needs, brought out and formulated more or less fully, that have always served as the compass in comparing and choosing plan alternatives. The main thing is only the mechanism for determining the global optimality criterion, the forms of its concretisation, the ways of applying it in making and carrying out decisions. This "only" is by far not a trivial matter. It has been the object of scientific discussions, intricate painstaking research and tremendous work in improving planning.

Clearly, it is impossible at once to go over to a definite single optimality criterion. Part of the social demands made

on the economy remain as constraints in the form of "external assignments". But it is beyond doubt that an ever greater part of the general targets can be summed up in the single global optimality criterion for the economic system as a social sub-system. The more weighty and broader this part, the greater the guarantee that the development of the economy will coincide with the demands of social development.

Thus, the target principle is regarded as a way of realising the optimality principle. Studies in this sphere are closely dovetailed with work in building up a comprehensive system of forecasting the economic development of the USSR.

It should be noted that in forecasting, alongside statistical extrapolation methods, ever wider use is made of optimisation economico-mathematical modelling. Forecasting is based on the Marxist-Leninist teaching of the laws governing society's development. Modelling of the main laws of future economic growth draws on a study of preceding economic tendencies and on determination of the economic system's parameters, which make it possible to regulate processes in their dynamics and formulate concrete recommendations concerning the nature of the changes of both these parameters and the entire system. In applying optimal methods in forecasting, account is taken of the fundamental distinction of the socialist economy—the possibility of exerting purposeful guiding influences on it in the course of its development.

The work of constructing comprehensive forecasts of the economic development of the USSR and of individual Union Republics is conducted in many research organisations, the Gosplans and the Statistical Boards of the Union Republics.

Specifically, forecasts of the economic development of the USSR are elaborated by the Institute of Economics, USSR Academy of Sciences, the Economic Research Institute of the USSR Gosplan (ERI), and by the Central Economico-Mathematical Institute, USSR Academy of Sciences (CEMI); forecasts of the development of a number of Union Republics are elaborated by CEMI jointly with the Institute of Economics of the Armenian Republic, the Gosplan of the Lithuanian Republic, the Gosplan of the Ukrainian Republic, the Computation Centre of the Gosplan of the Georgian Republic, and so on.

## 2. Application of Economico-Mathematical Methods and Models in National Economic Planning

Planning of the national economy is now based on the balance method, which consists in co-ordinating the needs and resources both for separate products and on the scale of the entire economy. The Soviet Union is the pioneer of the balance method of planning and above all its sections which pertain to the economy as a whole and are expressed in the balance system of the national economy. This explains why the first economico-mathematical model of national economic planning, most elaborated theoretically and practically, was the model of the inter-sector balance. Study of inter-sector relations is the initial point for a qualitatively new stage of planning—construction of models of the optimal functioning of the national economy.

Since the national economy is characterised by close interconnections in the production and consumption of many types of products the idea rose already in the period when the balance method was taking shape to construct a table of inter-sector relations (balance of the national economy of the USSR for 1923-1924 based on reports for that year and other computations of Soviet economists in the 1920s). But at that time it was impossible to turn the balance calculations into a corresponding model due to absence of both mathematical methods for processing the tables of inter-sector relations and computers whose application ensures the highly intricate calculations of inter-sector models.

An important part in working out and applying a mathematical apparatus in analysing inter-sector relations (input-output tables) has been played by the economist W. Leontief. The appearance and spread of computers at the end of the 1940s and in the early 1950s gave an impetus to empirical studies of the structure of inter-sector proportions in many countries.

In the USSR intensive studies of inter-sector proportions were resumed in the mid-1950s. Since then much experience has been accumulated in the construction and analysis of inter-sector balances.

In the USSR the theory and practical application of in-

ter-sector studies have developed along the following main lines:

elaboration of methodological problems in studying and planning the structure of inter-sector relations in the country's economy and in economic regions;

practical construction of inter-sector balances for past periods;

practical construction of planned inter-sector balances according to a statistical model;

elaboration of methods and algorithms for the calculation of planned inter-sector proportions for the purpose of organically co-ordinating the indicators of inter-sector balances with the system of indicators accepted in planning and statistics;

practical construction of planned inter-sector balances using a dynamic model for this purpose;

studies of the potentialities and main trends in the application of inter-sector models in the system of optimal planning.

Inter-sector balances of the USSR and economic regions for past periods are compiled for a comprehensive analysis of the structure of material production and inter-sector relations which arose during the periods under review and for preparing the initial information base for constructing planned inter-sector balances. For these purposes inter-sector balances were prepared for 1959 in money (83 sectors) and physical (157 products) terms.

In 1968, the Central Statistical Board of the USSR completed an inter-sector balance of the production and distribution of products in the national economy of the USSR for 1966 in money and physical terms. It shows in physical terms the distribution of 237 products in the national economy.

Construction of regional models of inter-sector balances has been considerably developed in the USSR. This has been stimulated by the need to analyse the structure of economic complexes of regions in a country which takes up one-sixth of the earth's land surface and has a population consisting of tens of nationalities.

These studies proceeded in two main stages:

1. Experimental construction of balances by individual economic regions.

2. Construction of balances of all the Union Republics

for past periods, done simultaneously with the preparation of the balance for the USSR as a whole for 1966 according to a unified methodology and classification. This was the first step in creating a unified system of inter-sector models.

In furtherance of this work, the elaboration of inter-sector balances for 10 economic regions of the Russian Federation for 1966 is being completed; within the bounds of this work balances for 1966 are being constructed for a number of autonomous republics, administrative regions and territories of the Russian Federation (Komi, Karelian, Bashkir, Tatar and Buryat autonomous republics, Saratov, Novosibirsk and Chita regions, Khabarovsk Territory, and others). Inter-sector balances of a number of Union Republics for 1970 (Estonian, Lithuanian and others) are being prepared.

The elaboration of inter-sector balances for past periods is of great significance in raising the level of scientific substantiation of concrete economic measures.

At the preliminary stage of planning inter-sector balances are compiled for calculations of different alternatives of developing the national economy in order to determine the most rational structure of material production. These calculations are effected in the following stages:

- calculation of the volume and structure of the planned final product;

- elaboration of plan coefficients of direct inputs;

- calculation of the gross output by industries and their co-ordination with the plans of investments and use of labour resources.

The plan balances of the Soviet economy for 1966-1970 were drawn up in this aspect (about 120 industrial sectors, including more than 20 alternatives of the 1970 balance); balances were also elaborated in this aspect for the Latvian, Estonian and Lithuanian republics for 1970 (150 industrial sectors).

Further development of studies in preparing balances at the preliminary stage of planning is proceeding along the lines of constructing aggregated dynamic models.

These models were used as a basis in the Economic Research Institute of the USSR Gosplan for estimates of the economic growth rates of the USSR for 1971-1975 and up to 1980. The model is based on co-ordinating the balances of goods production and distribution with investment balances.

The link-up of plan indicators of successive periods is effected through the indicators of uncompleted construction.

A dynamic inter-sector balance is being elaborated in CEMI for purposes of regional planning. The specific features of the object of study require consideration in such models of the investment lag, differences in their structure and also the specific features of commissioning completed projects because the construction of individual projects of many sectors is unique for small districts and, as a result, is exerting an essential impact on the structure of the economy of regions.

Original dynamic inter-sector models have also been prepared by the Economics Institutes of Academies of Sciences of the Lithuanian and Estonian republics.

Inter-sector balances at the final stage of planning are compiled for co-ordinating the overall national economic and sectoral proportions and for the reciprocal concerting of the material balances system of the most important types of goods. At this stage of work the initial indicator for establishing a balanced plan can be not only the indicator of the final social product but also indicators of the gross output of sectors of material production.

Planned inter-sector balances were compiled in this aspect (in physical terms) for the Soviet Union for 1962-1970 (the nomenclature of these balances was steadily expanding, from 346 products in the balance for 1962 to 600 in the balances for 1966-1970) and also for the Georgian and Azerbaijanian republics.

Another trend in this aspect of research is that of constructing a model of the inter-sector balance in terms of indicators which may directly be regarded as plan targets for definite ministries or enterprises.

It will be recalled that the model of the inter-sector balance is being elaborated in accordance with the "product-product" principle. This is required for the precise formalisation of the sectoral technological interconnections. This model employs the concept "technological sector", i.e., a totality of homogeneous products. Actually such sectors do not exist because, for example, a steel works, alongside metal, may produce a number of chemical products, an engineering plant, articles which are related to different industries, and so on. Consequently, the need arises to make

the indicators of the inter-sector balance comparable to the plan indicators formulated on the basis of the existing planning methodology and oriented on "economic" (or "administrative") sectors representing real economic units.

The Economic Research Institute of the USSR Gosplan has proposed a scheme of an inter-sector balance both in physical and money terms in which, first, the classification is oriented on reflecting the main indicators of production and distribution of products in physical terms (which corresponds to the accepted planning methodology), while the rest of the products are considered by aggregated positions in money terms for each sector.

Second, the scheme of this balance is so constructed that it is possible directly to obtain plan targets for both "technological" and "administrative" sectors, in other words assignments are addressed to the respective ministries and departments.

This is attained by incorporating into the scheme of the inter-sector balance special relationships which characterise the distribution of the produced goods by "administrative" sectors. It should be noted, however, that in obtaining this result a number of "positive" properties of the model is lost (specifically it is no longer an ordinary system of  $v$  equations with  $n$  unknowns).

Much attention is paid to concerting the indicators of the aggregated inter-sector balance with detailed calculations of the balances of production and distribution of many types of products. For these purposes a special algorithm of iterative aggregation and disaggregation of inter-sector models has been proposed, in the course of which the weights of concrete types of products in the aggregated sectoral units are consecutively adjusted.

In some Union Republics calculations of indicators of the inter-sector balance are supplemented by a system of matrix tables which characterise different aspects of the extended reproduction process. For example, in compiling a planned inter-sector balance of the Georgian Republic for 1964, alongside the balance itself, there were prepared an overall material and financial balance characterising the main directions of financial flows in the economy of the Republic and also an inter-sector labour force balance.

Theoretical studies related to optimising indicators of the

inter-sector balance have been made in recent years. All these researches have shown that the construction of optimal inter-sector models for the national economy as a whole is a much more intricate problem than the construction of such models for objects at lower levels—enterprises and sectoral complexes.

Attempts at a simple “mechanical” conversion of the scheme of the inter-sector balance into a model of optimal planning are unsuccessful because the prerequisites on which the model of the inter-sector balance is based come into contradiction with the goal of optimising inter-sector proportions. Specifically, a model of an optimal plan must be oriented on real economic objects and not on “technological” sectors. To choose an optimal alternative of the technological structure it is necessary in the process of plan formulation to change the parameters of the inter-sector model, while the classical model of the inter-sector balance is based on constant model coefficients during one cycle of calculations.

Renunciation of the assumption of the classical inter-sector balance model in order to construct an optimal plan model inevitably leads to an essential modification of the model structure. Moreover, adjustment of the model parameters in the process of plan optimisation cannot be achieved if planners confine themselves to the model as such. This problem can be solved only if an optimal inter-sector model is incorporated into a system of models of optimal national economic planning which encompasses several levels of the production hierarchy.

All this in no way belittles the significance of the classical model of the inter-sector balance for optimal planning. Balance models of inter-sector relations in the system of optimal planning are needed for determining the initial approximation to the optimal plan.

The dynamic models of the inter-sector balance will be further improved. What is especially valuable for planning agencies is the great potentialities of comparing alternatives of balances constructed on the basis of different hypotheses of technological progress which are expressed in changing unit rates of material inputs, in improving national economic proportions, and so on.

It should be noted, however, that it is hardly possible to elaborate in this way a unified optimal national economic

plan efficient both from the viewpoint of the economic system as a whole and of each sectoral element. For this purpose it is necessary to design more intricate systems in which the inter-sector balance will be a component part.

Since the construction of such systems is a problem that has not been adequately studied and is of great complexity, research in this field is conducted parallelly by many scientific bodies. Different approaches to the solution of this problem are explored. Research and experimental work in creating systems of economico-mathematical models for mid-term planning is conducted mainly in three institutes: CEMI, ERI and the Institute of the Economics and the Organisation of Industrial Production, Siberian Division of the USSR Academy of Sciences. In particular, CEMI is exploring different approaches to the solution of this problem. Three systems have been elaborated more fully so far.

One of the systems of economico-mathematical models designated for the formulation of a mid-term plan has already been partly tested experimentally. Among its important merits demonstrated experimentally we can mention the following: it makes it possible, with the help of computers, to recalculate in brief, in any case fully acceptable, periods, entire indicator systems and thereby ensure their reciprocal co-ordination. Thus, fully to recalculate the aggregated electric power plan the computation centre needed not more than 24 hours.

A five-level model system is designated for calculating an aggregated mid-term plan. At the level of 15-20 industrial sectors and a similar number of financial sectors which represent in an aggregated way the organisational structure of the economy, it is in the main ensured with the necessary initial information which is available or is accessible at moderate costs in most industrial and developing countries. But the volume of calculations in this system is so large that a powerful computer must be used.

The principle of operation of the model system resolves to the following. At level I, in accordance with the principle “at once and on the whole”, an interconnected system of national economic indicators is found. At levels II-IV, however, the calculations resolve to successive attainment of balance both vertically and horizontally, first for each section of the plan’s material aspect, then for the internal

price structure and, lastly, to the establishment of a financial balance.

Given definite hypotheses as regards population growth, external factors and, indirectly, technological progress, 75 main national economic indicators are calculated at level I (growth rates of the economy, the fixed and circulating assets, employment, man-hour output, share of consumption—personal and social—accumulation and investments by types, aggregated structure of governmental consumption, efficiency rate of investments, and rate of pay for assets, dynamics of the main price indices—for example, cost of living index—and so on).

The planning information obtained at level I is utilised at level II as initial for specifying the socio-economic hypothesis of level I by making detailed calculations of the main material and financial balances of the mid-term plan, which still precludes a sectoral breakdown.

At level III the planning information of level II, in turn, is initial, and the entire cycle of calculations for specifying in greater detail the planning hypothesis of levels I-II with an evaluation of the degree of imbalance is repeated in the aspect of about 20 industrial sectors, three forms of property and 24 financial sectors. At this level the following main national economic characteristics are obtained: 1) detailed evaluation of the fund of personal and social consumption by 20 sectors and by various designations, channels of forming the consumption fund and the respective system of retail prices; 2) investments in the fixed and circulating assets of producing and consuming sectors, types of investments, their material structure, designation, aggregated list of consumers and suppliers; 3) price system of the investment elements; 4) volume and prices of a 20-sector structure of exports and imports and governmental consumption; 5) evaluation of the gross output and productive capacities with a breakdown by 20 industrial sectors, designations and financial sectors; 6) price system of gross output; 7) future structure of fixed and circulating assets and employment; 8) detailed specification in these aspects of the type and rate of technological progress; 9) structure of distribution of incomes and financing conforming to the material aspect of this mid-term plan.

At level IV, for which the results of level III are initial,

the planning hypothesis is further specified in detail—the number of sectors is extended to 80-100 and balances of products in physical units are introduced. At this level a more detailed characteristic is given of each main product and the main trend of technological progress expressed in the introduction of new types of products.

Lastly, at level V the targets of the aggregated mid-term plan are definitely assigned through the optimal selection of investment projects in conditions of uncertainty and risk, and the allocation of projects within the bounds of level IV is accomplished. The fundamentally important feature of level V is to establish the area of real possibilities for project substitution and evaluating different selection methods.

The decomposition principle underlying this model system has definite advantages from the mathematical viewpoint: in necessary cases some or other sub-systems may be regarded as non-linear, and at all levels, beginning with the second, as sub-systems which include uncertainty and compensation of errors of aggregation and forecasting.

The described system of models allows a multi-alternative calculation, assuming, however, the availability of adequate computation facilities, full provision of information and the maintenance of the entire system in an operational state.

A preliminary estimate of the requirements as regards information and computer capacity for the first three levels has already been made and also an evaluation of the informational content of the indicators of the three levels.

In calculating the requirement made on computer capacity, a machine with a capacity of one million operations per second was taken as a unit, and the time needed for calculations of each type was considered. The time required for a detailed and thorough forecast at the first three levels by the combined operation of five machines of this type can approximately be estimated at 15 hours.

The testing of the model system for mid-term planning naturally has to pass through several stages and represents a large complex of research and experimental work.

In the next few years this system will be developed in all its main elements: 1) along the line of a better formal description; 2) creation of more improved computation programmes; 3) extension and improvement of the information base; 4) better co-ordination of separate blocks; 5) fuller ac-

count of price changes in the calculations; 6) actual calculation of a wider range of elements; 7) polishing up the technique of multi-alternative calculations.

Such is one of the model systems for mid-term planning now being developed.

The two other schemes being elaborated in CEMI can to a certain extent be regarded as consecutive stages in developing a system for long-term optimal planning.

The first will be based on the principle of utilising the optimality criterion as a working instrument, which will make it possible to obtain a number of plan alternatives possessing the necessary formal mathematical properties of an optimal plan. From them, with the help of non-formal methods, the best plan is chosen, taking into account political, socio-economic and other considerations.

What is known as the *approximation scheme of multi-stage optimisation* underlies the proposed complex of models. Its main idea is that for each object (whether a sector, association or enterprise) the planner seeks not one optimal plan in accordance with the given criterion, but a number of plan alternatives which might be assumed, in one or another degree, to be close to the expected optimum. The number of such alternatives must not be large; therefore they must express the production possibilities of the planned objects in an aggregated form: in the marginal case in terms of only two alternatives—optimistic and pessimistic. The former expresses a reasonable maximum which is possible given the utmost provision of the object with resources; the latter expresses the minimal potentialities of the object. Intermediate alternatives are also possible.

Such an approach makes it possible to give higher planning agencies a picture of the production potentialities of local objects in a compact form. A correspondingly constructed system of indicators in physical and value terms enables planners to aggregate the submitted information in plans at different levels which are also compiled in several alternatives. The plans of individual economic objects are co-ordinated through the use of horizontal relations, but for a more detailed range of indicators. Maximally concrete plans for all production links can be formulated as a result of vertical and horizontal iterative recalculation.

It is assumed that, at least at the first stage, the process

of optimising the national economic plan must be carried down to the sectoral nomenclature, i.e., in accordance with a two-stage scheme: the entire national economy—sector. Subsequently, the optimisation calculation scheme has to include enterprises or groups of enterprises (associations) as the third level.

The initial data for sectors ("range" of possible provision of resources) are prepared at the pre-plan stage with the help of macro-models of national economic growth, according to data of forecasts of technological progress, calculations of separate programmes determined at the target stage of national economic planning, and so on.

A concrete plan optimised in accordance with the given criterion for every alternative can be obtained as a result of solving the sectoral mathematical model constructed by considering the mentioned information. The obtained plan alternatives are regarded as initial (base plans) for subsequent computations.

These plans are approximated (i.e., the information contained in them is reduced) so that a maximally compact notion of the sectors should be fed into the model for optimising the national economic plan: usually it is given in the form of one aggregated product and one constraint. This makes it possible to form a comparatively simple national economic model which presupposes maximisation of a certain national economic criterion—for example, a criterion like the maximum final product (or national income) in some optimal proportions.

Determination of these proportions is a special, quite intricate task.

Solution of the aggregated national economic problem will bring out the optimal scale of output of sectoral products and their optimal valuations (a detailed sectoral nomenclature is established by a direct count of consumer requests). Moreover, an additional optimisation of sectoral plans might be required. In sectors which restrain the development of the national economy it is necessary to solve anew the problem of maximum output in the new assortment. In other sectors it is better to solve the problem of producing the needed volume of output with minimum inputs calculated in valuations of the *optimal plan*.

Several consecutive recalculations, i.e., organisation of the

iterative process, are needed for the final formulation of an optimal plan. Theoretical and experimental studies of approximation models of this type have shown that this process can be carried out well.

The described system of models does not solve some problems which complicate the system and demand vast additional information and many years of research and experimental work. For example, it does not solve questions of regional socio-economic planning; it solves, but only in a simplified way, problems of production location taking into account transport costs, and so on. On the other hand, possibilities are opened for the gradual inclusion of a number of models of this complex in the existing system of national economic planning and also for the direct use and extension of experience already accumulated in economic-mathematical planning and locating individual sectors of the national economy.

The second scheme of optimal long-term planning, likewise elaborated in CEMI, is distinguished by the following main features.

It takes as objects of planning the national economy as a whole, programme-economic complexes and economic regions. This reflects the actual complexity of drawing up plans for such a vast country as the USSR. Both sectors which arose in accordance with the operating departmental structure of management and also production associations which are set up in the course of improving this structure may be regarded as programmed economic complexes. Economic regions may be considered both within the existing regionalisation of the territory of the USSR and also considering its possible changes, but with the obligatory singling out of Union Republics. Proceeding from the most typical periods for the development and commissioning of productive and non-productive capacities embodying the latest scientific and technological achievements, a plan period of 10-15 years is taken, *with the singling out of the first five years* for a more thorough analysis and calculation of the plan indicators.

The complex of planning calculations makes it possible to obtain a consistent solution of the main economic and social problems (the maximally possible advance in the well-being of the population by applying the achievements of

scientific and technological progress, the drawing together of the levels of economic development of Union Republics and economic regions, the creation of favourable conditions for long-term economic growth, and so on), taking into account the need economically to ensure the country's defence, foreign trade, fulfilment of foreign political and economic obligations, the maintenance of an adequate level of strategic reserves, the carrying out of fundamental research, the requirements of management, and so on.

The system attains an organic consistency of material and financial planning, planning the production and distribution of goods and services, of the plan targets in physical terms and prices and rates of pay for various resources.

The envisaged mechanism makes it possible in the process of computation to link up the formulation of the plan with consideration for such socio-economic consequences of its fulfilment as changes in the location and distribution of the population and the labour resources by economic regions, vocational groups and sectors, in the consumer demand of the population, and so on.

According to the idea of the authors of the system, the central planning agencies, which represent the highest level of planning, concentrate effort on solving the problem of optimising the rates of scientific and technological progress. Guided in their evaluations by the long-term effect, they take as the upper-level criterion the integral effect for the entire plan period obtained from drawing into social production natural and labour resources minus the real incomes of the population. The dynamics of this criterion reproduces the accumulation dynamics in the national economy for the plan period under the influence of applying scientific and technological achievements. The indicators which measure the upper-level criterion—evaluation of the efficiency of labour and natural resources—are calculated when drawing up optimal regional plans.

The optimality criterion of an economic region is the maximum sum of population real incomes in the plan period, provided a balance of production and distribution of goods in the region is ensured and the assignments for the production of goods and removal from economic circulation of the resources needed for reinforcing the country's defence capability and other purposes of a general state nature, are ful-

filled. Moreover, account must be taken of all the requisites for developing the economy of the region, reflected in the system of constraints of its model. It should be emphasised that the maximum real incomes is an *internal* criterion for regions, while the upper-level planning agencies assess the plan and the real development of the economy of each region by the magnitude of the effect obtained from drawing its natural and labour resources into social production.

The proposed process of planning as a result of multi-step successive approximations makes it possible to ascertain such magnitudes of financial and value parameters under which orientation on both the internal regional criterion and on the evaluation of the economic development of a region at the upper level leads to the choice of one and the same regional plan, which attests to the attained co-ordination of the general national economic interests with the interests of every region and, correspondingly, the goals of achieving a long-term and a current effect. Thus, as a result of the entire planning process based on both the upper-level criterion and on regional criteria, given the co-ordination of the interests of economic regions and the national economy, an indicator is shaped which expresses an optimal degree of attainment of these goals in their harmonious combination—a magnitude of the upper-level criterion upon completing the process of plan designing.

The optimality criterion of each programmed economic complex is profit in aggregated prices of goods and services calculated at the upper level, taking into account pay for labour and natural resources the norms of which (indicators of efficiency of these resources) are determined in the regional models. The exception are complexes (transport, construction, and others) whose production assignments at each stage at the process are strictly fixed, proceeding from the needs of other sub-divisions of the national economy. That is why upon the completion of the planning process, i.e., at optimal magnitudes of the indicators in which profit is calculated, the criteria of programmed economic complexes are co-ordinated both with regional criteria and also with the upper-level criterion and express the integral effect from the use, by the respective programmed economic complex, of material, production, financial, labour and natural resources.

The process of plan formulation in this system consists of three stages:

1. Calculation of the magnitudes of all plan indicators in their initial approximation and also indicators of general state needs in resources for defence, administration, science, fulfilment of foreign economic and political obligations, and so on.

2. Optimisation of plans of programmed economic complexes, economic regions and of the upper level, and their co-ordination. This stage can be effected in two alternatives. In the first the draft plans, which are optimised by sectors (complexes), are dovetailed into the national economic plan and then the latter is co-ordinated with the possibilities of the regions; in the other alternative regions are given wider possibilities to display initiative as regards the choice of specialisation and the structure of their economy.

3. Co-ordination of the plan with the social processes (movement of population and labour resources, formation of the consumer demand) which depend on the results of its fulfilment but now yield only to indirect regulation and, moreover, within limited bounds (i.e., planned creation of favourable conditions for stable plan fulfilment).

All the proposed systems are intricate man-machine systems for planning the national economy. All calculations of the plan indicators at all cycles of co-ordination are done by computers. At the same time an important place is assigned to man who will pass expert judgement on the initial information, control the process and non-formally guide it.

Control in no way implies obligatory knowledge by experts of all the magnitudes assumed by the variable plan indicators in the planning process. Information in the course of computations must be given to the expert in a generalised way, but in principle all the current magnitudes of any indicator must be accessible to him. An analysis of this information can furnish the basis for making and carrying out a decision on the intervention of the expert in the process in order to adjust its parameters.

Thus, in applying this approach the role of expert planners is considerably enhanced because the emphasis in planning work is shifted wholly onto an analysis of the state of the economy and the indicators of the draft plans.

### 3. Sectoral Optimising Problems of Production Development and Location

Much experience in modelling and practical computations based on economico-mathematical techniques has been accumulated in sectoral planning, and it is widely described in the literature. The USSR Gosplan, jointly with ministries and research organisations, plans the development and location of production of more than 70 sectors with the help of economico-mathematical methods. What is important is that this work is being conducted along unified methodological principles.

Optimal planning of the development and location of production makes it possible to obtain a considerable saving as a result of a correct choice of:

alternatives of reconstruction and extension of operating enterprises;

sectoral structure of production (determination of the optimal composition of a sector's output);

alternatives and sites for building new enterprises and also enterprises which are to be closed down or thoroughly reconstructed;

directions of use of existing capacity;

optimal size of enterprises and installations;

alternatives of specialisation and co-operation in production;

the most advantageous schemes of deliveries and transportation.

Economico-mathematical problems of different types are utilised in planning the development and siting of production, depending on the specific features of the optimised sector, provision with information and also the experience accumulated by research and designing institutions. In particular, use is made of dynamic and static, deterministic and probabilistic, single-product and multi-product problems and also problems with discrete and continuous variables, production and production-transportation problems and, lastly (according to the nature of the reflected economic, usually transport, relations), matrix and network problems.

The process of designing an optimal plan for the develop-

ment and location of production includes the following stages:

a) ascertaining the range of problems to be solved and the sought results;

b) system localisation, i.e., determination of the complex of the objects belonging to the examined system and its relations with the national economy;

c) choice of the planning period;

d) choice of the type of extremal problem, depending on the nature of the problems to be solved, the specifics of the optimised system, duration of the plan period, and so on;

e) establishment of the criterion of optimality and a corresponding objective function;

f) determination of possible development alternatives of the system's separate objects—prospects of extension or modernisation of operating enterprises, possible sites for building new plants and auxiliary objects of the system, the existing and forecast alternatives of production methods, and so on;

g) formulation of the conditions in which the entire system and its separate objects operate, including its external and internal relations;

h) problem formalisation, i.e., description of the conditions of the system's operation and the objective function in an economico-mathematical model;

i) preparation of the initial information, evaluation of the parameters of the economico-mathematical model;

j) solution of the arising extremal problems of finding the best alternative for the system's development, utilising methods of mathematical programming and computers;

k) analysis of the obtained results;

l) making of planning decisions.

In optimising a system it is necessary to strive for its justified singling out from the general complex of which it is a part. A preliminary analysis serves as a basis for finding the boundaries of the system, the further extension of which must not essentially change the conclusions about the efficiency of the objects belonging to the initial system. Thus, an optimised system includes the allied links of the national economy, the relations with which are the strongest or the least predictable. At the same time the singled out

system may be examined and optimised as a totality of interconnected sub-systems so that the extremal problem will be solved as a multi-step one.

An optimal alternative of the development and location of a system is an alternative of expansion and modernisation of existing and the construction of new economic objects, choice of the volume and assortment of the goods produced and sold and the applied methods of production and also transportation and use of the output (taking into account foreign trade) under which, during a certain examined period, the necessary conditions for the activity of the system are observed, while the value of the objective function reaches the extremum.

Maximum national economic efficiency is the optimality criterion of a plan for the development of separate links of the economy (local criterion).

In actual conditions, depending on the specifics of the problems being solved, this criterion can assume the concrete form of minimum inputs or maximum profit. At present the minimum inputs form is more widespread.

Independent of the problem formulation, the economic indicators of the objective function (income, inputs, profit) in a general case are calculated as integral, i.e., as the total for a number of years. For all the objects of this system the indicators are calculated for one and the same period, the plan period. In dynamic problems only integral indicators are utilised. In static problems both integral and also (preferably) annual economic indicators may be utilised.

In calculating inputs it is necessary to utilise money valuations of limited resources external for the system. These valuations (with the help of dual prices), may be obtained as a result of solving the optimal planning problem for a corresponding allied or higher link of the national economy. If such a problem has not been solved an approximate system of valuations may be constructed. The absolute level of these valuations is determined by the input indicators or the effect of the "marginal" object of the respective system, i.e., the object which will ensure the production of additional output when the need in it increases by a unit or will consume an additional unit of the given resources.

Valuations must be established for such scarce resources as natural resources (land, water and mineral resources, and

so on), labour resources, equipment and materials, fuel and power, transport facilities, etc.

As an example let us cite models of sectoral planning applied in such an intricate and swiftly growing sector as the chemical industry. Definite experience in solving economic-mathematical problems has been accumulated in this sector and a considerable economic effect has been received as a result.

Let us examine the problem of optimising the production structure of polymeric materials in the case of the plastic industry.

Plastics are used in many cases as substitutes for traditional goods: a cable covering from polyvinyl chloride instead of lead, flooring from plastic boards, foam plastics in the furniture production, articles for refrigerators from shock resistant polystyrene (instead of sheet steel); the number of such examples can be continued. This makes for specific features of the problem.

An analysis of the possible directions in the use of plastics in various sectors shows that the total quantity of plastics which could be efficiently applied substantially exceeds the possible output, say, in 1975. The point here is not only the resources assigned for the development of their production. Of course, investments are a major factor which determines the scale of a sector's development. But even if we were to make the hypothetical assumption that sufficient resources would be allotted for the expansion of the output of plastics up to 1975 to produce these materials in quantities corresponding to the economically justified needs, these resources could hardly be fully utilised owing to the limited nature of the plan period.

And so, it is necessary to establish *what plastics and in what quantities should be produced and in what directions they should be utilised.*

The main conditions and constraints which must be considered in solving such a problem are the following:

- first, the limited volume of investments;
- second, the limited volume of some scarce resources, such as certain types of raw materials, semi-products, equipment and so on;
- third, the necessity of fully utilising the operating enterprises, inasmuch as in conditions when the need exceeds the

possible output volume it is hardly expedient to raise the question of curtailing one or another production line in this sector;

fourth, it is important to consider not only the possibility of replacing traditional materials by plastics but also some plastics by others;

fifth, a necessary condition is the full provision of plastics for uses in which they appear not as substitutes for traditional materials.

These and other conditions will be seen more clearly from the following economic-mathematical model which was utilised for making practical calculations in formulating the five-year plan for plastic industry development in 1971-1975.

### SYMBOLS

$i$  = plastic ( $i = 1, 2, \dots, m$ );

$j$  = direction of use of plastic  $i$  ( $j = 1, 2, \dots, n$ );

$A_{ij}$  = efficiency attained in consuming plastic  $i$  in direction  $j$ ;

$D_{ij}^*$  = need (demand) for plastic  $i$  for use in direction  $j$ ;

$d_{ij}$  = level of the obligatory supply of plastic  $i$  to direction  $j$ ;

$R_k$  = quantity of scarce resource  $k$  which can be utilised in the given system for the production of plastic  $i$  ( $k = 1, 2, \dots, K$ );

$\gamma_{ki}$  = input of resource  $k$  for the production of a unit of plastic  $i$ ;

$C$  = investment for the development of the production of plastics;

$C_i$  = investment needed for a unit increment in the production of plastic  $i$ ;

$b_i$  = existing capacity for the production of plastic  $i$ ;

$\beta_{i'j}$  = coefficient for recalculating plastic  $i'$  into plastic  $i$  in direction  $j$ ;

$\gamma_{i'j}$  = share of plastic  $i$  which can be replaced by  $i'$  in direction  $j$ ;

$X_{ij}$  = increase in consumption of plastic  $i$  in direction  $j$ .

### MAIN CONDITIONS

An increase in the consumption of plastic  $i$  in use  $j$  must not exceed the difference between the demand for it and the level of the obligatory satisfaction of the demand

$$x_{ij} \leq D_{ij} - d_{ij} \quad (1)$$

(if plastic  $i$  cannot be replaced by plastic  $i'$ ).

If such a replacement is possible:

$$\left. \begin{aligned} \beta_{i'j} x_{ij} &\leq \gamma_{i'j} (D_{ij} - d_{ij}) \\ x_{ij} + \beta_{j'j} &\leq D_{ij} - d_{ij} \end{aligned} \right\} \quad (1a)$$

Constraint in the use of resources:

$$r_{ki} \sum_{i=1}^m \sum_{j=1}^n (d_{ij} + x_{ij}) \leq R_k \quad (2)$$

Constraint in investments:

$$\sum_{i=1}^m c_i \sum_{j=1}^n x_{ij} \leq c \quad (3)$$

Condition for use of existing productive capacity

$$\sum_{j=1}^n x_{ij} \geq b_i - \sum_{j=1}^n d_{ij} \text{ with } b_i > \sum_{j=1}^n d_{ij} \quad (4)$$

The objective function is to maximise the effect from production development within the bounds of the available resources.

$$\sum_{i=1}^m \sum_{j=1}^n d_{ij} x_{ij} \rightarrow \max.$$

To solve the problem in this formulation means to determine the quantitative value of all variables  $x_{ij}$ .

It is clear that the volume of production of each plastic  $i$  will be equal to the sum of the lower (obligatory) level of

satisfying needs ( $\sum d_{ij}$ ) and the increase in the consumption of this plastic ( $\sum_j x_{ij}$ ). Thus, if the volume of production (consumption) of plastic  $i$  is designated through  $Q_i$  then

$$Q_i = \sum_j d_{ij} + \sum_j x_{ij}.$$

Calculations made on this model show what quantity of each plastic  $i$  should be allotted for direction  $j$  and what quantity of each plastic  $i$  should be produced within the bounds of the given conditions and constraints.

If, according to this model, calculations are made for different moments of time ( $t$ ), for each of them the expedient volume of output of each plastic  $i$  will be established at  $Q_i^t$ .

And so from a solution of a number of static problems of optimising the structure of the production of plastics (according to the criterion of maximisation of the national economic effect) for different moments of time  $t_1, t_2, t_3, t_4$ , and so on, we obtain the production volumes of each plastic  $i$  included in the problem in these moments of time.

Similarly curves  $Q_i^{t=0} - Q_i^{t=3}$  for each of the plastics  $i$  can be obtained. In other words, in this way we will ascertain the production plans for each plastic  $i$  during the period  $t_0 - t_3$ .

This is how the problems of the second stage of long-term planning are solved.

After solving the problems of optimising the structure for the most important groups of chemical materials it is necessary to compare these solutions. If, for example, a number of consumers of synthetic fibres which in using them obtain an effect amounting to 2.5-2.0 rubles per ruble of investment in the manufacture of these fibres are refused deliveries, while polystyrene plastics are supplied to consumers which obtain an effect of 1.2 rubles per ruble of investment, this will be a violation of the accepted principle (criterion) of distributing resources so that the total sum of the effect should be maximal.

In this case it is necessary to take away part of the investments from the producers of plastics and turn them over for expanding the output of more efficient fibres until the unit efficiency of marginal consumers becomes about equal in the case of both fibres and plastics.

Accomplishing the third stage in the work of planning we thus will solve the problem of optimising the final chemical output.

A multi-product balance drawn up for the obtained structure of the final product will make it possible to choose the most efficient types of raw materials and their processing methods.

This makes it possible to go over to solving a new series of single-product problems in the following general formulation:

*it is necessary to ascertain the methods for fulfilling the given probability production plan of a certain type of plastics with minimum inputs.*

It is clear that this plan can be fulfilled by enterprises of different types (different projects).

The type of enterprise is indicated by the capacity, period of construction and commissioning to full capacity, the available investments, current inputs, and so on. All technically acceptable types of enterprises (projects) are included in the problem.

From the solution we learn in what year and what type of enterprise it is necessary to start building so that the contemplated production plan (satisfaction of the demand) be fulfilled with minimum total inputs (investments and current inputs) for the entire period.

To verify the solution stability additional calculations are made with altered trajectories of the plan in order to ascertain the interval of change in the production plan within the bounds of which the plans of building enterprises do not change.

In this case the economico-mathematical model will be constructed as follows. Let us assume that in every year of the plan period with a duration of  $T$  years, a certain volume of output  $M$  has to be produced. From the assumption of the discreteness of time naturally follows the demand for the discreteness of all the model parameters. All of them have to be set for an annual period—inputs, time of the beginning and end of construction, and so on.

Let us assume that there are  $N$  types of enterprises. Enterprises of type  $j$ ,  $j=1, 2, \dots, N$ , signify production (a factory, shop, production line) with the given capacity  $m_j$ , periods of building and commissioning; investments with a

breakdown by the years of construction; cost of production of the goods depending on the output volume. Let us denote through  $X_{tj}$  the number of enterprises of type  $j$ , the building of which has to be started in year  $t$  of the plan period. Since every enterprise can be either built completely or not built at all  $X_{tj}$  is an integer or 0.

Then let  $\beta_{tj}$ ,  $K_{tj}$ ,  $C_{tj}$  be respectively the coefficient of the capacity put into operation, the investments and the current inputs in  $(t+i)$  year of the plan period at the enterprise of type  $j$ , the building of which was started in year  $t$  of the plan period. Both the investments and the current inputs are summed up and reduced to the first year of the plan period with the help of the discounting factor.

In every year  $t$  of the plan period the total operating capacity of the enterprises must be not less than  $M_t$ . This demand is recorded in the form of a  $T$  system of inequalities

$$\sum_{\tau=1}^t \sum_{j=1}^N \beta_{\tau(t-\tau),j} m_j X_{\tau j} \geq M_t \quad t = 1, 2, \dots, T. \quad (1)$$

Let us now denote the expression for the total inputs (investments and current inputs) needed for meeting the conditions (1).

The inputs in an enterprise of type  $j$ , the construction of which was started in year  $\tau$  will amount during the entire plan period to

$$L_{\tau j} = \sum_{t=\tau}^T (K_{\tau(t-\tau),j} + C_{\tau(t+\tau),j}).$$

The total inputs  $Q$  during the entire plan period will be:

$$Q = \sum_{\tau=1}^T \sum_{j=1}^N L_{\tau j} X_{\tau j}.$$

The purpose is to find such a plan of building and commissioning enterprises (i.e., such a vector  $X_{\tau j}$ ) which, satisfying conditions (1), minimises the value of the functional

$$Q = \sum_{\tau=1}^T \sum_{j=1}^N L_{\tau j} X_{\tau j} \rightarrow \min. \quad (2)$$

The unknown magnitudes  $X_{\tau j} \geq 0$  and are integers (1a). The number of enterprises whose building is started simultaneously can be limited from above.

$$\sum_{j=1}^N X_{\tau j} \leq d_{\tau} \quad \tau = 1, 2, \dots, T. \quad (3)$$

A special method of discrete programming has been elaborated for solving problems of this class; it is based on the idea of a directed alternatives choice. Several calculations are made with different trajectories of the plan. This makes it possible to establish the interval of change in the trajectory, under which the set of factories and the periods for beginning their construction (or commissioning) remain unchanged.

The set of enterprises which ensures the satisfaction of the demand in such an interval may be regarded as optimal.

Such a model can be successfully used for making calculations in sectors where the transport expenses, as a rule, are small. This enables planners first to determine the optimal set of enterprises and then to solve the problem of their location.

But in optimising some sectors, for example, the production of mineral fertilisers, such an approach is unacceptable. In such a case it is necessary at once to solve the so-called production-transportation problem, i.e., *alongside establishing the volume of production at individual enterprises also to determine the optimal scheme of their location.*

For this purpose the following economico-mathematical model can be used.

## SYMBOLS

$r$  = point of production location ( $r = 1, 2, \dots, m$ );  
 $S$  = index of consumers ( $S = 1, 2, \dots, n$ );  
 $M_r$  = maximally permissible output at point  $r$ ;  
 $D_S$  = satisfaction of requirements of consumer  $S$ ;  
 $I_r$  = production inputs at place  $S$  per unit of output;  
 $I_{rS}$  = inputs for the transportation of the product from enterprise  $r$  to consumer  $S$ .

We have to establish the quantitative value of the following variables:

$X_i$  = output of the product in point  $r$ ;

$X_{rS}$  = volume of the product transported from enterprise  $r$  to consumer  $S$ .

The quantitative value of these variables must ensure minimum inputs for the fulfilment of conditions provided for in the problem.

What are these conditions?

First, the product output at point  $r$  must not exceed the maximally permissible production volume in this point:

$$X_r \leq M_r.$$

Second, the shipment of the product from point  $r$  (including its own consumption) must correspond to its production in this point:

$$X_r = \sum_{S=1}^n X_{rS}.$$

Third, the needs of all consumers must be fully satisfied:

$$\sum_{r=1}^m X_{rS} = D_S.$$

Fourth, production curtailment is ruled out:

$$X_r, X_{rS} \geq 0.$$

The objective function:

$$\sum_{r=1}^m I_r X_r + \sum_{r=1}^m \sum_{S=1}^n I_{rS} X_{rS} \rightarrow \min.$$

(the first member of the objective function shows the total inputs for manufacturing the product and the second, for its transportation).

The need for, and usefulness of, the proportional development of related sectors linked by material flows and of separate production lines within a sector are obvious. While in the engineering industry specialisation in the production of parts and assemblies has been developed, in the chemical industry its analogy is the constant deepening of specialisa-

tion by stages. Owing to this the importance of balance co-ordination of the volumes of production and consumption constantly rises.

The existence and even prevalence of comprehensive lines of production dictate strict co-ordination of the long chains of interconnected productions, while the possibility of mutual substitution of materials unites many of these chains. Any change in the structure of one of such interconnected balances demands the making of changes in all the other balances linked with it. This work is repeated so often and is so labour-consuming that in the final count individual balances become mutually contradictory—disproportions arise.

A multi-product balance makes it possible to connect all the production lines that depend on each other, to mechanise and speed up the recalculation of the entire complex of producers and consumers with all their material relations. But the set of final products cannot be optimised with the help of a multi-product balance. They are given in advance. That is why it is expedient to combine the problem solution of optimising production by separate groups of products and semi-products with the subsequent mutual co-ordination of the obtained optimal plans by using the multi-product balance.

The solution of economico-mathematical models makes it possible to obtain important economic information for a deeper analysis of the laws of development of the optimised sectors. It is above all a matter of valuating resources for their contribution to the attainment of the general optimisation goal. Practical experience in solving problems, including also in the chemical industry, conclusively demonstrates the justification and need for taking these valuations into account in price formation.

For example, if all the consumers of a chemical material (for example, polycaprolactam) are placed according to the unit national economic effect in receding sequence and the volume of needs is indicated on one scale for every level of efficiency, the result would be a step-wise diagram. For each possible production volume limited by the resources of raw materials, total investments, special equipment or other conditions, there will be a definite boundary of satisfying the efficient consumers after all consumers for which there is no substitute material are satisfied in the first place.

This boundary cuts off the marginal consumer who gets this material. But so far this is a calculation on paper. What should be done so that the other consumers themselves refuse to use this material since they cannot ensure its minimal, marginal efficiency?

For this purpose it is necessary to include in the price the sum of the marginal efficiency. Then for all other consumers with a lower efficiency this material will be too expensive and the consumers themselves will refuse to take it.

Possibly it is more correct to include in the price not the entire sum of marginal efficiency but somewhat reduce it, giving the remaining part to consumers in order to encourage them to use new materials. But these are already details, we are interested in the principle of operation of such a mechanism of price formation.

Technically progressive decisions in industry and agriculture are decisions which bring the national economy an effect that exceeds the average level of efficiency attained for the economy as a whole. Then progressive innovations will raise this average level and augment the national wealth.

As the national economy becomes saturated with polymeric materials the efficiency of using every successive 1,000 tons swiftly recedes, because the unit efficiency for different consumption spheres of the same material differs greatly.

Thus, in the case of block polystyrene if 52,000 tons are produced in 1975 the effect per ton will range from 15,000 to 1,100 rubles. Should output be increased to 81,000 tons the marginal effect will decline to 700 rubles per ton. About 90,000 tons would have to be produced for the relatively full satisfaction of all economically-justified consumers, and the users of polystyrene would include consumers with an effect of 250 rubles per ton.

With such great differences in efficiency it is easy to organise precise control over the expedient use of polymers and other materials with the help of prices which take into account the barrier of the planned efficiency level. The boundary of technically progressive decisions becomes clearer and more easily definable.

Many examples could be cited illustrating the high efficiency of solutions of sectoral optimisation problems. Let us name only some of them.

An optimal plan of the development and location of the

oil-extracting and the oil-refining industry, drawn up by CEMI, together with several sectoral institutes, is of great interest.

To solve this problem a mathematico-economic model was constructed describing the conditions of the production and transportation of crude oil and the production and distribution of oil products.

The calculations established: the volume of crude oil production by individual regions and its distribution among oil refineries; location of the refineries and their capacity; the volume of output of separate oil products at refineries and their distribution among consuming regions.

The given requirements of the national economy in oil products were satisfied by this plan with the least total inputs (current inputs plus investments) in the production, refining and transportation of crude oil and oil products.

In formulating the mathematical model for this problem use was made of a special method devised by the staff of CEMI and the research institutes of oil and oil refining. This method makes it possible to utilise a computer not only for solving the problem proper but also for preparing the basic initial data. The complexity of the problem is illustrated by the following figures: the computer solved 450 equations with 2,900 variables. The initial matrix had 19,000 elements. Such a big volume of the numerical material dictated a special organisation of calculations and the use of the best Soviet-made computer, the BESM-6 model.

What is important is that a number of alternatives of possible plans for the development and siting of the oil-extracting and oil-refining industry was compared. As a result, the saving in investments as compared with the plan drawn up by traditional methods amounted to 850 million rubles.

Quite interesting work was done in formulating an optimal plan for the location of the cement industry. The work was brought up to the stage of concrete recommendations as regards extendable construction work and can serve as a good example of the application of mathematical methods in planning. The effect for 1966-1970 amounted to about 75 million rubles in investments (14 per cent of the total) and 96 million rubles in current inputs. Similar calculations are being made for 1975 and 1980.

The work on optimal development and location of enterprises in the nitrogen fertiliser industry for 1970 encompassed only about 20 per cent of the planned output because the building of many enterprises had been started earlier. Within the bounds of this volume of output 47.5 million rubles of investments and 14.7 million rubles of current inputs were saved in five years. Similar calculations were made in drawing up the draft plan of the national economy for 1971-1975.

The work on the optimal development and location of enterprises of the phosphorous fertiliser industry for 1970 covered 47 per cent of the planned output. Within these bounds the saving amounted to 20 per cent in investments (81.3 million rubles) and 3.8 per cent in current inputs (6.6 million rubles).

The plan for the development and location of the coal industry of the RSFSR for 1966-1970-1975 was optimised for 66 consuming areas and 20 coal fields. This problem was formulated as a model of two-stage optimisation, where the upper stage was optimising the location and the lower stage, the production assignments of individual coal fields. The optimised plan makes for a saving of 13 per cent of the investments (100 million rubles).

The optimal plan for the development and location of the cable industry was elaborated on the basis of a solution of a four-stage production-transportation problem. The problem was to minimise the sum of current inputs in production and transportation of the goods in 1970, with constraints on the total sum of investments allotted to the sector. The solution of the problem made possible a saving of 15 per cent on current inputs.

For a number of years the Mathematics Institute, Siberian Division, USSR Academy of Sciences, and other research organisations have been working on the specialisation of rolling mills, employing various methods for concerting the most expedient directions of specialisation with the resultant rise in transportation expenses. The many examples of successful application of mathematical methods for optimising production location and development show that optimisation of sectoral plans helps to obtain a saving estimated at 10-15 per cent.

#### 4. Automated Management Systems of Industries and Enterprises

In conformity with scientific and technological progress, automated management systems for enterprises and industries have been swiftly developed in the Soviet Union in the last ten years. The elaboration and introduction of automated management systems (AMS) is a labour-consuming and costly process. To accelerate work and accumulate experience in this sphere, the Communist Party and the Soviet Government have initiated important measures to organise a network of respective research institutes and experimental units.

In a brief period (1960-1965) a network of such research institutes has been set up (the Central Economico-Mathematical Institute, USSR Academy of Sciences, the Central Research Institute of Management, Minsk, the Cybernetics Institute, USSR Academy of Sciences, the Institute of Economics and Organisation of Industrial Production, Siberian Division, USSR Academy of Sciences). This made it possible in a short period to train personnel and launch research on a wide scale on all problems of elaborating an AMS. In addition, special experimental plants and sectors of industry were assigned whose work in developing the AMS is financed chiefly from the state budget.

Specifically in 1966-1970 about 300 factories and 28 sectors of industry were assigned as objects of experimental work. This made it possible to carry out a sufficiently large amount of experimental work without linking its consequences with the results of current production and economic activity of the respective enterprises and industries.

Development of an AMS in any link of the socialist economy presupposes the solution of serious research problems within the general concept of optimising national economic planning and management. As a rule elaboration of AMS projects by concrete links of industry demands:

- a) specification of the goals and criteria of development of the given link within the bounds of the socialist economy;
- b) the exact definition of the quantitative and qualitative constraints on the development of the object;
- c) the bringing out of the internal laws of the functioning of production.

This serves as a basis for:

a) construction of a complex of economico-mathematical models of planning and managing the functioning of concrete enterprises or sectors of industry;

b) determination of the organisational, technical, information, and financial resources needed for realising the complex of models;

c) creation of a rational organisational structure of the managerial apparatus.

The enumerated problems which have to be solved at the initial stages of developing AMSs show that in the Soviet Union research in this sphere is oriented on developing models of management conceived in terms of the modern apparatus of mathematical programming. The task of developing AMSs is not reduced to a mechanical transfer of the operating management system to a new technical basis, but begins with a radical improvement of the planning and management models in all links of the national economy. This situation is characteristic both of every individual enterprise at which computers are introduced and also of ministries and departments and the USSR Gosplan. This makes it possible rationally to utilise all the achievements of scientific and technological progress both in computery and in economico-mathematical modelling.

The solution of technical problems in developing AMSs (choice of computers and other technical facilities, provision of a complete set of equipment for mathematical work, and so on) is effected on the basis of a management model elaborated through the use of economico-mathematical methods. It goes without saying that such an organisation is more labour-consuming as compared with the creation of electronic systems of data processing based chiefly on formalising the processes of functioning of the operating management system. But it makes it possible to solve technical aspects of creating AMSs, with a view to developing long-term management systems.

The introduction of AMSs in the Soviet Union is subordinated to the general task of raising the efficiency of social production. In view of this preference is given

to large national economic complexes-sectors, that is, to the creation of sectoral AMSs. It will be recalled that the more intricate the object, the bigger the effect from the

employment of computery and modern methods both in relative and in absolute terms. That is why the elaboration of sectoral AMSs in all departments and ministries of the country is regarded as a priority task;

to big enterprises and associations in industry, at which the introduction of computers yields a substantial national economic effect.

USSR ministries and departments are the main agencies which manage sectors. By the way, any ministry or department usually unites enterprises in different sectors of the economy and, in effect, is a multi-sector complex.

Thus, the solution of the problem of developing sectoral automated management systems presupposes the elaboration of questions of planning, accounting and management of multi-sector, multi-link production complexes which unite diverse types of activity.

The state national economic development plan for 1966-1970 provided for the elaboration and partial introduction of 30 sectoral automated management systems on the scale of ministries and departments. This work will be continued and further developed in the current five-year period between 1971 and 1975. The development and introduction of scores of other sectoral management systems is under way. Such a scale of development establishes a sequence in commissioning AMSs and presupposes the rational use of specialists and technical facilities.

An important part in co-ordinating the activity of these collectives was played by the preparation of general methodological regulations (on a country-wide scale) for the elaboration and introduction of sectoral automated systems of managing production. These regulations ensured

standardisation of the stages in elaborating projects of management information systems;

identification of project materials in different ministries and departments so as to be able subsequently to arrange their co-operation for the reciprocal use of their materials;

a unified procedure for the interaction of the management information systems of ministries and departments with the systems of the country's highest planning and economic agencies;

some general regulations for all ministries and depart-

ments (organisation of groups to work on the projects, standard documentation for formalising project materials, standard network graphs of the work, and so on).

Moreover, the general methodical materials defined the procedure of interaction between the development groups and the leadership of the ministries and departments in the practical creation of the automated management systems.

It may be noted that the introduction of general methodical materials (on a country-wide scale) on the whole made for a saving in time of one or two years for most ministries and departments. Correspondingly, this ensured an evening out of the process of creating automated management systems by ministries and departments.

The work of developing sectoral automated management systems is being carried on in accordance with the methodology established in our country for designing big systems of production management, which takes into account the distinctions of the functioning of socialist production and the ways of its transition to an optimal regime. Accordingly, in the general complex of creating automated systems of managing the activity of ministries and departments there were singled out:

the establishment of criteria for the functioning of the complex of various productions in the ministry or department and also the parameters of its interaction with other links of the national economy and the higher planning and economic agencies;

the choice of the economico-mathematical model of realising the management system and determining the production and organisation structure of the ministry or department in conditions of the new management system;

determination of the flows of data in conditions of the new organisational structure of production and the system of managing the activity of the ministry or department;

determination of the composition and structure of the technical facilities for the new management information system.

The singled out aspects are closely interconnected and respectively determine the sequence and nature of designing work.

The decisive part in the automated systems of managing the activity of ministries and departments is the model of

functioning of their multi-sector production complexes. Two approaches are employed for developing a model of functioning of an object of management:

formalisation and transfer to computers of the existing structure of the information flows of the operating managerial apparatus of a ministry;

creation of a new management model based on study and formalisation of the laws of functioning of a multi-sector production complex in a ministry.

In developing automated systems of managing the activity of ministries in our country the second approach prevailed. Besides other advantages, it makes it possible to draw up recommendations for rationalising the production structure of the complex of enterprises united by a ministry.

At the same time at the initial stages in the development of automated systems, the first approach, too, is utilised occasionally.

Automated systems of managing the activity of ministries are developed in conditions of the economic reform which specifically envisages the extension of the economic independence of enterprises and associations, the provision of greater material incentives to their personnel for the results of their work, and also for the introduction of cost-accounting principles in the activity of economic managerial agencies. This circumstance also increases the need for utilising the second approach in creating models of the functioning of ministries and departments.

Thus, models of the functioning of ministries are elaborated in favourable conditions simultaneously with the introduction of the new system of planning and management on a country-wide scale. At the same time the process of shaping the new system of planning and management dictates diversity in constructing models of the functioning of ministries.

In developing models of the functioning of ministries the most widespread are:

linear programming methods, especially block programming;

linear programming methods based on the use of iterative computation schemes;

non-linear programming methods;

simulation methods;

other methods of mathematical programming.

Irrespective of the employed apparatus, the development of separate models and complexes of models is based on a system analysis of the concrete conditions of the activity of ministries, which, as a rule, is used at the first stages in studying the problems of creating automated management systems. In particular the general methodical propositions of developing such systems provide for the making of a respective diagnostic analysis in the course of the work.

Automated systems for managing the activity of ministries are developed with a view to their interaction with systems of higher planning and economic agencies. In particular the information systems of managing the activity of ministries are co-ordinated with:

the automated system of planning calculations of the USSR Gosplan and the Gosplans of the Union Republics;

the system of data processing of the country's statistical agencies;

information systems of managing the state service of material and technical supply;

other information systems of the country's highest economic agencies.

Such co-ordination makes it possible to standardise, on a country-wide scale, scientific, technical and economic information, the schemes of data flows, and so on. In brief, all this creates the prerequisites for building up and putting into operation a general state information service, the establishment of which is envisaged by the 24th CPSU Congress.

The fundamental propositions enumerated above can be illustrated in the case of one of the sectoral automated systems of management put into operation, known as ASU-pribor (automated system of management in instrument-making). It was developed and introduced (the first section) in 1970 in the USSR Ministry of Instrument-Making, Means of Automation and Control Systems.

The instrument-making sector is a big industrial complex; its enterprises employ several hundred thousand people, it has a very extensive nomenclature (about 22,000 items), which is swiftly being renewed. It was the first sector in the country to go over to the new system of planning and economic stimulation. Moreover, by way of an experiment

the methods and indicators of planning, financial relations with the budget, relations of the central boards with enterprises, and so on, applied here, differ from those in other ministries.

ASU-pribor was brought into being by the need for essentially raising efficiency in managing the sector. It represents a combination of organisational and economico-mathematical methods, computers, business equipment and means of communications. It functions as a man-machine system, in which man naturally has the final say, and it is designed to solve problems connected with managing sub-sectors and the sector as a whole. The management systems being set up at enterprises remain beyond its bounds, but a link-up is provided between the factory and the sectoral AMSs (from the viewpoint of the system of indicators, normatives, and other types of information on which an exchange between the systems is possible).

The first section of ASU-pribor was designed for solving 74 types of problems—27 planning, 31 accounting, and 16 analytical problems. The system is divided into ten sub-systems:

01. Long-term planning, development and location of the sector;

02. Technico-economic planning and analysis of economic activity;

03. Operational management;

04. Management of material and technical supply;

05. Management of supplying technically complete sets of machines;

06. Bookkeeping and an analysis of economic activity;

07. Management of sales;

08. Management of financial activity;

09. Planning, accounting and analysis of labour and wages;

10. Planning and accounting of executives and working personnel.

The second section of ASU-pribor will have to solve a number of questions related to improvement of managing research and development work, construction, and some other types of activity of the ministry.

A number of the Soviet Union's large research and designing organisations took part in developing the sub-systems

of the first section. Valuable experience has been accumulated, which can greatly facilitate the elaboration and introduction of other sectoral automated management systems. In particular, experience has demonstrated the great importance of putting in order normatives for the proper functioning of sectoral AMSs. The ministry of the instrument-making industry has done much work in this respect which produced a positive effect. Additional measures are also needed to eliminate or at least mitigate the extreme unevenness, in point of time, of the flows of the processed information, because this overloads computation centres in some periods and leads to idle time in others. On the whole, according to statements of officials of the ministry and enterprises, the very first results of the operation of ASU-pribor may be considered encouraging. Management of enterprises by the ministry and its central boards has improved, labour inputs in the processing of planning and other economic information have been reduced (for example, in the sub-system "management of material and technical supply" manual processing of information took up about 84,000 man-hours: performance of the same amount of work by computers reduces it to 500 hours of machine time).

Economico-mathematical methods have been most widely introduced directly at factories. It is difficult to name now an industry at whose enterprises work is not conducted along these lines. In addition to the experimental enterprises named earlier, at which automated systems are being introduced with budget investments, hundreds of other systems are being elaborated and introduced directly by the forces and resources of ministries and also associations and enterprises themselves. Between 1971 and 1975 it is contemplated to introduce no less than 1,600 management systems at enterprises and organisations of industry, agriculture, transport, communications and trade. As a rule, they utilise the experience accumulated at the experimental enterprises and apply the same methodical principles of design and organisation of the work.

The work is most effective in cases when standard systems are created suitable for transfer to a sufficiently wide range of enterprises with similar technological, organisational and other characteristics.

The economic reform has greatly influenced the work of

developing automated management systems at enterprises. As a result of introducing new indicators for assessing economic activity the personnel of enterprises has become more interested in improving the quality of management and production planning. Hence the interest in new methods based on the achievements of mathematics and computery. A definite part has been played by the bigger scale of training respective specialists and also the measures taken in recent years to retrain managerial personnel. A ramified network of institutes, departments and courses for the advanced training of leading managerial personnel has been set up in most industries and transport. Their programmes pay special attention to the new methods of planning and management. The "psychological barrier" which hinders personnel with traditional training to assimilate the new methods and to trust decisions made with the help of computers, is successfully being overcome.

The wide complex of work aimed at introducing economico-mathematical methods at enterprises can conventionally be divided into three trends:

introduction of economico-mathematical methods and computers in calendar planning and dispatcher control of production;

introduction of economico-mathematical methods and computers in technico-economic planning;

modelling of production processes for the purpose of subsequent automatic control of their progress.

Modelling of problems of calendar planning is very important because their solution is labour consuming.

The introduction of economico-mathematical methods in technico-economic planning acquires particularly great importance in conditions of the economic reform. Enhancement of the role of materially stimulating the efficient use of fixed and circulating assets and the need to choose optimal alternatives of the production plan determine the interest of managerial personnel in economico-mathematical methods.

It should be noted that the singling out of these three trends is of a somewhat conventional nature, because all of them, as a rule, develop within the bounds of constructing automated systems of planning and managing production.

The development of automated systems of managing pro-

duction is the main line of introducing economico-mathematical methods at enterprises. The standard systems of managing production created in recent years and designated for enterprises with mass, big-lot and in some cases of small-lot, discrete production, and also for enterprises with continuous production yield a definite return by increasing output and raising the economic efficiency of production. Specifically, the experience of the Lvov system introduced at the Lvov Television Factory, and of the automated system of managing production (ASMP) at the Frezer Factory in Moscow, the Barnaul Radio Factory, the Minsk Tractor Works, and other enterprises shows that in present-day conditions of Soviet industry the expenditure for building up an automated system of managing production is recouped in a brief period—one or two years.

This can be demonstrated in the case of the Lvov system commissioned (the first two sections) in 1967-1969. Here a big complex of technical devices was installed, new forms of the circulation of papers within the factory were elaborated and introduced, taking into account the demands of the system, and the normative basis was improved. As a result the co-ordinating managerial centre of the factory now controls all the shops engaged in main production and performs all the functions of planning, accounting and analysing the productive activity of the factory.

An analysis brought out that merely an improvement in the rhythm of operation of the main shops on the basis of optimal production planning increased output by 6.6 per cent annually (not counting the expansion of output due to other factors). The turnover of circulating assets was essentially accelerated, output per ruble of fixed assets increased, and so on. On the whole, as shown by the calculations, in this case the investments in the automated system were recouped in one year. Efficiency of these investments was three times greater than the efficiency of investments in production as such.

Similarly high results are characteristic, for example, of the ASMP commissioned at the Frezer Factory in 1967. Here modern economico-mathematical methods helped to optimise the drawing up of production plans, including operational plans, to reduce the volume of uncompleted output and consequently to accelerate the turnover of resources.

Valuable experience was also accumulated in employing computers at the stage of preparing production, which is particularly important in view of the exceedingly wide nomenclature of output at this factory. According to executives of the factory, the introduction of the ASMP yields an annual saving of about one million rubles. The Frezer system is now being introduced at other enterprises of the Ministry of the Machine-Tool Industry.

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Thus, much work has been done in the USSR in introducing economico-mathematical methods in planning and managing the national economy. Extensive work is also being carried on to develop factory and sectoral automated management systems, and the accumulated experience merits wide propagation.

But we must look ahead. Individual systems do not exhaust the great possibilities created by introducing in the national economy such powerful equipment as computers and such powerful scientific means as economico-mathematical methods of planning and management. The advantages of the socialist planned economy open ways to attaining the highest efficiency in applying this equipment and scientific achievements.

The planning system will always be a man-machine system based on the hierarchic principle. In creating it, one of the most difficult tasks is the precise co-ordination of human and machine units, of human and "automatic" decisions. It is a matter not only of an intricate and ramified complex of optimisational, multi-alternative forecasting models which encompass and interconnect diverse aspects of socio-economic development. It is necessary to co-ordinate with it a range of methods and instruments for the making of human decisions and the evaluation of alternatives, such as the method of collective expert opinion, the method of target planning, the drawing up of "scenarios" of different situations, strategic games, and so on. All this totality of models and methods must be organically incorporated into the real process of decision-making, dovetailed with concrete subdivisions and workers and provided with information—in a word, must operate according to a precise technological

scheme. A network of computation centres will provide the foundation, the technical basis, for such a process. It will be linked with managerial agencies by developed peripheral devices combined with business equipment and means of communication.

Comprehensive improvement of the planning process demands the energetic and co-ordinated participation in this work of a large number of research and designing institutes. It is in fact a matter of building up the biggest man-machine system in the world. The organisation of this work is of an intricacy corresponding to its scale, and it can be regarded as one of the most important general programmes of our country's development. The carrying out of this programme by stages will efficiently promote the development of our country's management system, in accordance with present-day demands.

Co-ordination and linking up of the individual scattered sectoral AMSs is now under way. This presupposes the establishment of unified information systems, on a country-wide scale, data markers, a schedule for the interaction of different AMSs, and so on. In the long-range prospect the sectoral AMSs and the AMSs in separate links of the national economy will be combined in a unified country-wide automated system that will collect and process information for accounting, planning and managing the national economy. The technical basis of this system will be the Unified State Network of Computation Centres—USNCC. This network is an essential requisite for applying the scientific conclusions of the optimal planning theory and management of the socialist economy.

It goes without saying that important problems, both theoretical and technical, have to be solved in this sphere. However, the concentration of great forces and the allotted resources enable us to assert that they will be successfully solved.

In present-day conditions of socio-economic development of the Soviet Union the creation of an optimal planning and management system of the economy becomes an important factor in raising the efficiency of social production, the basis for accelerating the economic growth rates of our country and advancing the living standard of the Soviet people, which is the aim of developing the socialist economy.

Steadily improving the system of planning and management, it is possible to achieve the consistent and all-round realisation of the undoubted advantages of the socialist economic system as compared with the capitalist economy, which in principle is unable to ensure maximum efficiency in utilising society's productive resources.

Only socialist society, the economic life of which is based on social ownership of the means of production, is capable of creating a system of optimal planning and management.

A number of organisational measures is being carried out to extend theoretical studies and the practical application of the principles of optimal planning and management, namely, the training and retraining of personnel has been improved and extended and special subdivisions have been set up in ministries and departments, the provision of programmes and machine time for solving problems on computers is being perfected, and, what is particularly important, steps are being taken to improve and centralise the collection, processing and storing of information. The manufacture of modern computers is being substantially expanded and measures are drawn up to ensure their most rational and wide use in all links of the national economy.

Elaboration of the problems of optimal planning and management of the national economy is now a primary task of scientific economic institutions and planning agencies. That is why a great extension of work in this sphere is envisaged in the next few years.

This work is designed to promote the further improvement of economic management, seriously to enhance efficiency in utilising all resources in the interests of improving the well-being of the Soviet people in every way.

## CHAPTER 6

### THE ECONOMIC REFORM AND EFFICIENCY OF INVESTMENTS

Soviet economic science has accumulated much experience in elaborating the problems of the economic efficiency of investments. Methodical recommendations, systematised and generalised practical designing and planning materials and calculation methods are available. The elaborated theory of the investment efficiency proceeds from an analysis of the socialist economy and consideration of the tasks of its development.

The effect of investments in the form of an increment of net output is a result first of equipping the workers newly-drawn into material production with new means of production and, second, of improving the means of production, which ensures a rise in the labour productivity of all workers.

Accordingly, investments in the expansion of production can schematically be divided into two parts. One of them goes for increasing the quantity of the means of labour. To set into motion these new productive capacities new workers, engineers and technicians are needed which can be enrolled only partly through the natural population increase; the greater part consists of persons released from other sections of material production. The other part of investments goes into extended reproduction for replacing the operating means of labour by technically more improved which raise labour productivity. These investments do not demand additional manpower; moreover, they make it possible to release manpower which is employed at newly-built enterprises.

These two types of investments may conventionally be called extensive (requiring new manpower) and intensive (which ensure a rise in labour productivity and release manpower). This division is conventional because purely extensive or purely intensive investments are seldom made. Usual-

ly in making extensive investments both the productive apparatus is enlarged and its technical level is raised. Similarly, intensive investments go not only for the introduction of new equipment, but also often for the expansion of the productive apparatus.

The decisions of the 24th CPSU Congress provide for the further development of production primarily through intensification. The basic task is to raise the efficiency of social production—increase labour productivity, reduce unit material inputs and improve the use of fixed assets. Such a line of development is inherent in the high stage attained by the Soviet economy. The choice of the most efficient trends of investments is of great importance for raising the efficiency of social production.

The expediency of both these types of investments can be measured by the effect they create in the form of an increment of the national income (net output). The optimal alternative at a given moment is the alternative of the national economic plan which ensures the biggest increment of the national income per ruble of investments in productive assets, i.e., the maximum absolute efficiency of investments. This is possible if the trend of each type of investment is correctly chosen. Here it is a matter of comparing the efficiency of investments, the choice of the most effective alternatives which guarantee a higher level of investment efficiency in the national economy as a whole.

At the same time each type of investments differs for the nature of the effect it creates: extensive investments, all other conditions being equal, do not ensure a reduction of production costs, but they increase the general mass of profit, while the effect of intensive investments is expressed above all in a cut of production costs (which means also an increase in profitability). By the degree of this reduction in relation to the sum of the investments it is possible to judge of their efficiency.

Proceeding from these principles, Soviet economists proposed, even prior to the economic reform, concrete ways of calculating the efficiency of investments. In conditions when administrative methods, to the detriment of economic ones, prevailed in the management of industry and agriculture, when cost accounting was largely of a formal nature, the rights of enterprises were restricted, prices poorly reflected

the social labour inputs and the credit mechanism was not utilised in full measure, the proposed system of calculating economic efficiency was to a considerable extent a substitute for the mechanism of value relations, making it possible to solve a number of economic problems.

Among the methods which became widespread, especially in designing and partly in planning, was above all the choosing of alternatives of investments by the recoupment period or the minimum of the summed-up and reduced material inputs. The summed-up inputs  $I=C+EK$ , where  $C$ —cost of production,  $K$ —investments and  $E$ —the normative of investment efficiency. In this formula the efficiency normative reflects the limited nature of the accumulation fund in the national economy. The use of this formula makes it possible to reduce investments to an annual scale. The summed-up inputs represent a “shadow price”, which takes into account not only the cost of production but also the marginal share of accumulation per unit of output needed for raising labour productivity and expanding output. In conditions of a substantial differentiation of prices in both departments of social production (the output of means of production and of consumer goods), the use of summed-up inputs made it possible to draw nearer to reflecting the real inputs of social labour and at the same time allocate these inputs more correctly.

Another attempt to draw nearer to the real inputs of labour was the employment in economic calculations of all kinds of conventional adjustments of prices in cases when they sharply differed from real inputs. For these purposes it was suggested for example, that use be made of the cost of transportation instead of freight rates, that the turnover tax be excluded from the prices, and so on.

In view of the existence of differential rent in the socialist economy and in the absence of any rent payments a method which replaces the “shadow” principle was suggested and applied—consideration of the so-called marginal inputs of the worst enterprise the output of which, however, is needed to satisfy social needs. In other words, the inputs of society for expanding output were to be evaluated not by average indicators, but by the concrete inputs in the enterprises or productive capacities which had to be commissioned.

Among the methods of using “shadow” indicators is also

the employment of compound interest in calculating investments made at different times. With its help these inputs are summed up and reduced to one period of time, according to the coefficient

$$b = (1 + E)^t, \text{ or } \frac{1}{b} = \frac{1}{(1 + E)^t},$$

where  $E$ —normative of efficiency,

$t$ —number of years (for example, the difference in the period of investment in two alternatives).

In conditions when investments were “free of charge” the proposed methods of using compound interest were applied instead of calculations made in long-term crediting, reflecting the uneven value for society of expenditures in current and future periods in conditions of a rise in labour productivity and increase in accumulations.

The purpose of all these methods was to ensure a national economic approach to determining the efficiency of investments. Their employment made it possible to optimise the national economic plan in its separate sections, inasmuch as an optimal plan for the national economy as a whole had not yet been elaborated.

This system of calculations was widespread; it was envisaged in the Typical Methodics of Determining the Economic Efficiency of Investments and New Equipment in the National Economy of the USSR, elaborated by the USSR Academy of Sciences, and other methodics worked out on the latter’s basis. Its principles have been reflected in the measures of the economic reform. Among them are the creation of a new system of prices with the inclusion of a ratio of profit to assets (i.e., according to the scheme  $C+EK$ ), the introduction of pay for assets and of a system of rent payments, the transition to long-term crediting of investments, and so on.

Successful implementation of the measures of the economic reform is a primary task of all planning and economic work in the country. The reform raises in a new way the question of the earlier created “shadow” system of economic calculations. While formerly the purpose of the system was to reflect in economic calculations a national economic approach to evaluating economic decisions to be made, now, as the measures of the reform are being applied, this ap-

proach in the case of investments made from the production development fund and bank credits can and should be ensured directly, because the reform provides for the conformity of the interests of enterprises to the interests of society as a whole. But thereby the need in a dual count, in the duality of economic calculations, will be reduced. As the reform is improved there is less need for resorting to "shadow" calculations.

The reform provides for greater initiative and independence of enterprises in solving economic and technical tasks. An enterprise itself has to decide what investments it is advisable to make for expanding and technically improving production. For this purpose a production development fund is set up at enterprises and bank crediting of investments is allowed.

At present the share of investments made on account of the fund of enterprises is still small. Non-centralised investments make up about 20 per cent of total investments. But as the reform is deepened this share will grow. Investments in enlarging and modernising operating enterprises will be increasingly made on account of the production development fund and bank credits. Moreover, industry's own resources and long-term bank credits will serve as sources of investments in new enterprises which recoup with their own profit the invested resources in periods of up to five years.

Apparently, in making investments on account of its own development fund or bank credit, an enterprise will choose alternatives which enable it to increase profit and raise the level of profitability envisaged in the annual plan. This level has to be sufficient to ensure pay for assets at the established rates, of rent, of interest to the bank and the formation of the three economic stimulation funds at the enterprise. Thus the profitability which is to be obtained from the contemplated undertaking must be compared not with pay for assets, but with the level of profitability established for the enterprise. Of all the alternatives an enterprise will choose one that provides for the biggest rise in profitability. The terms of choice of the best alternative are expressed in the following formula:

$$\frac{(P_2 - C_2) - (P_1 - C_1)}{A_2 - A_1} \geq E_p,$$

where  $C_1$  and  $C_2$  = cost of production in the alternatives,  
 $P_1$  and  $P_2$  = price of the goods at the enterprise in the next two years,

$A_1$  and  $A_2$  = productive assets of the enterprise,

$E_p$  = coefficient of profitability set for the enterprise.

To stimulate measures which are advantageous for the national economy but do not meet the cost-accounting demands of individual collectives, it is necessary either to set higher prices for such enterprises, or reduce their planned normative of profitability or give them a subsidy for a definite purpose. The contradictions arising between the normatives of profitability and the normatives of efficiency must be resolved in the course of implementing the reform, specifically by changing the payments made by enterprises. There is, for example, the proposal to introduce separate pay for old and new assets (investments); moreover, pay for new assets must be brought up to the level of the normative coefficient of efficiency, while pay for old assets should be determined by deducting from profit all other contributions and payments envisaged by the reform. There are also other proposals which need to be examined.

The question arises, does all this mean that after the economic reform is completed, efficiency will be determined only by direct calculation and there will be no need for national economic calculations of efficiency? By no means.

The economic reform and the methods of calculation following from it do not and cannot cover all the economic measures in the economy. These methods encompass chiefly "short-term" decisions, each of which does not require particularly big investments and is recouped in a brief period. But the development of the national economy also demands measures of another nature carried out under long-term investment programmes often designated for 10-20 years. Among them are investments in the building up of new industries, the development of new economic regions, and so on, the full effect of which can be realised only in the more or less distant future. The economic efficiency of such long-range measures cannot be evaluated by cost-accounting methods of enterprises applied for current investments. Different methods have to be used for such measures.

Calculations of efficiency by these methods are also needed in cases when planners have to decide the degree of expedi-

ence of technical measures general for a sector or for the national economy as a whole, for example, in planning the manufacture and distribution of different types of machine tools, synthetic materials, and so on. Calculations have to be made in designing equipment and manufacturing processes for a sector as a whole when the need arises to compare measures not linked with concrete enterprises or envisaging the production of goods the prices of which are not yet known.

Increment of the national income is the most general indicator of efficiency of investments in the national economy as a whole. An optimal national economic plan ensures the obtaining of a maximum magnitude of the national income with the given structure, corresponding to the social needs, and with the given resources. It includes both the part which during distribution goes for accumulation and the part which goes for consumption, above all, in the form of wages (for enterprises these are inputs and not income).

The relationship of the volume of the national income to the sum of the fixed and circulating productive assets of the economy (in stable, comparable prices) is the main indicator of efficiency for the national economy. This is an overall indicator. It reflects, as compared with the assets, the total magnitude of the net product which increases both through a rise in labour productivity and a reduction of material inputs and also through the enlistment of additional workers. The level of this indicator in the national economic plan makes it possible to judge how rationally the plan is formulated and how fully the available resources are utilised.

The dynamics of this indicator for the Soviet economy as a whole over ten years is shown in Table 1.

A decline of this indicator during the seven-year period (1959-1965) speaks about the existence of unfavourable phenomena in the Soviet economy, although to a certain extent these can be explained by structural shifts and other objective factors. The plans must provide for an increase of this indicator in the next few years at least to the level of 1959-1960, i.e., to 61-63 kopeks per ruble of fixed and circulating assets.

If we take this indicator per ruble of only fixed assets, i.e., without circulating assets, we find that it was 84.5 kopeks in 1959 and 68.5 kopeks in 1970. In the United States there were 63 cents of the net product per dollar of fixed capital

Table 1

Indicators	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Fixed productive assets, at the beginning of the year ('000 million rubles)	162	174	190	209	230	254	278	312	337	363	392	422	459
Circulating assets of commodity-material values, at the beginning of the year ('000 million rubles)	57	66	71	78	86	93	103	108	117	131	142	149	162
Sum of fixed productive assets and circulating assets, at the beginning of the year ('000 million rubles)	219	240	261	287	316	347	381	420	454	494	534	571	621
National income in comparable prices ('000 million rubles)	137	148	158	167	174	190	203	218	234	251	265	288	—
National income in relation to the sum of fixed productive assets and circulating assets (kopeks of national income per ruble of assets), at the beginning of the year	62.6	61.6	60.5	58.2	55.0	54.7	53.2	51.8	51.5	50.8	49.6	50.4	—

in 1957 and 64 cents in 1963 (for entire material production), but this indicator can only very conventionally be compared with the Soviet indicator.

Some economists hold that a reduction of the output-asset ratio by itself is not yet an adverse indicator if it is caused, for example, by a change in the structure of production and, therefore, it is not at all necessary to strive for its increase. Moreover, a decrease of the output-asset ratio (or a growth in asset-intensity) can be compensated by a saving in the cost of production. This often is the case. But the reduction in the output-asset ratio in 1960-1965 was largely determined by subjective reasons which depended on shortcomings in planning and management. In recent years the decline in the output-asset ratio was stopped and in 1970 it was higher than in the preceding year.

The efficiency of investments in the national economy may be expressed as the ratio of increment of the national income to the increase in fixed and circulating productive assets. This indicator fluctuates considerably by years and amounted to 43 kopeks per ruble of fixed and circulating assets on the average for the last five years, which is much lower than the ratio of the national income to assets. What tells here is the lag in commissioning the new assets. This shortcoming can be fully eliminated.

The indicator of investment efficiency in the national economic plan can be regarded as a resultant general indicator characterising the quality of the plan. Moreover, it is necessary to provide for measures which ensure the attainment of the planned efficiency level.

The ratio of the sum of profit, turnover tax and other accumulations to productive assets can be determined for the national economy. In 1960 this ratio amounted to 27 per cent, in 1965 to 22 per cent and in 1967 to 23 per cent. The ratio of accumulation to productive assets is not a fully objective indicator because it may vary during the change of prices of the turnover tax rates.

The ratio of the national income to productive assets by sectors cannot reflect their efficiency to the same extent as that for the national economy as a whole, owing to the deviation of prices of individual goods from value (for the national economy as a whole the sum of prices equals the sum of values). That is why the indicators of efficiency by

sectors representing the ratio of the net product to investments demand corresponding adjustments. For example, the net income in agriculture, calculated according to purchase prices, will be underestimated. If, however, the turnover tax on the final product is added it will be exaggerated. In sectors and sub-sectors of industry and agriculture the deviation of prices from value is even greater and the national income or net product are not calculated at all.

Data of reports on the increase in the sum of profit and the turnover tax in relation to investments do not reflect precisely the actual efficiency of investments in different industries. Indeed, in the electric power, iron and steel, and non-ferrous metals industries this indicator is lower than the average for all industry; it is still lower in the fuel, building materials, timber, paper and woodworking industries. In the engineering, light and especially the food industry it is considerably higher than the average. Such sharp differences are explained by the imperfection of prices.

The reform of prices has led to the approximation of the efficiency indicators of sectors. Specifically, the exclusion from the calculation of the turnover tax and the calculation of profit on the basis of wholesale prices of enterprises have substantially reduced the efficiency indicators of the light and food industries.

The indicators of investment efficiency by sectors must be planned, i.e., the plans should establish the relationships of accumulation to investments by individual sectors.

In comparing alternatives of investments it is most convenient and simple to employ the efficiency normative for calculating the summed-up inputs, which was discussed earlier. In this case the efficiency normative plays the same role as the profitability normative in calculating whether one or another measure to be carried out at an enterprise is acceptable.

The use of efficiency normatives makes it possible to select from all the possible alternatives of production development the most economical. The level of these normatives signifies the lowest acceptable boundary of investment efficiency. It is necessary that no ruble of investments should yield an economic effect below the level fixed by the normative. Moreover, it is assumed that alternatives are chosen in conditions when the scale of production of each type of goods

and the degree of satisfaction of the social needs are predetermined by the national economic balance and it is a matter of choosing the way of satisfying these requirements.

The level of the normative is determined by two conditions: the available resources, i.e., the magnitude of the accumulation fund with the given number of workers in material production, and the existing requirements in investments which depend on technological progress, differences in the level of the operating and the new equipment which has to be introduced. The bigger the accumulation fund, all other conditions being equal, the less restricted is the scale of possible investments and the lower the efficiency normative can be. On the other hand, the greater the possibilities of investments which follow from the differences between the operating and the new equipment, i.e., the bigger the "demand" for investments, the higher the efficiency normative has to be. Of all the possible objects of technical development it is necessary to choose those which for the level of economic efficiency correspond to the fixed normative. This will raise the yield of investments, increase the accumulation fund and ultimately make it possible to reduce the normative coefficient.

All this shows that frequently the demand to achieve in the near future a "maximally high technical level of production", without linking it with the efficiency of investments, is unjustified. The technical level must be maximal not in general but optimal, considering the limited nature of the accumulation fund.

By reducing or raising the efficiency normative in a planned way it is possible to regulate the relationship between the accumulation fund and the scale of possible investments, ensuring the necessary proportion in the national economic plan and the balancing of the investment plan.

At the same time the level of the efficiency normative can exert a great influence on the degree of a country's technical development. This means that with a relatively small accumulation fund and a sufficient number of workers it is necessary to carry out alternatives which demand relatively less investments and usually are technically less improved. On the contrary, if the efficiency normative is low which is possible with a relatively big investment fund, this makes it possible to effect more "costly" alternatives demanding big

investments, i.e., technically more improved alternatives which raise labour productivity, provide, for example, for the automation of production, and so on. It is assumed that proportions in the national economy are observed in such a way that the investment fund has a material content in the form of the means of production which can be utilised for accomplishing the set tasks.

In capitalist countries the interest rate on long-term credit is lower where there is a relatively bigger scale of accumulation and smaller possibilities for the profitable investment of capital. Thus, in the United States, interest on long-term loans given to reputable and reliable companies was 4-5 per cent at the beginning of the 1960s, while for other companies it reached about 10 per cent. In France, the interest on capital was taken as 8 per cent in calculating the efficiency of investments made on account of the state. The efficiency coefficient used in the USSR is higher than these figures and ranges for individual sectors from 10 to 20 per cent, and in most cases it is 12-15 per cent. It should be taken into account that in capitalist countries the interest rate on long-term loans represents only payment to the bank for the borrowed capital, while in the USSR the efficiency coefficient includes the minimal acceptable profit of an enterprise. The average profit on investments in newly-commissioned projects amounted on the average to 23 per cent in 1959-1965 and to 20 per cent in recent years. If we add to investments the increase in circulating assets the ratio of profit to investments decreases to 15 per cent. The normative coefficient in general has to be lower than this magnitude, at 10-12 per cent.

At present, in view of the limited scale of investments, higher efficiency normatives should be employed. This will make it possible to channel investments into projects where they ensure a more substantial rise in the efficiency of production. But it should be borne in mind that the high efficiency normative will limit the technical level of the effected national economic measures; moreover, the introduced equipment will operate a sufficiently long period before it is replaced. Therefore in sections of the national economy on which technological progress and, consequently, the long-term growth rates of the economy, depend (among them are radioelectronics, precision instruments, synthetic materials, and also some particularly important projects in traditional

sectors like the power and metallurgical industries), even with a limited accumulation fund, it would be desirable to apply reduced efficiency normatives.

In long-term calculations investments may also be directed for the development of new economic regions which initially do not give a sufficient economic effect as compared with the normatives.

The need for such decisions is confirmed by experience in developing new regions in the USSR and also in the building of new industries (for example, aircraft, automobile and new chemical production lines). At the end of the 1920s, the following arguments were advanced against the proposal to develop the Urals-Kuznetsk complex and, together with it, a powerful industrial centre in the East: proceeding from the principle that it was necessary to ensure normal interest on "capital", the development of industry in the East would have been less efficient than the development of the coal and steel industry in the South. True enough, in those years the development of industry in the East gave a smaller effect than in the South but this was subsequently compensated fully: for many years now the steel works and collieries of the Urals and Siberia have been producing the cheapest metal and coal, serving at the same time as the basis for the development of the industry in the East.

In capitalist countries too, especially with the development of state-monopoly tendencies, favourable prerequisites for development are created for such basic sectors as the power industry, transport and major raw material-producing industries by giving them privileges and subsidies and making direct state investments in the most costly projects. All this stimulates the swift expansion of production as a whole. Individual monopolies, too, give priority to measures which promise a big return in future but demand big investments and privileged conditions of development.

The need for providing privileged conditions of development for key sectors upon which the future of technological progress and consequently labour productivity depends, is seen from a comparison of labour productivity in the USSR and other countries, the USA in the first place. On the whole the level of labour productivity in Soviet industry is about half of that in the USA. At the same time there are sectors of decisive significance for technological progress in which

the USSR is ahead of the United States for the level of technological development and cannot afford to lag behind it (space technology, atomic power industry, radio technology). Among these sectors it is also necessary to include some closely connected, allied production lines. In these sectors a maximally possible technical level must be secured, not restraining economically the introduction and further development of the most advanced equipment. To apply here the higher efficiency normative set for ordinary investments would mean to deprive these sectors of the possibility of accelerated technological progress and at the same time worsen the possibilities of developing new equipment.

But giving priority to key sectors if there is a limited accumulation fund dictates a more rigid approach to investments in other spheres where a lower technical level has to be accepted. The share of investments which play a special role in technological progress cannot be substantial. This is indirectly shown by the fact that every year 80 per cent and more of all investments go into projects in the process of construction (including projects to be commissioned) and thus the possibilities of building new projects, including those for the development of new sectors, are limited.

It would be correct to make calculations of long-term efficiency not according to current, but the long-term planned prices especially for the types of goods and resources in the case of which big changes may be expected in view of technological progress, changes in the degree of scarcity, and so on.

For the immediate future an efficiency normative of 0.12 may be recommended as a general initial level, with its subsequent specification on the basis of a number of verifying calculations. The establishment of a general efficiency normative will make it possible at least approximately to optimise the national economic plan for separate sections and to make calculations of the comparative efficiency of investments with a precision sufficient for practical purposes.

In determining the efficiency of concrete measures which are not linked with some definite enterprises or have an inter-sector significance, or provide for the output of new goods, and so on, the calculation is made according to the formula of summed-up and reduced inputs examined earlier  $I=C+EK=\min.$  and, all other conditions being equal, pref-

erence is given to the alternative which provides for the least magnitude of these inputs.

In individual cases an alternative may be accepted which does not ensure a minimum of summed-up inputs if factors exist which cannot be expressed in value terms (for example, working conditions, safety measures, the demands of defence) or are not fully reflected in these indicators (surplus or shortage of manpower, scarcity of individual productive resources, the need to organise the production of new goods, and so on).

It is assumed that differences in conditions of production for various sectors and sub-sectors, a shortage or surplus of manpower (for example, in the Extreme North or the Far East, on the one hand, and in the Transcaucasus or Central Asia, and also in small towns, on the other), differences in rates of technological progress, unequal periods of the development of new sectors and new types of goods can to a certain extent be reflected in a flexible system of prices, changes in wages or wage adjustment coefficients, a system of subsidies to individual sectors or privileged conditions of pay for assets or other payments, and so on. Until these measures are carried out the differences in production conditions must be reflected in adjustments of the efficiency normative set by the USSR Gosplan.

The choice of an alternative which provides for investments at a later period is tantamount to increasing the investment fund at present. This makes it possible to effect investments which otherwise have to be put off because of the inadequacy of this fund. The efficiency of such additionally included investments must be lower than that of all others already incorporated in the plan (it is understood that all of them ensure an efficiency not lower than the level fixed by the normative). The reason for it is that in summing up inputs made at different times and reducing them to one period the same efficiency normative is applied as in other cases when alternatives are compared. It is pointed out that not the entire deferred sum will again be put into circulation but only the part of it which conforms to the share of accumulation in the national income, that the effect of these investments cannot be received at once, and so on, and so forth. For all these reasons a lower efficiency normative (at the level of 0.08) is suggested for summed-up inputs made

at different times. There are certain grounds for these arguments.

To sum up investments made at different times and current inputs it is advisable to reduce them to the initial moment of time with the help of a coefficient ( $B$ ) based on the use of compound interest:

$$B = \frac{1}{(1 + E)^t} t,$$

where  $B$  = reduction coefficient,

$t$  = the time expressed in years,

$E$  = the normative coefficient of efficiency.

Calculation of summed-up inputs made at different times according to the above formula is recommended only for comparing and choosing alternatives. It cannot serve as a basis for changing both the estimated cost of a project and the magnitude of the planned investments.

The choice of alternatives according to indicators of summed-up inputs does not do away with the need for a thorough economic substantiation of the accepted investment plan or individual construction projects and employing for this purpose of indicators of unit investments, the output-asset ratio, cost of production, labour productivity, indicators in physical terms, and so on. Without a wide range of economic indicators an analysis of plan fulfilment is inconceivable.

It is advisable to calculate the economic efficiency of investments in the process of formulating plans and elaborating individual economic measures, i.e., when these calculations may influence the choice of the most effective ways for solving national economic problems and raising the efficiency of investments. In this connection it is very important to make preliminary calculations of economic efficiency at pre-plan and pre-design stages.

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Problems of determining the efficiency of investments were elaborated before the economic reform and played a certain part in preparing it. With the carrying out of the reform, determination of the efficiency of investments, in

turn, acquires particularly great importance and becomes highly necessary not only for the state as a whole, but also for every enterprise directly interested in the expedient use of its resources.

Ascertainment of the efficiency of investments is also important for a general improvement of construction on which the long-term economic growth of the country depends. Construction, metaphorically speaking, is the foundation for the development of industry, agriculture and transport.

In 1969, the Central Committee of the CPSU and the USSR Council of Ministers adopted important decisions on improving construction. These decisions are designed to improve the planning of investments, to ensure the stability of plans and their balancing, the introduction of full cost accounting in construction and improving designing and estimate work. Implementation of these decisions makes big demands on economic activity, on raising the level of economic substantiation and economic calculations in construction.

The proper choice of construction projects which are most efficient and correspond to the financial, material and technical resources and the capacity of building and assembly organisations is an important source for the expansion and improvement of socialist production and enhancement of its efficiency. This determines the importance of profound, scientific elaboration of the methodology of calculating the efficiency of investments, the main principles of which we sought to outline in this chapter.

## CHAPTER 7

### THE ECONOMIC REFORM AND THE STIMULATION OF TECHNOLOGICAL PROGRESS

Swift and effective scientific and technological progress can be achieved only by closely combining centralised (national economic, sectoral) planning of technological development with cost-accounting stimuli and the wide initiative of enterprises and their collectives. A technical policy cannot be shaped by the scattered efforts of thousands of enterprises. A socialist country must have a single technical policy, based on knowledge of the entire complex of modern scientific and technological achievements, a policy which proceeds from the long-term prospects and consistently reflects a national economic approach that synthesises the distinctions of every sector, region and the entire mass of enterprises. Consequently, this is a function of centralised planning which is beyond the strength of individual enterprises.

Centralised planning (national economic agencies, ministries) passes down to enterprises (associations) the basic assignments which reflect the development trends of technology proceeding from the needs and possibilities of the economy and its sectors. In so doing, naturally, every account must be taken of the concrete needs and possibilities brought out by the enterprises and cost-accounting organisations themselves, and it is necessary to ensure the centralised resources and proportions in their allocation required for attaining these trends and plan targets. Enterprises, on the basis of their trends and consequent assignments, themselves determine the most efficient and economical ways of achieving these targets, considering their distinctions and cost-accounting demands. The task is maximally to reinforce technological progress efficient for the national economy by cost-accounting incentives to enterprises and associations.

This demands that the concrete trends and forms of technological progress which conform to the interests of the

entire national economy should be economically advantageous for the enterprises and their cost-accounting associations. It is important that the development of every type of new equipment efficient for the national economy should fully correspond to the interests of enterprises and their collectives. Their interests, consequently, should economically be directed into the channel of the national economic interests. The possibility of combining interests in this way represents one of the main advantages of the socialist economic system, and its consistent realisation is of major significance for technological progress.

The economic reform now under way leads to the ever closer unity of technological development and economic measures. The consistent application of the principles and methods of the economic reform for accelerating technological progress makes it possible actually to ensure the necessary unity in accomplishing technical and economic tasks and enhances the economic efficiency of new equipment. The reform creates new, favourable prerequisites for the successful solution of the economic problems of technological progress. Possibilities are furnished for attaining a higher efficiency of social production and consequently also for extending the resources which go for the mass production of new equipment and its swift and wide introduction (use) by enterprises and (in the case of household appliances) by the population. The economic reform leads to the more efficient manufacture and use of new equipment, a rise of its return in production, its faster mastery, i.e., the swiftest attainment of the technico-economic parameters inherent in new plant.

The reform brings about a rise in the economic effect resulting from the application of new equipment. The role and importance of cost accounting and economic stimuli in technological development rises. The line has been charted of removing the existing disproportions and discrepancies in material production, which is exceedingly important for materially ensuring technological progress. A transition has been made to the sectoral principle of managing industry so needed for promoting technological progress. Better opportunities are opened for specialisation of production.

On the basis of the decisions of the 24th CPSU Congress a number of measures has been taken for furthering the comprehensive planning and stimulation of scientific and tech-

nological progress and the organic fusion of research and development plans with the general economic plan. The establishment of a network of production associations accelerates technological progress.

The fund for organising the manufacture of new equipment is considerably increased and the sphere of its application is extended. The importance of production development funds at enterprises is enhanced. The size and efficacy of all incentive funds are being increased, which extends the sources for the material stimulation of the development of new equipment. In 1972 the total sum of allotments from planned profit and depreciation to economic stimulation funds will exceed 17,000 million rubles, 2,000 million rubles more than in 1971. In setting up such funds account will be taken of the share of new, more improved and efficient goods in total output. This will furnish bigger incentives to workers for the development of advanced equipment. Prices are improved with the aim of creating more favourable conditions for the introduction of new equipment and lowering its prices. It is contemplated to reduce wholesale prices of engineering output by 10-12 per cent, and of the output of the electrical equipment, electronic, radio equipment and instrument-making industries even more. The price policy is aimed at inducing enterprises to organise the mass production and use the improved plant. The initiative and economic possibilities of enterprises and their associations in the sphere of technological progress are being extended.

Five-year plans of enterprises and associations have become the basis for planning their activity. This creates greater stability in planning. Plans and economic activity will be more oriented on progressive technico-economic normatives, on applying scientific and technological achievements which yield a big economic effect. The new role of five-year plans will make enterprises more interested in organising the manufacture of new equipment. It is a fact that in the initial year or two the results of economic activity of producing enterprises may temporarily deteriorate. If the operation of enterprises is to be assessed and stimulated solely by their annual performance indicators, their interest in undertaking the manufacture of new equipment is lessened. The situation is different when their operation is evaluated proceeding from five-year plan assignments and long-term norma-

tives which also encompass the years when the manufacture of new plant has already been organised and the economic results have been improved, which increases the stimulation funds of an enterprise. Given such an approach the economic interest in the production of new equipment rises. At the same time the accumulated experience demonstrates the need for elaborating substantial additional stimulating measures on the basis of the principles of the reform and its further development.

Increasing theoretical and practical significance attaches to the ways of realising more expediently, as applied to technological progress, the formula: "What is in the interests of the national economy must be advantageous for enterprises and cost-accounting organisations". The point is how to combine the technical policy of the state with material cost-accounting interest of sectors, associations and enterprises in its swift and efficient implementation.

The economic reform and its further development put this problem to the fore, because the role of cost-accounting indicators and stimuli (including profit) rises considerably. If the manufacture or application of new equipment runs counter to the task of improving the indicators of cost-accounting activity of enterprises and associations and, consequently, to respectively increasing cost-accounting stimulation funds, then, as the facts show, some tendency to hamper technological development arises in certain cases. Hence the need for a well-functioning economic mechanism to prevent or eliminate such contradictions.

It goes without saying that besides cost-accounting stimuli the state has a number of powerful instruments for ensuring the fulfilment of major measures for the development of science and technology. But we must not also underestimate the importance of cost-accounting interest and initiative in accelerating technological progress, of revealing internal reserves for its intensive, broad and most effective advance.

At times it is held that only enterprises come within the cost-accounting sphere which influences technological progress, and it is pointed out that they inevitably play a limited part in solving related questions. Such a presentation of the problem does not correspond to the real situation, especially in the light of the further development prospects of the reform.

First, as the cost-accounting initiative of enterprises is extended and they have bigger resources for investments, the modernisation and technical renewal of fixed assets, the transition to new production methods, the application of new materials and the manufacture of new goods depend more on the enterprises themselves. In deciding such matters the executives and the collectives of enterprises cannot but consider how technical measures will affect current cost-accounting indicators and the size of the incentive funds depending on them. Yet, it is a fact that during the first years of the production of new equipment when its manufacture is still being organised, the relevant inputs and losses are inevitably high, as a result of which the current cost-accounting indicators of enterprises may temporarily decline.

Second, account must also be taken of the fact that the evaluation of economic activity not only of enterprises but also of sectors as a whole is to a considerable extent determined by such cost-accounting indicators as the increase in the mass of profit, the level of profitability and sale of their output. Hence it is natural that ministries, too, have to consider this circumstance in determining investments in new equipment. This factor becomes particularly important with the transfer of the central boards of ministries to cost accounting, their conversion into big cost-accounting associations. Consequently, the sphere in which the question of applying some or other technical measures is directly linked with cost-accounting indicators and stimuli is very broad and encompasses the biggest part of investments in the renewal of equipment and the introduction of new production methods at operating enterprises.

An economic approach to equipment with a view to saving inputs and comparing them with the achieved results is of great importance and should be reinforced. The whole point, however, is that it should reflect the real interests of the national economy in raising the efficiency of production through accelerated technological progress and that enterprises and cost-accounting organisations themselves should be interested in such an approach.

An economic approach to equipment of course must be strictly differentiated. For the manufacture of plant which is of a special nature and is of major state importance the effect is determined in a special way to one or another

extent. Such equipment is not discussed here. But even as regards such special types of new plant it is necessary to compare the inputs and the economic results most thoroughly. To save inputs in this sphere without detriment to the set aims is of exceptional national economic significance.

The system of stimulating technological progress, introduced already prior to the economic reform, undoubtedly plays an important positive role. In many respects it has promoted, and is promoting, the development of new equipment. But the existing forms of specially stimulating technological progress and the general system of cost-accounting incentives to enterprises and their collectives by far not always make them sufficiently interested materially in the manufacture and use of new equipment which is economically efficient for society.

To begin with, in planning new equipment, so far inadequate use is made of a well-grounded account of the additional economic effect which this plant brings the national economy. Often such an account is still largely of a formal nature. At the same time in many cases no due material incentive in the development of new equipment is provided both to enterprises and to research institutes and designing organisations.

The very existence of two parallel stimulation systems—the basic, according to the general results of cost-accounting activity of enterprises introduced after the reform, and the second, specially for stimulating technological progress which had arisen prior to the reform—is fraught with a number of contradictions. The separation of these systems reflects the point that planning of new equipment has not yet become an organic and, moreover, a cardinal element of the general planning of production and investments. On the one hand, general cost-accounting stimulation does not yet sufficiently reflect the need for the development of new equipment and, on the other, the special system of stimulating new plant is so far inadequately co-ordinated with the organisation of cost accounting and the general cost-accounting incentives.

Planning and stimulation of the economic effect of new equipment have so far not been duly developed and, consequently, do not yet serve as a sufficient basis for combining the two systems into one, in which a central place would be held by ensuring and encouraging the economic effect of

new plant so that it should really improve the indicators of the cost-accounting activity of enterprises and correspondingly increase the incentive funds.

Since general cost-accounting stimulation was aimed chiefly at obtaining a current effect and was not sufficiently extended to the long-term effect (i.e., the effect over a number of years, which is particularly important for encouraging the development of new equipment) contradictions frequently arose between the operating cost-accounting incentives and the necessity for developing new plant.

There have been instances of a certain discrepancy between the special system of stimulating technological progress and the general system of cost-accounting incentives. The incentive for new equipment at times runs counter to the incentive for the general (especially current) results of an enterprise's operation. This is expressed in a number of ways. Since the practice of encouraging the manufacture and introduction of new equipment is not always based on the actual economic effect and real needs, in such cases the production of little-effective new equipment which does not satisfy consumers is stimulated. Furthermore, and this is the main thing, if during the period of organising the production of new equipment the general cost-accounting indicators upon which the setting up of the incentive funds of enterprises depends temporarily deteriorate, at times the decrease in bonuses for the general cost-accounting results of operation of an enterprise is several times greater than the bonus received for the development of the new plant.

The desire to avoid a worsening of economic indicators and a reduction of the incentive funds owing to the temporary high inputs and losses caused by organising the manufacture of new equipment, lessens the cost-accounting interest in its production if these inputs and losses are not adequately compensated. Since bonuses for new equipment usually are much lower than bonuses received for the general performance indicators, in such cases stimuli impelling enterprises to refrain from the manufacture and use of new equipment prevail.

In future a single system of cost-accounting stimulation should ensure a situation in which the manufacture and use of new plant which is economically advantageous for the national economy and corresponds to its needs would, from

the very beginning of its production, also be advantageous for both the producers and users. But so long as a transition to a single system of stimulation has not been made this task must be accomplished jointly by both systems through ever greater reciprocal co-ordination of their functions.

The steady drawing together of both these systems in the cost-accounting sphere and the hooking up of the special system of stimulating new equipment to the general incentive system, demand serious and thorough preparation. This is a gradual process requiring a number of transitional measures. A premature, artificial speeding up of such a fusion without proper economic preparation would be of a purely administrative and mechanical nature and may result in that the specific economic conditions for the manufacture and use of new equipment would not be taken into account. As a result the stimulation of new plant, far from improving, may even worsen, which will unfavourably affect technological progress.

As pointed out earlier, the incentive system, according to the general results of the operation, so far insufficiently reflects the task of encouraging the development of efficient new equipment. This happens above all when such stimulation is designed chiefly to obtain a current effect and inadequately extends to the long-term effect. Yet usually there is an inevitable time gap between the beginning of the manufacture of new equipment and the obtaining of the expected effect. Moreover, the actual duration of the period for organising the manufacture of new equipment, especially the numerous stages in "bringing it up" to the designed parameters when production is already formally regarded as mastered, on the average substantially exceed the actually necessary time. The organisation process itself, as a rule, is accompanied by a temporary increase in production inputs, additional expenditure for personnel training and losses connected with a temporary decrease in the scale of output. These actual inputs and losses often considerably exceed the needed level which could be attained by better organisation of the entire system of planning, designing, preparing and arranging the manufacture of new equipment. All this particularly enhances the importance of planning all stages in the manufacture of new equipment as a single complex, beginning from applied research and ending with its use on a large scale. This is achieved now above all by making

five-year plans the main form of planning (moreover, annual plan assignments must be determined by the five-year plan targets) and by basing the cost-accounting incentive funds on five-year assignments and long-term technico-economic normatives and also on long-term normatives for the setting up of incentive funds at enterprises.

The socially necessary temporary high inputs, caused by organising the manufacture of new equipment, so far are often insufficiently compensated by the mechanism of prices, financial resources, the making of corresponding adjustments and introducing privileges in plan indicators and the normatives for setting up incentive funds.

As for the mechanism of prices, while an indisputable improvement has been achieved in forming prices of new goods and they take more into account the interests of technological progress (especially on the basis of the effected reform of wholesale prices), a further improvement of prices is needed so as to ensure the interests of both the producers and users of new equipment. Producers at times still sustain considerable economic harm owing to the unjustifiably low prices of new equipment set without due consideration for the necessary inputs and the effect received by its users.

On the other hand, there are instances when high prices bring the enterprises producing new equipment excessive profit, and these high prices at times cover inputs which are a result of poor work both in organising the production of new equipment and in other sections. Moreover, new equipment is offered to user enterprises at prices which obviously exceed the increase in the actual consumer effect from its application as compared with old plant. The setting of excessively high prices still takes place without due consideration for the interests of users. To stimulate the introduction of new equipment the practice of setting temporary high prices during the period of organising the manufacture of new equipment must be even further restricted.

Prices of new equipment should to a greater extent reflect the use effect and for the most part be set at a level proceeding from the inputs in new equipment, the manufacture of which has already been organised, with a differentiated approach (at times this is the second, the third, or even the fourth year of its production).

As for the special funds for organising the manufacture

of new equipment, designated for compensating the high inputs, they often were insufficient, i.e., did not compensate the inputs and losses during the organisational period. Owing to this enterprises did not receive the profit which they ought to get from the new equipment. On the other hand, at times these funds go to cover expenditures and losses which are a result of poor work. This is explained both by the absence of a proper normative basis and shortcomings in determining the functions of funds for organising the manufacture of new plant and a distinct line in their application.

The procedure of setting up and using bonus funds for new equipment is also not fully satisfactory. These funds at times are formed not in accordance with the actual needs. They are determined by the size of the wages fund at a given enterprise, and occasionally differ from the scale of planned and effected measures for the development of new plant, from the contemplated and actual economic effect achieved on the basis of this equipment.

Proceeding from an analysis of the existing situation as regards cost-accounting stimulation of technological progress in conditions of the reform and the prospects of its development, the basic interconnected trends have been charted of measures for reinforcing cost-accounting incentives aimed at the consistent, economically effective implementation of the technical policy.

First, stimulation of the manufacture and introduction of new plant has been increasingly determined by the additional economic effect which it brings the national economy as compared with old equipment. This is achieved by a complex of economic conditions which really ensure the obtaining, on the basis of this effect, of sufficient economic benefits (above all, an increase in profit) both by producers and users of this equipment, as compared with the obsolete plant. Since the use effect of new equipment largely depends on its conformity to the concrete needs of the clients, the cost-accounting stimulation of producers, depending on the degree of such conformity, is of great importance.

Second, an ever greater organic fusion takes place between the special system of stimulating the development of new equipment, established prior to the reform, and the incentive system based on the general results of an enterprise's operation introduced by the reform. Such fusion can-

not be attained by a simple mechanical combination of both systems in the forms they exist now. For such a fusion it is necessary to introduce essential changes in each one, leading to their drawing together.

To begin with changes should be introduced in both systems which would duly consider the specific features of the economic effect of new equipment expressed in the inevitable time gap between the big inputs for organising its manufacture and the obtaining of the planned effect in future. This gap confronts cost-accounting enterprises with the problem of how to "weather" this period of the temporary economic disadvantage of organising the manufacture of new plant until the future economic benefit is obtained. This presupposes compensating the enterprise for the temporary high inputs and losses which are really necessary and also materially stimulating the maximally possible reduction of the period and the cost of organising the manufacture of new plant.

Compensating enterprises for the socially necessary expenditure and losses linked with organising the manufacture of new equipment is a major, inalienable element of promoting scientific and technological progress.

This demands, on the one hand, greater orientation of the system of general cost-accounting incentives on problems of technological progress, and stimulation not only of the current but also of the long-term economic effect on the basis of five-year plans of enterprises. Alongside this, it is important to establish, within definite bounds, privileges as regards allotments from profit, level of plan assignments and norms of setting up incentive funds for the period of organising the manufacture of new equipment. The share of bonuses for new equipment should be increased in the sum of the stimulation funds utilised within an enterprise.

For greater co-ordination of the special funds for stimulating the introduction of new plant with the general cost-accounting incentive funds, it is also expedient to make changes in the methods of setting up and utilising the two funds for new equipment now being applied which would enhance their efficacy and extend their cost-accounting nature. This can be achieved by the gradual change-over to the setting up of these funds from profits and to the introduction of methods of recouping the resources used to compensate

for the high inputs in organising the manufacture of new plant.

A single approach would thereby be gradually achieved in assessing and stimulating both the economic effect of new equipment and the general economic effect of the operation of an enterprise (considering the time gap in obtaining the planned effect from the new plant). Ultimately, stimulation of new equipment will become one (moreover, a major) aspect in the single system of the general stimulation of production.

Third, this is the transition to calculating the planned and actual economic effect of the new plant at all stages in the course of which it is developed and manufactured by the producers until its obsolescence and replacement by other, more up-to-date equipment. At the same time it is necessary to calculate the effect for the entire period of use of the new equipment (also by corresponding stages). This presupposes the establishment both of an average magnitude of the effect received during these periods in their entirety and also at separate stages and periods. Only if planning and stimulation of new equipment is based on such calculations is it actually become possible to ensure adequate incentives, determine the necessary and economically reasonable scale of compensation of the additional expenditure linked with its development and find cost-accounting sources of this compensation.

Fourth, improvement of the forms and size of compensation, its ever greater co-ordination with cost-accounting, profit and the credit principle, are needed. The entire compensation system must be more effective and weighty so as to make enterprises confident that the temporary worsening of economic indicators during the organisation of the manufacture of new plant will be covered and, consequently, that they will obtain economic advantages from it on the whole.

Only the actual inputs and losses must be compensated. It is necessary to compensate: a) the socially necessary temporary high inputs which adversely affect the indicators of the cost of production, profit and level of profitability, the inputs connected with preparing and organising the serial manufacture and use of new equipment (including the additional expenditure for training and hiring personnel and the resultant temporary underemployment of manpower); b) the

adverse influence, exerted by organising the manufacture of new equipment on the scale of production (temporary curtailment of the possibilities for expanding output), on the indicator of output sold (and through it on the profit and the level of profitability). Moreover, in this case, too, only the losses which are actually necessary should be compensated.

A special place is held by the question of financing the so-called necessary production risk involved in the transition to new equipment. Apparently, coverage of the adverse result of such risk should be distributed between scientific and technical organisations, enterprises (associations) and the state (from the respective funds of ministries and, in appropriate cases, from the general state funds). The share of each of these links in covering the adverse results of this risk should depend on the importance of the given equipment, its novelty, prospects, the role of exploration, and so on. A consistent solution of the problem of compensating for adverse results of a risk in producing and introducing new equipment is a necessary and important requisite for stimulating scientific and technological progress.

It is very important that the use of the additional economic effect (additional profit) already yielded by the new plant should become the financial basis of compensation. New equipment should pay for itself chiefly by redistributing its effect (in point of time), i.e., to cover the "shortage" of profit or losses during the organisation of the manufacture of new equipment on account of the results obtained after its production is mastered. Compensation resources should be formed on this basis (and also from other sources) in different links—on the scale of ministries, their central boards, associations, and at the level of enterprises. Wider use for compensation should be made of bank credits, also repaid by the additional effect from the new equipment.

As the necessary conditions are created an enterprise itself should increasingly return the obtained compensation with its own resources, chiefly on account of the additional effect from the new equipment. Thus, the subsidy features of compensation will be gradually curtailed, and in future the use of credit methods will be increased, above all, the compensation resources will be returned within a definite period.

If we proceed from the prospects of the further development of the economic reform, the compensation of the tem-

porarily high expenditure involved in organising the manufacture of new equipment should be gradually changed, increasingly acquiring a credit nature. This will be an effective stimulus to reducing the periods of, and the expenditure for, the organisation of the production of new equipment and to the economical use of the received compensation resources. It goes without saying that in future, too, types of expenditure for new equipment will remain which will necessarily demand a subsidy compensation, but we are not discussing them here.

One form of participation by an enterprise (association) in creating sources for compensation is to utilise its own resources: a) on account of the additional effect from other types of new equipment after their production was organised, received in the past or at the same time; b) on account of the additional effect from the given new plant after organising its manufacture (redistribution of the effect in point of time).

Bank credit is the most consistent credit form of compensating the necessary high expenditure in organising the manufacture of new plant.

The transfer of compensation onto credit lines must be done gradually so as not to weaken the stimuli to technological progress. Replacement of the existing compensation system, which is basically in the nature of a subsidy, by compensation on the principle of recoupment and repayment of these resources, demands the creation of the necessary prerequisites. Among these prerequisites first of all are:

consistent introduction of five-year plans of enterprises and their provision with financial and material resources;

transition to long-term stable normatives for the setting up of stimulation funds and the establishment of greater conformity between the periods of the credits and the periods of organising the production of the new equipment;

sufficient stability in the production plans, the economic relations of suppliers and buyers and greater guarantee of supplies.

Under these conditions enterprises are more confident of their ability to repay the credits, which to one or another extent will replace the present funds for organising the manufacture of new equipment which are given free of charge.

To neutralise the worsening of economic indicators which arises at the stages of organising the manufacture of new equipment, adjustments should be made in the annual plan targets of the increase in the mass of profit (or output sold) and the level of profitability; moreover, the duration of these stages should be limited by differentiated normatives.

Thus, for the real covering of the sums necessary to compensate enterprises for high inputs and losses during the period of organising the production of new equipment, in addition to budget appropriations for corresponding purposes, the following sources can be utilised:

fund for organising the manufacture of new equipment; increase, on privileged terms, in the share of the net profit in the total mass of the received profit;

partial or complete release from allotment of profit to the budget (including pay for assets, rent payments, free balance of profit, and so on), from allotments to funds of ministries (including the ministry's centralised fund for organising the manufacture of new equipment);

privileged change of the normatives of allotments to the cost-accounting stimulation funds;

granting of sums from other funds of ministries and associations;

bank credit (special form of crediting).

The mechanism of prices can be utilised for compensation within definite bounds by considering in them the real inputs for new equipment and its use effect.

These sources and factors should be used comprehensively, applying a differentiated approach and flexibility in selecting some or other methods.

The question as to what forms of compensation and in what combination are to be used should be decided depending on the concrete conditions (distinctions of the sector and specific features of the given type of new equipment; the expenditure at different stages of its production and application; periods for receiving the planned effect; conditions for the sale of the new equipment; prices; financial position of the enterprise, profit and other economic indicators; possibilities of utilising credit sources, and so on).

The function of the fund for organising the manufacture of new equipment is above all to compensate the necessary temporary high inputs and losses which arise in the produc-

tion of new plant characterised by big changes in parameters which require a big expenditure.

The sphere of this fund is now extended in the following directions.

First, the use of this fund applies to all sectors which produce and use the new equipment and it is turned into a fund for organising the manufacture and the introduction of new plant.

Second, this fund should be used not only at the stage of preparing the manufacture of new equipment, but also at the entire period of organising its production, i.e., until the time when, according to the normatives, the designed technico-economic parameters are attained in the main.

Third, it should be utilised not only for covering the temporary losses caused by new equipment, but also (together with other forms of compensation) for obtaining the lacking profit so that profit in the very first year of organising the new production should be bigger than for the replaced old equipment.

This fund will thus play an essential part in the general system of cost-accounting stimulation of enterprises by providing an economically-based corresponding level of such a major indicator and source of stimulation as profit.

It is expedient gradually to transfer the setting up of the new equipment fund onto a basis of allotments from profit, i.e., the same source as the entire system of cost-accounting stimulation funds. The allotments to this fund from profit should be fixed in advance.

Proceeding from the above, what should be the entire system of forming the new equipment fund? The present allotments should be preserved (not on account of the cost of production but of profit) with the following changes: an enterprise organising the production of new plant may be released, in full or in part, from allotments to the new equipment fund. At the same time it is expedient that enterprises, after organising the manufacture of new equipment, should make allotments to these funds at higher rates according to differentiated but sufficiently high normatives. Lastly, when this plant becomes obsolescent, these allotments should rise at an even faster pace.

There is an urgent need for big changes in the nature and

forms of the special bonuses for the manufacture and introduction of new equipment.

First of all it is necessary to eliminate the existing discrepancy between the procedure of forming up this fund, on the one hand, and the real needs in it, on the other, between the plans for the development of new equipment and the receiving of an economic effect from it. The present procedure of forming this bonus fund leads to such a discrepancy. As a result, in some cases the sources of bonuses are inadequate, while in others it is impossible to utilise them.

The bonus fund for new equipment should be set up and used on the basis of the planned and actual effect of this equipment. Instead of allotments from the cost of production in percentage of the wages fund it is more expedient gradually to go over to allotments from profit as a source for the setting up of the given special bonus fund, as in the case of the general stimulation fund.

The share of bonuses for the manufacture and introduction of new equipment must be raised and the "weight" of such bonuses increased. For this purpose it is necessary to raise the average size of each bonus, to extend their dependence on the concrete role of the given working man in ensuring technological progress at the enterprise, to eliminate the existing practice of levelling and fragmenting these bonuses, to set their lowest boundary, to guarantee in the total sum of these bonuses a sufficiently big share for the main personnel engaged in developing the new equipment and those who play a principal part in its manufacture and introduction.

The existing bonuses for organising the manufacture of new productive capacity should be preserved and extended to a number of other sectors.

The elaboration and implementation of a system of measures for increasing stimuli to accelerating the manufacture and introduction of economically efficient new plant and organising a number of relevant experiments are among the essential tasks in the further development of the economic reform.

Correct solutions to the problems of promoting technological progress can be found only by proceeding from the unity of technological and economic development, the stimu-

lus and effect, and not from one-sided decisions that run counter to this unity. This is expressed in a number of points.

The stimulation of technological progress can be much more effective when it becomes an organic element of general cost-accounting incentive system. It is a mistake to deny or underestimate the need for this unity, but it is equally wrong to approach the matter mechanically—to ignore the specificity of stimulating the development of new equipment (above all the time gap between starting work on new plant and the obtaining of an effect).

Stimulation of technological progress must be aimed at the manufacture and use of efficient new equipment which brings the national economy an additional effect as compared with the old one. It is wrong to deny or underestimate this fundamental economic principle of technological progress, namely, the need for exerting economic pressure on an enterprise to ensure a bigger saving of inputs per unit of the use effect from the new plant. But it would be equally wrong to lose sight of the fact that such pressure must necessarily be combined with economic assistance to enterprises in covering the necessary high inputs for new equipment. Otherwise one-sided emphasis on saving inputs may undermine the stimuli to produce and utilise the new plant.

Promotion of technological progress necessarily includes such reasonable assistance to enterprises. It is wrong to deny or underestimate the need for it. But it would be equally wrong to separate this compensation from the general line of saving resources and to create the possibility of covering up poor work on account of compensation.

Technological progress and its stimulation must not impede the attainment of high cost-accounting indicators of an enterprise's operation, an increase in its profit; on the contrary, they should improve these results. It is wrong to divorce technological progress and its stimulation from the principles of cost accounting, from the economic reform. But at the same time it is erroneous to overlook the fact that the links between technological progress and cost accounting, the economic reform and the category of profit cannot be ensured mechanically only through the current effect, but must be achieved above all on the basis of a lasting effect (designated for a number of years), that cost-accounting

stimulation must fully apply to this long-term effect both in profit and other economic indicators.

Thus a dual task arises: on the one hand, organically to link up planning and the stimulation of technological progress with the cost-accounting mechanism of the reform and, on the other, increasingly to orient this mechanism on the demands for accelerating the rates and enhancing the economic efficiency of technological progress.

Such reciprocal combining of measures for furthering scientific and technological progress with measures for improving the mechanism of the economic reform and its more efficacious use for the development of new equipment, now acquires greater importance for the efficiency of social production and the growth rates of labour productivity and the people's living standard.

The practical introduction of the economic reform in the national economy was initiated by the Plenary Meeting of the Central Committee of the CPSU, held in September 1965, which adopted the decision "Improvement of the Management of Industry, Perfection of Planning and Greater Economic Stimulation of Industrial Production". In the subsequent period the system designed radically to alter the methods of managing the economy and ensure a rise in the efficiency of social production, became a powerful instrument in improving the organisation of production and performance indicators, in bringing to light and tapping big potentialities not only in industry but also in other sectors of the economy.

### 1. Transfer of the First Group of Enterprises

The first group of enterprises was transferred to the new system in 1966, i.e., without waiting for the completion of the entire complex of preparatory measures, including such a major step as the revision of wholesale prices. This was done to accomplish the following tasks:

- a) creation in each sector (sub-sector) of the necessary basis for studying the experience of operation under the new conditions and mastery of the new management principles, taking into consideration the distinctions of every sector of industry and each group of enterprises. The experimental enterprises had to become a kind of a school both for their own sector and also for enterprises territorially close to them;
- b) testing the efficacy of the new complex of indicators and economic instruments in disclosing and utilising internal

production reserves and improving all the economic activities of enterprises;

- c) study and generalisation of the experience of operation of individual enterprises in the new conditions with the object of introducing the necessary amendments and specifications in the methodical instructions for going over to the new conditions of work and preparing for the organised transfer of sectors of industry to the new system.

The transfer of the first group of enterprises prior to the completion of the entire complex of measures making up the new system of planning and economic stimulation, was to a certain extent a forced retreat from its comprehensive introduction. But it was necessary in order to test in practice the operation of all the elements of the system in the concrete conditions of different sectors of industry.

To cope with these tasks a number of industrial enterprises of Union and Union-Republican ministries and departments, and also of industry subordinate to Councils of Ministers of the Union Republics was switched over to the new methods of management in 1966, including:

on January 1	43 enterprises (I group)
on April 1	206 enterprises (II group)
on June 1	423 enterprises (III group)
on October 1	27 enterprises (IV group).

The third group included three sub-sectors of industry: production of soda and tobacco and tea packaging.

The enterprises transferred to the new system in 1966 accounted for about 1.5 per cent of the total number of industrial enterprises which operated on an independent balance-sheet and they produced 8 per cent of the gross output. In individual ministries the share of transferred enterprises was bigger than the average for the country. For example, enterprises of the Ministry of Instrument Making, Means of Automation and Control Systems contributed more than 43 per cent of the total output. This, by the way, greatly helped the Ministry to become the first in the country to switch over all its enterprises to the new system.

It should be remembered that the transfer was effected in conditions when the plan for 1966 both for industry as a whole and for each enterprise was already approved. This determined the specific approach to setting up economic stim-

ulation funds at the transferred enterprises (material incentive fund, fund of socio-cultural measures and housing construction and production development fund).

These funds are formed from the profit of an enterprise after contributing to the budget, from the balance-sheet profit, pay for productive assets, interest for credit and rent (fixed) payments.

Since the expected profit of enterprises at the time they were switched over to the new system had already been allocated under the 1966 plan, additional resources were needed for setting up the economic stimulation funds. The question arose of the enterprises assuming additional obligations as regards the volume of output sold and profit, i.e., of finding internal reserves the use of which would enable them to form economic stimulation funds on the requisite scale. This is how the principle originated of getting the transferred enterprises to adopt additional obligations and of forming, on their account, stimulation funds. This principle proved to be correct because all enterprises as a rule had unutilised production reserves.

The enterprises were able to set up all the three funds on account of the profit they undertook to obtain in addition to the figure approved in the plan. Moreover, the size of the funds as compared with those approved in the plan increased as follows: the material incentive fund rose by 85 per cent; the fund of socio-cultural measures and housing construction by 60 per cent, and the production development fund by 210 per cent. Only the production development fund was set up on account of the additional profit and a part of the depreciation allotments designated for the complete renewal of fixed productive assets.

Thus, enterprises shifted to the new system were able, thanks to the disclosed production reserves, not only to set up economic stimulation funds but also to increase substantially allotments to the budget from profit and also make additional payments of the turnover tax.

The transfer to the new system of management benefited every worker, the personnel of enterprises and the state as a whole.

The advantages of the new system are also demonstrated by data on the fulfilment of the plan by these enterprises and by other indicators.

	Per cent of plan fulfilment in 1966 by enterprises transferred to the new system	Growth rate, 1966 as compared with 1965, per cent	
		At transferred enterprises	Industry as a whole
Output sold	103.1	10.5	—
Gross output	103.2	10.3	8.6
Balance-sheet profit	106.6	23.3	10.6
Labour productivity (gross output per employed person)	104.0	8.0	5.2
Average wages (plus current bonuses)	101.2	5.1	3.5

These data adequately show that the new system of management and planning, even when it was incomplete, helped to bring to light and utilise internal reserves, increase the volume of output, reduce production and circulation costs, and raise labour productivity and the economic efficiency of production. Tapping first of all the visible reserves, enterprises increased the volume of output sold by 4.8 per cent and profit by 10 per cent as compared with the originally approved plan, substantially topped the target for the growth of labour productivity both as compared with the plan and with 1965.

The fact that these results were obtained in the main by using only part of the production reserves and with the insufficient utilisation of latent reserves connected with the improvement of equipment and production methods attested to the great potentialities inherent in the new system.

The initial experience already showed that the extension of the rights of enterprises as a result of reducing the number of plan indicators approved by the higher organisation, far from lowering the role of state planning, on the contrary, consolidated state centralised planning. The role of the plan was enhanced because the approved plan targets expressed the economic substance of an enterprise's operation.

To a certain extent the new system also accomplished the task of stimulating enterprises to draw up intensive plans. For example, the Sigma association in the instrument-making industry drew up for 1967 a plan ensuring an increase in

output sold by 23.9 per cent as compared with 1966 (formerly a 17-per cent growth was envisaged for 1967) and profit by 34.8 per cent. The level of profitability was set at 47.3 per cent as against 33.7 per cent attained in 1966.

The efficacy of introducing pay for fixed productive assets and circulating assets was confirmed. The use of equipment, machinery and raw and other materials improved; enterprises displayed a greater sense of responsibility in their applications for, and plans of, supplies. Considerable surpluses of raw and other materials and also unutilised equipment were brought to light. As a result, in a number of cases enterprises did not need the centrally allocated materials and equipment.

Considerable work was done at enterprises in the consolidation of cost accounting, elaboration of normatives, of a system of indicators for their sub-units and of material incentive systems. A system of scientifically-based norms and normatives and a system of intra-factory calculation prices were introduced at a number of enterprises.

The employment of a new indicator—the volume of output sold—compelled enterprises substantially to reconstruct the organisation of production and the work of their financial, supply and sales departments. Production became more rhythmical. This was the case at the Dnieper Titanium and Magnesium Works, the Moscow Hard Alloys Works, the Podolsk Chemical-Metallurgical Works, a group of watch factories and other enterprises. For example, the group of watch factories transferred to the new system (in Zlatoust, Penza, Serdob and Uglich) attained the following rhythm in the output of goods by 10-day periods at the end of the year: first ten days, 29-34 per cent, the second ten-day period, 32-37 per cent, and the third ten-day period, 33-37 per cent. Prior to the transfer up to 45 per cent of the output was produced in the last ten days of the month.

All these measures introduced considerable changes in the operation of enterprises. For example, the stocks of materials and other goods above the normative figures not covered by crediting were reduced by 32 per cent in 1966 as compared with 1965. The turnover of circulating assets was cut from 82 to 75.2 days. The overdue indebtedness on State Bank loans was reduced by half. Inputs per ruble of commodity production decreased by 2.7 per cent, while for

industry as a whole they were lowered only by 0.3 per cent. The share of allotments to the budget from above-plan profit rose from 25-30 to 47 per cent. The number of enterprises which did not fulfil the plan for the main indicators was cut.

The new system of planning and stimulation enabled enterprises to improve their financial position and to set up, on this basis, economic stimulation funds: material incentive fund, fund of socio-cultural measures and housing construction and production development fund.

The enterprises received for the first time the opportunity to dispose of the production development fund on a scale sufficient to maintain the means of production at an up-to-date technical level. The Likhachov Motor Works in Moscow can serve as an example.

Prior to the transfer of the works to the new system, the production development fund consisted of resources allotted for new machinery, modernisation of equipment and the expansion of production. Up to 500,000 rubles were spent for these purposes annually. After the switch-over the following sums were allotted to the production development fund:

second half of 1966	2,863,000 rubles
first half of 1967	3,500,000 "
under the plan for 1967	8,778,000 "

These sums were designated for the purchase of equipment (to replace worn out fixed assets)	4,000,000 rubles
the introduction of new equipment	2,000,000 "
building and assembly work to replace obsolete and introduce new equipment	1,300,000 "
improvement of the organisation of production, modernisation of equipment, and so on	800,000 "

These data show that the production development fund is designated for definite purposes and its use has made it possible considerably to raise the technical level of production and maintain the means of production at an up-to-date level.

Enterprises were given the right to utilise substantial resources for material incentives to their personnel, the building of cultural and service establishments and housing for their workers. The material incentive fund as a whole

for the enterprises shifted to the new system was distributed as follows in 1966 (numerator—million rubles; denominator—per cent).

	Total	Of which	
		Workers	Engineers, technicians and other employees
Material incentive fund	195.0	98.9	96.1
Total	100.0	50.7	49.3
Of which:			
Current bonuses under factory bonus systems	88.4	15.7	72.7
Bonuses to outstanding workers	45.3	8.0	37.3
Material aid to needy workers	17.0	16.1	1.8
A bonus for the results of the year	9.2	8.3	0.9
	10.7	8.6	2.1
	5.5	4.4	1.1
	78.0	58.5	19.5
	40.0	30	10

It should be borne in mind that in setting up the material incentive funds bonuses to engineering and technical personnel were transferred to these funds from the wages fund, which determined the relationship between the size of the funds of engineers and technicians and of workers; in the case of the latter a considerable part of the bonus sums remained in the wages fund.

The new material incentive system substantially raised the share of additional earnings and bonuses in the total earnings of workers, engineers, technicians and other employees. Here are data for 1966 obtained at 32 surveyed enterprises in eight sectors of industry.

Year	Bonuses and additional piece-rate earnings of workers, in per cent of their wages under the basic rates	Bonuses received by engineers, technicians and other employees, in per cent of their salaries	
		Engineers and technicians	Other employees
1965	27.5	21.4	10.9
1966	32.8	30.6	24.8

Here is how the fund of socio-cultural measures and housing construction was allocated at the Likhachov Motor Works. The fund amounting to 7,023,000 rubles in 1967 was designated for building:

a hospital for 1,100 beds	3,560,000 rubles
cultural and service establishments at the Moscow carburettor factory (a branch of the Likhachov Works)	664,000 "
a mother-and-child sanatorium in Tishkovo	600,000 "
a bedroom wing in the Vaskino Holiday Home	400,000 "
a bedroom wing in the Maurice Thorez Holiday Home	30,000 "
second section of the Vaskino Children's Camp	650,000 "

The figures show that this fund is of great importance for enterprises. Its proper and full use greatly promotes an improvement of cultural and other services and housing conditions of the personnel.

The question of the planned supply of material resources for the needs of enterprises to engage in building under the production development fund and the fund of socio-cultural measures and housing construction, was taken up already in 1967. But not all the building jobs could be provided with the necessary resources, owing to which a big part of these funds was unutilised in 1967.

Notwithstanding the shortcomings in the use of the economic stimulation funds greater initiative was displayed both by the collectives of enterprises and individual workers in bringing to light internal reserves, improving the quality of goods, equipment and production methods.

Although the initial results were good it was still impossible on their basis to draw exhaustive conclusions about the efficient operation of the new management system.

To begin with, only 23 enterprises operated in the new way during the entire year, while the rest worked from 3 to 9 months. The number of enterprises, from about 40 sectors of industry, constituted a sufficiently representative group, especially for the scale of production, but the period of their

operation was too short for drawing any exhaustive conclusion about any element of the system.

Second, the influence of the new wholesale prices could be tested only in some cases because in industry as a whole they were introduced only in the second half of 1967.

Third, the new system operated only within the bounds of individual enterprises, moreover, those which ensured normal preparation for the switch-over to the new system. Therefore the interaction of the main elements of the system could be tested only within individual enterprises, their shops, departments and other sub-units. But it was not possible to test the operation of the system in interaction of the transferred enterprises with other enterprises and organisations of industry, and especially other sectors of the economy because the transferred part was too small, while the enterprises and organisations of other sectors were only beginning to introduce the new system by way of an experiment. Therefore if the economic mechanism did operate, it was only within an enterprise, while the external economic relations between organisations of different sectors of the economy practically did not go beyond the bounds of the existing system of management, planning and economic stimulation.

Fourth, enterprises worked in conditions when, alongside the new indicators, the old indicators passed down to enterprises by the higher economic agencies were also in force.

Fifth, the level of the organisational preparation for the transfer to the new system was not the same at all enterprises. Moreover, the degree of intensity of the plans differed. This to a certain extent distorted the results of economic activity and predetermined essential differences in the size of the economic stimulation funds set up at various enterprises.

Sixth, in ministries the main mass of enterprises operated under the old system, which could not but affect the style of work of the ministries. It actually remained the old style, which did not conform to the new conditions of operation of enterprises, to the new demands made on economic leadership following from the need for wider use of economic methods instead of the existing, predominantly administrative methods.

Seventh, the methodical instructions did not always consider all the distinctions of sectors and separate groups of

enterprises; they were specified and "polished up" in the course of the economic reform.

Eighth, most of the enterprises worked in conditions when lasting and stable relations, which had to improve both planning and the supply of materials and equipment, were not yet organised.

The subsequent transfer of new enterprises and then of entire sectors, the spread and deepening of the economic reform had to furnish new, broader and more representative material for analysing the efficacy of the new system of management, planning and material stimulation.

## **2. Transfer of Enterprises to the New System in 1967 and 1968**

The year 1966 served as a school for all enterprises and organisations, ministries and central boards, planning and financial agencies. The experience gained in 1966 enabled them to extend the work of shifting enterprises to the new system of planning and economic stimulation. Instead of scores and hundreds, thousands of enterprises were transferred. In 1967, already 7,200 enterprises in different branches of industry operated under the new system. They accounted for 37 per cent of the volume of output, 50 per cent of the profit, and employed almost one-third of the country's industrial workers.

The distinction of 1967 was not only the steep increase in the number of switched-over enterprises. The transfer was supplemented by two essential features: the new system was introduced not only in individual enterprises but primarily in sub-sectors and sectors of industry;

together with enterprises managerial agencies were transferred to the new system: sectoral central boards and boards and production associations.

In the light industry, for example, 11 sectors and sub-sectors were transferred in 1967; in the food industry 15 sectors and sub-sectors, and in engineering 11 sub-sectors under different ministries, and so on.

Great importance was acquired by the inclusion in cost-accounting activity and the transfer to the new system not

only of separate enterprises but also of the biggest production associations, which represent systems of enterprises. In 1967, these were such major associations of the oil industry as Grozneft (Grozny oil), Tatneft (Tatar oil), Bashneft (Bashkir oil), Kuibyshevneft (Kuibyshev oil); and in the power industry, Tsentrenergo (Central power), Mosenergo (Moscow power), Kievenergo (Kiev power) and a number of republican power systems.

In some sectors of industry also central boards (margarine, combine harvester, tyre, macaroni, confectionery, watch, electric instruments, synthetic rubber, and others) were transferred.

By way of experiment several regional boards of local industry and the Ministry of Local Industry of the Latvian Republic were shifted to the new system.

Enterprises switched over to the new system in 1967, just as the enterprises transferred in 1966, assumed additional obligations as regards the volume of output sold and profit, and as a result set up economic stimulation funds. The additional obligations for output sold amounted to 1,100 million rubles or 1.8 per cent of the plan of these enterprises in 1967. This exceeded the obligations assumed by enterprises in 1966 (1.6 per cent). For profit the obligation was 555 million rubles or 6.4 per cent of the plan (3.6 per cent in 1966).

How did the enterprises switched over to the new system on January 1, 1967, operate? They, just as the enterprises transferred in 1966, registered high growth rates of output, sales and labour productivity. Here are the respective data (1967 in per cent of 1965).

	Output sold	Gross output	Labour productivity
Total for all enterprises transferred to the new system	110.3	109.7	107.5
Of which:			
Transferred in 1966	110.1	110.2	107.6
Transferred in 1967	110.4	109.6	107.5

All enterprises operating under the new system sold output above plan for 3,200 million rubles. Fulfilment of the

profit plan and growth rates as compared with 1966 were as follows.

	Per cent of plan fulfilment	1967, per cent of 1966
Profit for all industry]	103.9	120.9
Of which:		
Transferred enterprises	105.6	122.4
Non-transferred enterprises	102.3	119.5

It should be noted, however, that an analysis of economic activity under the new conditions also brought out a number of shortcomings in the work of enterprises, central boards and ministries. Essential shortcomings were still observed in the material and technical supply of enterprises, especially in the supply of articles needed for making up complete sets of equipment. This was largely a result of the delay in organising lasting and stable relations between enterprises. In many cases an adverse effect was exerted by the absence of bilateral contracts which above all depended on the organisation of lasting and stable ties between enterprises.

These and some other shortcomings resulted in the non-fulfilment of plan targets and the additional obligations by individual transferred enterprises. Thus, in 1966 12 enterprises did not cope with their production plans, 2 per cent of the entire number operating under the new system, while in 1967 the share was 3.6 per cent. In 1967, the profit plan was not fulfilled by 23.7 per cent of enterprises of the entire industry, of which 26.3 per cent among enterprises not transferred to the new system and 10.5 per cent operating under the new conditions.

These data show that the transferred enterprises worked better than industry as a whole and the number which did not live up to their plans in this group was relatively smaller both as regards output and profit. But even such a situation could not be considered normal. The new system can and should ensure such an organisation of the work under which all enterprises would fulfil the increased plans and thereby ensure a considerable rise in the efficiency of production.

The process of extending, deepening and developing the economic reform was continued in 1968. As of January 1, 1969, 26,850 industrial enterprises producing about 72 per cent of all industrial output and contributing more than 80 per cent of the profit in industry were operating under the new system. All enterprises (except pilot plants) of 15 industrial ministries were transferred.

Enterprises and organisations in other sectors of the economy also introduced the new system. As of January 1, 1969, all railways, all shipping lines of the Ministry of the Merchant Marine, all enterprises and organisations of the Ministry of Inland Waterways, Ministry of Civil Aviation and all general-purpose motor transport were shifted to the new system. Service establishments, enterprises and organisations of the public utilities, trade and public catering, material and technical supply and many enterprises of the Ministry of Communications of the USSR operated under the new system by way of an experiment. Eight hundred state farms were transferred to cost accounting with elements of the new system.

Thus, the reform encompassed enterprises and organisations in almost all sectors of the national economy.

The transfer of building organisations to the new system began in 1970. This enables us to draw the conclusion that the spread of the economic reform was effected on a scale meeting the decisions of the September 1965 Plenary Meeting of the CPSU Central Committee. Prerequisites are being created for the wider use, on a socialist basis, of commodity-money relations both within sectors of industry and also in relations between enterprises of different sectors of the economy.

Enterprises shifted to the new system in 1968 assumed the following additional obligations:

output sold	1,600 million rubles (2.3 per cent)
profit	1,100 million rubles (9.6 per cent).

Industrial enterprises operating under the new system fulfilled the plan of 1968 as follows (see first table on page 201).

The plan for the sale of output was not fulfilled by 12 per cent of the industrial enterprises, including 16 per cent of the non-transferred and 9 per cent of the transferred enter-

	Per cent of plan fulfilment	1968, per cent of 1967
Output sold	102.0	109.0
Balance-sheet profit	102.0	115.4

prises. The target of the profit plan was not met by 21 per cent of the enterprises, including 25 per cent of the non-transferred and 18 per cent of the transferred enterprises.

In 1968, in addition to shifting enterprises to the new system, measures were taken to improve their work and the system itself.

As a result the number of workers covered by additional bonus systems increased in the first half of 1968. At the Krasny Oktyabr Steel Works in Volgograd, for instance, the bonus systems spread as follows as compared with 1967.

	First half of 1968	First half of 1967
Number of workers covered by additional bonus systems	7,321	6,950

This made it possible to increase the scale of material incentives as shown by the following data.

	Per cent of bonuses, additional earnings and payments from the material incentive fund to the basic wage rate and salaries	
	1st half of 1968	1st half of 1967
Workers	37.6	35.47
Engineering and technical personnel	32.2	27.9

Data on the operation of enterprises transferred in 1968 also revealed the great possibilities of the new system, and

at the same time demonstrated the existence of substantial unutilised reserves for the further expansion of production, reduction of costs, and rise in labour productivity and in the economic efficiency of production.

### 3. The Economic Reform in 1969 and 1970

In 1969 and 1970 the transfer of industrial enterprises to the new system was continued and work was kept up at all previously shifted enterprises to deepen cost accounting and make fuller use of the initiative and economic independence of enterprises. As of December 31, 1969, 36,000 enterprises operated in the new way, contributing about 84 per cent of the output and 91 per cent of the profit of industry. By that time 22 industrial ministries had fully completed the transfer of all enterprises to the new system. Only pilot plants which have certain distinctions were not transferred because that demanded the elaboration of substantial supplements to the adopted methodics for the shifting of industrial enterprises to the new system.

At the end of 1970 industrial enterprises operating under the new system accounted for about 92 per cent of the industrial output and more than 95 per cent of the profit.

The enterprises transferred in 1967 and 1968 not only lived up to the assumed additional obligations, but also considerably exceeded them. The principle of setting up economic stimulation funds by finding and utilising production reserves fully justified itself and became the main one in introducing the new system at enterprises in industry and other sectors of the economy.

A comparison of the actual results for 1966, 1967 and 1968 reveals the big production reserves and the great possibilities of enterprises which tapped these reserves and not only fulfilled but also substantially exceeded the assumed obligations, as shown by the following data (see table on page 203).

The 9,000 industrial enterprises transferred in 1969 also assumed additional obligations which were substantially topped.

Altogether the industrial enterprises shifted to the new system between 1966 and 1969 contributed additionally above

	Output sold		Profit		Payments to the budget, million rubles
	million rubles	per cent of the approved plan	million rubles	per cent of the approved plan	
Additional obligations assumed by the 704 enterprises transferred to the new system in 1966	305	1.6	131	3.6	34
Actual fulfilment in 1966	911	4.8	384	10.4	84
Additional obligations assumed by the 6,365 enterprises transferred to the new system in 1967	1,117	1.8	555	6.4	243*
Actual fulfilment in 1967	3,117	5.1	1,071	12.4	479*
Additional obligations assumed by the 20,000 enterprises transferred to the new system in 1968	1,644	2.3	1,112	9.6	161
Actual fulfilment in 1968	4,800	6.7	1,800	15.6	400

\*Including turnover tax of 186 million rubles.

the original plan more than 11,000 million rubles of output sold, about 3,500 million rubles of profit and 1,200 million rubles of payments to the budget. This was done only in the first year after their switch-over to the new system. It is clear that in subsequent years, too, these enterprises, utilising the advantages of the new system, raised labour productivity, reduced production costs and increased the sales of output and profit.

Comparing the operation of 580 enterprises prior to and after the transfer in 1966 it is seen that economic methods of leadership produced noticeable results and enhanced the efficiency of production. This is shown by the following data on page 204.

As seen from these data, after the transfer the qualitative

	Prior to the transfer				After the transfer		
	1963	1964	1965	1966	1967	1968	1969
Results per ruble of fixed productive assets:							
Output sold, kopeks	198.9	195.9	197.4	209.3	212.8	213.3	213.3
Gross output, kopeks	195.7	193.3	198.1	209.9	214.7	214.2	215.5
Profit, kopeks	26.5	28.1	30.1	35.3	33.0	40.5	43.8
Share of increase in output received through a rise in labour productivity, per cent		65.9	61.9	83.7	67.7	74.2	82.8
Profit received:							
Per ruble of inputs, kopeks	15.3	16.7	18.0	20.3	22.5	23.6	25.9
Per ruble of wages, kopeks	98.1	108	116.7	135.6	151.7	157.2	176.6
Per employed person, rubles	1,188	1,336	1,485	1,773	2,027	2,217	2,549

performance indicators not only improved but there was a kind of leap which initiated better operation.

These 580 enterprises are only part of industry, but all industry also considerably improved the results of operation during the past period which was a consequence of reorganising work on the sectoral principle, improving the activity of both enterprises and agencies of sectoral economic management.

This was facilitated by measures for shifting to the new system not only of industrial enterprises, but also of enterprises and organisations in other sectors of the economy, specifically all types of transport, which plays an important part in the development of the national economy.

During 1969 and 1970 the new system of planning and economic stimulation was introduced in 12 sectoral central boards of the Ministry of Instrument-Making, Means of Automation and Control Systems, eight central boards of the Ministry of the Light Industry, and three associations under the Ministry of the Light Industry. In 1970, the Ministry of Instrument-Making, Means of Automation and Control Systems, and also Glavmosgoravtotrans (Central Moscow Motor Transport Organisation), the biggest in its field, were transferred to the new system by way of an experiment.

This step is linked with the reinforcement of sectoral leadership, enhancement of the role of sectoral ministries, and also extension of their rights in planning, construction and economic stimulation, with the simultaneous consolidation of centralised planning and the role of five-year plans of the Ministry of Instrument-Making and of Glavmosgoravtotrans.

These organisations are given five-year plans for a limited range of targets and also the normatives of allotments from profit left at their disposal and for the development of the sector. Simultaneously the breakdown of assignments by years of the five-year period, including also payments of profit to the budget, are approved. Moreover, the payments to the budget set in the five-year plan must be made by the ministry irrespective of plan fulfilment. If the ministry fails to fulfil the profit plan it still pays into the budget the sum of profit fixed in the plan for the given year, this being done by reducing part of the profit left at the disposal of the

ministry. The transfer of ministries to the new system marks the beginning of a new stage in the reform, a stage of deepening it and drawing into economic relations not only enterprises but also the middle and higher links of management.

During the past period measures were elaborated and applied further improving the organisation of management. In 1970 decisions were made on further improving the organisation of management in the chemical, oil and coal industries.

This improvement is designed above all to create a harmonious system of management, reduce the number of management links, provide the necessary conditions for arranging cost-accounting relations not only at an enterprise, but also between enterprises and economic management agencies. For this purpose the chemical industry, for example, is to have a three-link management system: ministry—industrial cost-accounting association—combined works. In view of this, the ministry has been reorganised from a Union-Republican into a USSR ministry. About the same changes are envisaged in the Ministry of the Oil Industry which is also to have a three-link system: ministry—territorial production cost-accounting association—enterprise. The central boards which formerly existed in the ministry have been dissolved. The ministry has also been reorganised into a USSR body.

Essential changes have been introduced in the management of the coal industry. Here too a three-link management system has been instituted: ministry—cost-accounting combined coal enterprise—large mine management. As a result, 92 coal trusts, which acted as an intermediate managerial link, have been dissolved.

Thus organisational prerequisites have been created in these industries for cost-accounting relations not only horizontally but also vertically in order to enhance responsibility for the fulfilment of state plans and the profitable operation of enterprises. A harmonious management system, without unnecessary intermediate links, furnishes a reliable basis for introducing automated management systems which in future will be applied in all sectors of industry and the national economy. Without the precise organisation of management, without a definite system of management it would be difficult to introduce cost-accounting relations and automated management systems.

#### 4. Results of the Economic Reform in Five Years

The share of profit remaining at the disposal of enterprises increased between 1966 and 1970 at enterprises shifted to the new system. While in 1966 this share amounted to 26 per cent, it gradually rose in subsequent years: in 1967 to 29 per cent, in 1968 to 33 per cent and in 1969 to 40 per cent.

Enterprises have set up substantial economic stimulation funds, with the help of which they maintain equipment at an up-to-date technical level, build cultural, service and other establishments, spend considerable resources for sports installations and housing. The material incentive fund enables enterprises not only to pay current bonuses but also to assign considerable sums for bonuses given for the results of the year, which came to be known as the thirteenth monthly wage. The scale of the economic stimulation funds can be judged by their increase as compared with 1966: the production development fund rose 6 times, the fund of socio-cultural measures and housing construction 2 times, and the material incentive fund 4 times.

The interest shown in the results of the reform is not accidental. These results are an outcome of the economic policy of the Communist Party of the Soviet Union, of the work by the Soviet people. In this context it should be noted that the results of the Eighth Five-Year Plan (1966-1970) were better than in the preceding five years.

The growth of the national income is the best overall indicator. Under the Seventh Five-Year Plan the average annual growth rate of the national income was 6.1 per cent. In 1966-1970 it increased to 7.1 per cent, and a considerable part in this was played by the economic reform.

The growth rate of gross industrial output in the past five years was 8.5 per cent. This figure, however, should not be examined in isolation from the earlier investments and the accretion of the fixed assets. Seventy-eight kopeks of output were received per ruble of increment in the fixed assets in 1961-1965, while in 1966-1970 the figure went up to 99 kopeks, a 27-per cent rise. The decrease in the output-asset ratio was stopped in 1966-1970; in the preceding five years it declined by 8 per cent, calculated per net output.

A reduction in production costs is a primary condition for raising the efficiency of production. In the past five years costs were cut more than previously. While in 1961-1965 the average annual decrease of production costs was 0.9 per cent, in 1966-1970 it was 1 per cent.

Thus, the economic reform ensured fuller use of the fixed productive assets and material inputs, i.e., improved the use of inputs of materialised labour.

Alongside this, in the Eighth Five-Year Plan a bigger average annual growth rate of labour productivity was achieved as compared with the Seventh Five-Year Plan. This means that a saving of labour, both materialised and living labour, was attained, moreover, the saving was essential, expressed in the average annual growth of labour productivity by 5.8 per cent as compared with 4.8 per cent in the preceding five years.

As much as 73 per cent of the output increment under the Eighth Five-Year Plan came as a result of the rise in labour productivity, as compared with 62 per cent in 1961-1965. It is characteristic that in 1970 the increase in output as a result of higher labour productivity amounted to 88 per cent of the total increment.

A number of measures to raise wages was effected during the past five years, including an increase in the minimum wage to 60 rubles, a rise of wages of lathe operators, an increase in the Northern additions to wages, and so on. As a result average wages went up by 5.2 per cent annually, as compared with 2.6 per cent in the preceding five-year period. Notwithstanding such a considerable increase in wages, their growth rate did not exceed that of labour productivity.

The relative saving of investments through improved utilisation of fixed productive assets is a big achievement of the past five years. This saving is estimated at about 24,000 million rubles, the sum which would have had to be spent for commissioning new productive assets, were it not for the better use, as a result of the economic reform, of the existing productive assets in all industries.

In 1966-1970 profitability in industry rose notably. While in 1961-1965 it amounted on the average to 16.7 kopeks per ruble of productive assets, in the next five years it was 21.3 kopeks (in prices of 1960).

All this made it possible to increase per capita incomes

by 33 per cent in the past five years as compared with 19 per cent in 1961-1966. Almost one-fourth of the country's population, 55 million people, moved to new flats in the past five years.

The work of concentrating production and setting up production associations was continued during the economic reform. One of them was the Vorovsky Clothing Association, set up on the basis of the Vorovsky Clothing Factory in Odessa, which united a number of clothing factories in the region.

Indicators of the work of the Vorovsky Association reveal the big possibilities inherent in the new system of planning and economic stimulation and in the concentration of production and the setting up of big production-economic complexes. The Vorovsky Association, having united small clothing factories and arranged specialisation of production registered in four years notable achievements in raising the level of profitability and the output-asset ratio and improving the quality of goods.

The possibilities of the new system of planning and economic stimulation are such that any normally functioning enterprise, utilising them, can achieve good results in its production and economic activity, considerably improving the indicators of operation and economic stimulation. There are many such enterprises now, and their number is steadily increasing.

The results for 1966-1970 offer grounds for the following conclusions:

the new system of planning and economic stimulation makes it possible to consolidate centralised planning with the simultaneous extension of the rights and economic independence of enterprises, and strengthening of cost-accounting relations between enterprises and associations, and also to reinforce contractual relations based on lasting and stable ties between supplier enterprises and consumers;

the new system helps to bring to light and tap production reserves, raise the growth rates of output, labour productivity and efficiency of production;

a reduction in the number of approved targets enhances the initiative and economic independence of enterprises and ensures the possibility of exercising the broad rights given to enterprises;

the new system ensures better use of the operating productive assets, it stopped the decrease in the output-asset ratio and makes it possible to raise it in enterprises operating in the new conditions;

the organisation of production improved and operation became more rhythmic; there is greater interest in introducing progressive methods of managing and planning production with the employment of computer technology;

greater attention is paid to the economics of production, the introduction of cost accounting and to the advance of economic knowledge of all categories of the working people;

the working people, Party, trade-union and Komsomol organisations participate more actively in managing production, in implementing the economic reform. Production conferences, workers' meetings and commissions on various questions have become more effective.

These results have been achieved only with the partial utilisation of the advantages of the new system of planning and economic stimulation. The system has not yet been able to operate as a complex because it has not been introduced in all the sectors of the economy and not all the elements of the system operate the way it is envisaged in the decisions.

The economic reform is a system of measures which operates most efficiently, as every system, in a complex. It must not be regarded as a single measure, with an immediate and full return. The economic reform represents the economic policy of the Communist Party at the given stage of communist construction, and its efficiency will rise as ever new elements of the system are included and it draws nearer to its comprehensive introduction in the national economy as a whole.

This demands above all the swifter reorganisation of the style and methods of guidance of enterprises by the highest and middle links of management, fuller exercise of the rights of enterprises and associations, and also the rights of industrial ministries. It is necessary to find more effective ways of economically stimulating enterprises, associations and ministries to formulate intensive plan targets for the sale of output, profit and labour productivity.

It is necessary to stimulate a rise in labour productivity and optimal relationships between the growth in labour pro-

ductivity and in average wages, which should be promoted by the more effective use of the economic stimulation funds, specifically the material incentive fund, especially for the acceleration of technical progress.

The work of drawing up five-year plans from the enterprise up to the USSR Gosplan was not completed in the past five years, and, therefore, the enterprises did not have such plans with a breakdown of assignments by years. Because of this, stable long-term normatives for the setting up of economic stimulation funds were absent in many cases.

The work of further improving the organisation of management both in the primary (enterprise) and in the middle (association) links was not finished too. In particular, the setting up of combined works and production associations was not completed.

Future steps in carrying out the economic reform are designed to bring out the immense reserves for the development of production and enhancement of its efficiency.

## **5. Questions of Further Developing the Reform**

In the relations between enterprises and organisations, there must not be a situation in which some of them are in privileged conditions as compared with others. But so far in a number of instances more rigid demands are made on industrial enterprises than on organisations economically connected with them.

This, for example, is the case in relations between industrial enterprises and the railways, between industrial and agricultural enterprises, at times between industrial enterprises and trading organisations. It cannot be said that these relations remain unaltered. They are constantly changing towards equalising the economic responsibility of industrial enterprises and enterprises and organisations in other sectors of the economy. Weightier economic sanctions when properly applied make it possible considerably to improve relations of suppliers and consumers. But even today the conditions dictate a further improvement of economic relations between suppliers and consumers in all sectors.

That is why it is a major requisite for the success of the

economic reform in the USSR not only to introduce the new system at all enterprises and organisations in all sectors of the national economy, including the non-productive sphere, but also to work out such conditions of their operation which would ensure equivalent relations so that each enterprise and organisation bear equal responsibility for the non-observance of the provisions of their contracts. Only in this case is it possible to expect the economic mechanism, economic methods of management of the national economy to operate efficiently.

The fact that in the very first year of industry's work in the new conditions a need arose to transfer a number of enterprises and organisations of other sectors confirms the importance of the adopted decisions on shifting enterprises and organisations in a number of sectors to the new system. It is a major task to prepare the necessary conditions for the mass transfer and the efficient operation in the new conditions of building organisations, agricultural enterprises, and enterprises in the sphere of circulation and service. Moreover, the conditions of their transfer should ensure the preferential position of the consumer.

The decisions of the 24th CPSU Congress provide for completing in 1971-1975 the transfer to the new system of planning and economic stimulation of all cost-accounting enterprises and organisations in sectors of material production and the services.

The second problem, on the solution of which the efficient operation of the system of economic instruments largely hinges, is the planned organisation of lasting and stable relations between supplier and consumer enterprises, between enterprises and organisations in all sectors of the economy. It includes at least two relatively independent questions: improvement of planning the national economy and the organisation of sales and the supply of the economy. With the introduction of the new system the problem of improving planning is linked above all with the plan indicators in physical terms, the number of which must be considerably reduced. This, of course, does not mean that such a reduction can be made mechanically. Moreover, such a mechanical reduction should be shunned as the worst manifestation of subjectivism and voluntarism in national economic planning.

The plan indicators in physical terms must follow from

the organisation of economic relations between suppliers and consumers and reflect the organic unity of these relations. For example, if an automobile works produces 120 modifications of motor vehicles in two basic models, apparently it would be correct to envisage in the state plan an assignment for the two models. But in so doing it is necessary to arrange relations between enterprises and organisations so that the two lines of the state plan guarantee the production of automobiles of different modifications really needed by the economy.

Under the old system this was achieved by including many concrete types of vehicles in the state plan. The transition to the new, preferably economic methods of management puts to the fore the task of finding other methods of planning.

In the given case it is necessary, within the bounds of the two models provided for in the state plan, to attach to the works for a long period the biggest consumers which receive the main quantity of automobiles. Let us assume that 80 per cent of the automobiles are received by 20 per cent of the consumers. It is these consumers that have to be attached to the motor works for a long period, for example, five years. Together with them, the works management will specify the modifications within the bounds of the two models in the plan. Considering the wishes of consumers, contracts are concluded for a number of years which will serve as the basis for the plan drawn up by the works. These contracts are concluded after the plan for the aggregated nomenclature is approved. Moreover, the approval of the plan is preceded by specifying in detail the need in automobiles for a wide nomenclature, co-ordinating the types and modifications of automobiles and the examination of these materials in the ministry so that the plan should maximally take into account the needs of the economy. Approval of the plan for an aggregated nomenclature does not run counter to the need for drawing up a plan for a wide nomenclature by the enterprise. Fulfilment of this plan (with the approval of only two models from above) will be ensured by the enterprise within the bounds of the contracts, and observance of their fulfilment will be supervised directly by the works and not by the higher organisation because the violation of contract relations will lead to fines which will reduce the profit and its share which remains at the disposal of the enterprise.

This example shows that economic methods of management extend the initiative of an enterprise and enable the higher agency to engage not in petty supervision but in cardinal questions of the sector's technico-economic development.

But we discussed only 80 per cent of the automobiles and 20 per cent of the consumers. What about the remaining 20 per cent which have to be delivered to 80 per cent of the consumers? This matter can be handled in two ways.

First, consumers can be attached to the territorial boards of the State Supply Committee, each of which will represent a definite group of consumers, obtain from them data about the needed modifications and receive the vehicles at the works, releasing consumers from all cares in this respect. For this the territorial board will charge a definite fee.

Second, consumers of the second group, just as of the first, can receive automobiles by making applications directly to the works which will sign a bilateral contract with them on general terms. In this case full responsibility for fulfilling the plan in the agreed nomenclature devolves on the works.

Here is one more example demonstrating the necessity for lasting and stable ties between supplier and consumer enterprises. The Krasny Oktyabr Steel Works in Volgograd produces rolled metal of approximately 300 type/sizes and 300 grades which are supplied to about 1,500 consumers. Under the operating procedure an order is written out for every consumer annually and for every quarter, altogether five orders. Theoretically as many as  $300 \times 300 \times 1500 \times 5 = 675$  million orders, approximately in ten copies each, may have to be written out. Practically the works, of course, never receives such a quantity of orders. Actually about 20,000 orders are written out with about 200,000 items (lines) in them. This demands a tremendous expenditure of labour by the USSR Central Metal Supply Board and the works and also a big number of assignments in the plans approved for the supplier and consumer enterprises and much work in controlling the carrying out of these plans.

Under the new system of planning and economic stimulation it is apparently necessary to change this procedure and instead of it introduce one which is in keeping with economic methods.

This means that 75 per cent of the output which is con-

stantly received by 150 consumers should be switched over to lasting and stable direct relations. In this case the numerous assignments in physical terms in the state plan should be replaced by one line: "rolled stock". This line would also apply to the plan of consumers. Within the bounds of the planned designation of rolled stock as a whole 150 consumers agree upon a detailed assortment with the works and conclude long-term contracts. These latter will serve as the basis for a detailed plan approved by the director of the works.

The rest of the output designated for small consumers can be delivered to them directly on the same terms as to big consumers, but such an organisation will hardly be expedient. It is apparently more advisable to organise these deliveries through the territorial boards of the USSR State Supply Committee. In this case all the work with the smaller consumers will be handled by the territorial boards (let us assume ten boards). In this case the territorial boards will act as big consumers which conclude long-term contracts with the supplier which will have 150+10 consumers.

Thus, the Krasny Oktyabr Steel Works will have to fill instead of 675 million (theoretical) or 200,000 (actual) applications for definite type/sizes and grades of rolled stock listed in 20,000 orders, only 160 annual orders, including ten group orders which cover the needs of the overwhelming number of consumers attached to the ten territorial boards of the USSR State Supply Committee.

The attaching of consumer and supplier enterprises for a long period will enable them to arrange direct relations and to decide independently, on the basis of bilateral economic contracts, questions of assortment, grades, quality, periods of delivery, having only one approved aggregated indicator.

Under such a form of organisation of planning the production and deliveries of goods, an economic contract becomes a major document which supplements the plan in an aggregated nomenclature and regulates economic relations between the supplier and consumer enterprises. Contractual relations must become a major requisite for planning and organising deliveries. They should encompass 100 per cent of the enterprises and 100 per cent of the output. Actually now contractual relations cover a small part of the output, which adversely affects the fulfilment of the delivery plan.

Long-term and stable relations between supplier enterprises and consumers, organised in a planned way, are a primary condition for the planned distribution of means of production through wholesale trade. The form of organising lasting and stable relations described above is the basis for the main form of wholesale trade in means of production directly between supplier enterprises and consumers.

The delivery of means of production through intermediaries—territorial boards of the State Supply Committee—on the basis of lasting and stable relations between them and the supplier enterprises is the second form of the planned distribution of means of production through wholesale trade.

The third form is trade through shops and centres of the territorial boards of the State Supply Committee which handle universal means of production (oil products, building materials, tools, and so on).

The Directives of the 24th CPSU Congress for the Ninth Five-Year Plan point to the need for the planned development of economically expedient direct long-term economic relations between enterprises and also the extension and improvement of wholesale trade.

Rational use of the economic stimulation funds holds a major place among problems of deepening the new management system and raising its efficiency.

Let us begin with the use of the material incentive funds of enterprises. Some of them have elaborated many systems of bonuses for the fulfilment of concrete assignments, but they cover only from 20 to 60-70 per cent of the workers.

Naturally at enterprises where the bonus systems apply to a bigger number of workers the effort to achieve best results is stimulated by the concrete size of the material incentive. Here instead of general arguments about the usefulness of material incentives the latter ensure the accomplishment of concrete tasks by the forces of entire collectives.

The way to solve the problem is to create at each enterprise a system of material incentives (considering the standard system) which would be fully dovetailed into the plan indicators of the structural sub-divisions of the enterprise and ensure the collective and personal reward of the personnel in full conformity with the quantity and quality of the work done by every collective and every workingman, with their contribution to raising the economic efficiency of production.

The establishment of such systems at enterprises would put an end to the attempts to reduce the matter to the distribution of bonuses between sub-divisions or categories of workers instead of a real effort to attain high efficiency of production, to receive a profit and corresponding economic stimulation funds, and then precisely determine the size of the reward for concrete types of work accomplished by each sub-division and every member of a collective.

No less important is the rational use of the production development fund and the fund for socio-cultural measures and housing construction.

Decisions of the 24th CPSU Congress make even more important the rational use of the economic stimulation funds.

The Congress set the task of accelerating scientific and technological progress and, on this basis, of raising to the utmost the efficiency of production. The use of the economic stimulation funds should be subordinated to the accomplishment of this task. At the end of the current five-year period these funds will reach up to 20,000 million rubles for the entire national economy, a big sum even on the scale of the USSR. Hence the purposeful employment of these funds can essentially affect the acceleration of technological progress and rise in production efficiency. The increase in the share of bonuses in the earnings of workers, engineers, technicians and other employees already under the Eighth Five-Year Plan ensured a considerable increase in the absolute size of bonuses. In the Ninth Five-Year Plan the funds and long-term normatives of their formation are envisaged on a scale ensuring the observance of economically-based proportions between the growth of wages, profit, labour productivity and other plan indicators.

Small enterprises are faced with difficulties. Since their economic stimulation funds are not big, they are not always able to build cultural and service establishments and houses and also to undertake measures for the development of production because the size of the funds does not allow them to do this in one or two years; they have to accumulate resources over a number of years, with the result that at times the contemplated measures lose their meaning.

That is why economic stimulation funds can be better utilised in cases when they are set up by big enterprises or associations of enterprises. In a number of instances they

should be centralised for the purpose of more rational and fuller use both by concentrating resources on concrete objects and by including these jobs in plans of enterprises, providing them with the necessary material resources, equipment, the services of building and designing organisations and manpower.

The question of the optimal size of the production development fund requires study. This problem is acquiring now ever greater significance, as demonstrated by practical experience. During operation under the new conditions some enterprises, and at times even ministries, quite often raise the question that the production development fund, set up in accordance with the operating normatives, cannot be rationally utilised because an enterprise does not need it on such a scale. At the same time other enterprises and ministries point out that under the existing normatives the production development fund does not ensure the renewal of means of production and their maintenance at an up-to-date technical level.

The rational use of the production development fund is of paramount significance for ensuring the conditions for a rise in labour productivity by introducing new equipment, improving production methods, increasing the volume of output sold and profit and, on this basis, for further improving the living standard of the collectives of enterprises.

The solution of the problems mentioned earlier is linked with one more aspect of the economic reform—the planned establishment of production associations and combined works in all sectors of industry.

An increase in the scale of production sends up economic efficiency not only as a result of introducing new equipment and improving the methods and organisation of production, but also by improving the organisation of management. Modern production demands big expenditures for research and development work and also the maintenance of special services, which requires additional outlays that only big enterprises can make. Today it is impossible to picture a modern enterprise without computers needed both for preparing production and also for controlling production processes. It is beyond the strength of an average enterprise, not to speak of a small one, to organise a computation centre.

Small enterprises, as a rule, have higher labour inputs

and lower labour productivity, a larger share of ancillary personnel and bigger fluctuations in the growth rates of output sold and profit.

With a big number of small and medium enterprises it is more difficult and practically almost impossible to organise lasting and stable relations, i.e., one of the main elements of the new system. Yet, in industry more than half of the enterprises employ only up to 200 people each. In some industries small enterprises are the biggest in number and they contribute an insignificant part of the output. For example, in the engineering industry 25 per cent of the enterprises account for 82 per cent of the output, while 75 per cent of small and medium enterprises provide only 18 per cent. In the cotton textile industry enterprises employing up to 300 people make up 28.7 per cent of the total, but they produce only 1.8 per cent of the entire output. In the clothing industry 44.4 per cent of the enterprises employ up to 300 people and they account only for 6 per cent of the output. The situation is similar in a number of other industries.

The experience of operation of Leningrad enterprises united in production-territorial associations, shows that the latter practically decide all questions raised by the ministries. For example, the Elektrosila Association in Leningrad introduced 422 general standards and 497 standards for tools during the first two years of its operation. It set up specialised foundries, centralised and specialised the production of tools, the preparatory shops were reconstructed and re-equipped, modern moulding shops were built and repair shops organised.

During the first two years of the reform 30 associations of the former Leningrad Economic Region released a pilot plant, 77 shops, 100 production sections with a total floor space of 38,500 sq m and a big quantity of manufacturing equipment. The total economic effect of all the measures carried out by the associations in the two years exceeded 60 million rubles, which is three times greater than the effect of the measures carried out by individual enterprises in the two preceding years. Instead of scattered designing and technical sub-divisions large specialised central designing offices and big technical departments and laboratories were organised. The associations established their own computation centres.

The experience of the Likhachov Motor Works which actually is a production association, is of interest. In addition to the Likhachov Works in Moscow, it includes a number of large factories as branches, namely, the Moscow carburettor factory, the Moscow automobile units factory, the Moscow cardan factory, the precision casting shop, the spare parts factory in Roslavl, the aluminium casting foundry in Mtsensk, the automobile units factory in Ryazan, the units factory in Serdobsk and the spare parts factory in Sverdlovsk.

The experience of Likhachov Works over a number of years shows that a production association headed by a big enterprise offers a number of advantages.

First, conditions are created for the efficient specialisation of individual factories with an adequately big volume of production of homogeneous goods which, in turn, ensures high specialisation of the shops and a rise in labour productivity;

second, constant and direct production relations are ensured between the head enterprise and the branches with a high guarantee of the observance of the period and scale of reciprocal deliveries;

third, the periods of preparing and organising the manufacture of new goods are substantially reduced because the head works exercises control, co-ordinates and renders the necessary assistance in preparing the new production at branch factories. Assistance of the head works substantially reduces the periods of construction and assembly, preparing for and organising new production at branch factories, especially at newly built. Thus, the level of organisation, equipment and production methods at the branches is brought up to the level of the head works;

fourth, conditions are provided for the fuller use of the capacity of the enterprise as a whole by greater operational skill and manoeuvrability in loading up the production floor space, equipment and manpower;

fifth, the solution of many problems is greatly simplified for the branch factories because of the unity of the tasks and responsibility of the head works and its branches and the absence of a multi-link system in management;

sixth, a considerable saving in managerial expenses is effected. Thus, at the Likhachov Works there is no special

apparatus for managing the branch factories and the relevant activity is handled by the staff of the head works.

The departments and services of the head works exercise functional guidance of the respective sub-divisions of the branches, preserving the full responsibility of the directors of the branches for the operation of all their services.

The advantages of the associations have been particularly displayed under the new system of planning and economic stimulation. For example, in view of the big volume of construction work involved in the further enlargement of the spare parts factory in Roslavl it was allotted 350,000 rubles from the production development plan of the Likhachov Works for setting up its own building facilities. In 1967, the Mtsensk aluminium casting foundry was allotted 900,000 rubles for housing construction from the fund for socio-cultural measures. Neither the Mtsensk nor the Roslavl factory would have been able to do so had they been outside the association.

The experience of a number of associations shows that their branch factories develop much faster than the head enterprise, and undoubtedly faster than if they were outside the association.

For example the Malaya Vishera Glass Factory which is part of the Svetlana Production Association was turned in four years from a small primitive establishment into a mechanised enterprise which doubled its output.

The question of providing personnel for the enlarged enterprises is easier solved in production associations. Many big enterprises are located in cities where new industrial construction and enlargement of existing factories are restricted (Moscow, Leningrad, Kiev, Minsk and others). The setting up of branches in small towns facilitates the solution of their problems in expanding production and providing it with manpower.

Big enterprises and production associations are able to specialise not only the main but also auxiliary and preparatory production and also to specialise the functions of management, extend the technical services and, with their help, ensure the wide introduction of the latest equipment and production methods.

Thus, the systematic establishment of production associations is a necessary requisite for improving the organisation

of production and management which ultimately facilitates a rise in the efficiency of social production. The need for setting up production associations (combined works) was emphasised in the 24th CPSU Congress decisions.

The setting up of industrial associations in the middle link, according to the pattern in the chemical, coal and oil industries, is an important condition for improving the organisation of industrial management. Industrial cost-accounting associations in the middle link represent a *system for managing a sub-sector of industry*. This presupposes the expansion of the rights of industrial associations as a result of placing them directly under the ministries. The rights of industrial associations should be extended without infringing the rights of enterprises which may give up part of their rights if, with their consent, some of their functions are centralised.

The transfer of industrial associations to the new system of planning and economic stimulation is a requisite for consolidating cost-accounting relations between enterprises and the higher management agency. In that case industrial associations together with the enterprises will represent a production-economic complex which operates on the cost-accounting principle. Industrial associations transferred to the new system will solve problems of developing their respective sub-sectors and raising the efficiency of production by utilising in their work the principle of the wide independence of enterprises, their initiative in finding and utilising internal reserves, and also by centralising functions to the maximum, especially in the sphere of supply, sales, planning and accounting, and by specialising auxiliary and preparatory production.

In addition, industrial associations will undertake the task of helping enterprises to accelerate technological progress and introduce computers in production and management.

A mechanical approach to the setting up of different industrial associations which unite diverse enterprises not belonging to a concrete sector of industry, is impermissible. On the other hand, the organisation of industrial associations in the tyre industry, rubber industry, bearing, watch and other sectors with a distinctly pronounced specialisation of production, has been fully justified.

In preparing to organise associations it is important thoroughly to examine the composition of enterprises which in

the new conditions must correspond to the sectoral principle and the main trend in the work of the respective sub-sector. Some redistribution of enterprises in organising associations will be a necessary requisite for the transfer of the latter to the new system. It is possible that as a result the number of central boards in some ministries will be substantially cut. Only a logically justified structure of associations will be viable and ensure a rise in the efficiency of social production.

In the process of transferring enterprises of local industry (printeries, food factories and other enterprises under local jurisdiction) it was established that many of them were too small and did not have the necessary conditions for the introduction of the new system. The activity of the enterprises which were shifted showed that the big fluctuations in the growth rates of output sold and profit and also the level of profitability make it impossible to apply in full measure the system for setting up economic stimulation funds.

Consideration for the distinctions of sectors during their transfer to the new system is a serious problem.

Experience shows that not all the shifted enterprises could make use of the methodical instructions for introducing the new system. That is why enterprises with sharp fluctuations in the growth rates of the volume of production and the level of profitability, with decreasing growth rates and levels of profitability, seasonal factories, enterprises with a long production cycle and a number of others which have distinctions, as compared with the usual type, could be transferred to the new system only after supplements were made to the methodical instructions taking into account their specific features.

Ministries, departments and enterprises, studying operation in the new conditions, explore new ways of setting up economic stimulation funds, which is one of the major requisites for further improving the system of planning and economic stimulation.

In the process of exploration some enterprises have chosen such a variant of forming economic stimulation funds as direct allotments from the mass of profit instead of setting them up depending on the growth rates of sales or profit. Notwithstanding its essential shortcomings this method can be more effective in a number of sectors than the

usual way of forming these funds. Perhaps it is advisable to study in detail the possibility of applying this method in a number of sectors (to make preliminary calculations, study the effect exerted by the growth of the mass of profit on the size of allotments both to the budget and to the economic stimulation fund, depending on the distinctions of some or other sectors or groups of enterprises, and so on).

Apparently realities will also dictate the use of other methods of forming economic stimulation funds and the exploration and improvement of other elements of the new system.

The further development of the economic reform largely hinges on the further improvement of planning, the conversion of the five-year plan into a working programme of each enterprise, with assignments broken down by the years of the five-year period.

Alongside this, it is necessary to elaborate in good time, approve and pass down to the enterprises the long-term normatives of allotments from profit to the economic stimulation funds up to 1975, as envisaged in the Directives of the 24th Party Congress.

Further improvement of the plan indicators, especially in physical terms, is a big problem in advancing the economic reform.

Of great importance will be the establishment of a scientifically-based group nomenclature of output for the purpose of reducing the number of plan indicators and ensuring the real possibility of replacing the wide nomenclature of the plan by contract relations, with the state planning an aggregated nomenclature.

Alongside this, the system of normative indicators (normative of allotments from profit to the budget, normative of wages per ruble of output sold, and others) will be widely utilised in planning.

Planning can also be improved by concentrating in ministries the planning of their internal turnover by widely introducing computers for these purposes.

A solution of these problems will make it possible to cope with the *task of stimulating technological progress and raising, on this basis, labour productivity*. Definite positive results were achieved in the past period, but the need substantially to enhance the efficiency of production demands

the acceleration of technological progress and the constant growth of labour productivity.

The transfer of entire sectors of industry to the new system puts forth the problem of the sale of output; sectoral management agencies will have to supervise it and be responsible for it to the ministry. This cannot always be done at present because the sale of output is to a certain extent separated from the middle link of management, which leads to adverse phenomena even at the enterprises themselves. For example, factories producing consumer goods should, according to regulations, turn over their output to wholesale trade centres which for a definite remuneration do the work of sending the goods directly from the factories to the consumers. But many wholesale trade centres, subordinated now to trading organisations, instead of serving the consumers and dispatching the goods from the factories, do now only the office work of writing out the orders and numerous shipping documents, shifting all the practical work of packaging and sending the goods onto the consumers.

Of great interest is the elaboration of an effective system for stimulating the expansion and renewal of assortment, the development of new goods and improvement of quality because the system adopted for transferred enterprises does not exert a big influence and does not ensure the necessary improvement of quality and change of assortment.

Enterprises operating under the new conditions receive from higher organisations approved indicators for the growth of labour productivity under their five-year plans. The ministries elaborate measures ensuring a steady rise in labour productivity. Faster growth rates of labour productivity as compared with those of average wages, have been and remain an important law of socialist management and a requisite for the successful advance of the economy.

The initiative of the collectives of enterprises, of economic and planning agencies and scientific organisations, with the constant help by Party, trade union and Komsomol organisations, is of great importance in organising the operation of enterprises under the new conditions. Experience shows that where all these organisations render in good time the necessary support and assistance the enterprises achieve in brief periods a substantial increase in labour productivity and in the economic efficiency of production.

A rise in the efficiency of production will be greatly facilitated by accomplishing the task formulated by the 24th CPSU Congress to reduce the number of managerial links, go over to a 2-3 link set-up and to work out a definite sectoral *system* of management conforming to the nature and scale of production and based on the concentration of production optimal for the present level of the productive forces and hence also on an optimal size of enterprises. The sectoral management system must not have superfluous intermediate links. A minimal number of links makes it possible to ensure the interaction of the entire system and to introduce in each link an automated system securing the normal functioning of the system with a reduced managerial staff.

The creation of such a system demands the solution of a number of problems, namely:

to work out in every sector questions of concentration of production by enlarging enterprises and setting up production associations in the primary link. It is necessary to determine the concrete factories and works which have to be included in such production associations and also the research, designing, technological and other organisations, information and computation centres which have to be incorporated in them;

to elaborate the technico-economic substantiation of the expediency of forming concrete production associations in the primary link;

to draw up plans for organising associations, having in view the need for construction work to specialise production, especially in the technological aspect, expand capacity, concentrate preparatory and auxiliary production and centralise a number of functions;

to enumerate the factories and works to be included in the industrial cost-accounting associations of all-Union importance and also a list of these associations;

to prepare designs of automated systems of sectoral management with a view to encompassing all the sectoral managerial links (primary, intermediate, higher).

Improvement of the sectoral management of production will make it possible to cope more successfully and in brief periods with the tasks of improving planning and enhancing economic stimulation and thus to accomplish the compre-

hensive task of bettering the organisation of production management in the broad sense of the word.

Alongside the creation of such a system (this work is now under way in all ministries) the extension of economic methods of management in sectors will be of great importance. Use is to be made of the experience of the Ministry of Instrument-Making, Means of Automation and Control Systems transferred to the new system in 1970. This ministry has been set in the five-year plan (1971-1975) major assignments for production, building and commissioning of fixed productive assets, profit, deliveries and material and technical supply. The share of profit which remains at the disposal of the ministry and the share to be paid into the budget have been fixed. The five-year plan assignments of the ministry have been broken down by years and are co-ordinated in the established way.

If the ministry organises the work of the subordinate enterprises so that the plan is overfulfilled, the total sum of profit and that envisaged for each year will increase, and hence the share of profit remaining at the disposal of the ministry will rise in accordance with the approved normatives.

This part of the above-plan profit can be used by the ministry at its own discretion, and similarly the entire sum of profit remaining with the ministry may be redistributed (of course, provided all the assignments for the commissioning of productive capacity and output are fulfilled). Profit may not be used for increasing the wages fund and the material incentive funds above the set normative.

The ministry thus is given greater rights in disposing of its resources. At the same time it is responsible for fulfilling the approved plan. If the plan is not fulfilled, the ministry, in addition to sanctions for the non-fulfilment of the output programme, will have to pay into the budget the full sum of the profit envisaged in the five-year plan for the given year, with a respective cut in the share of profit left at its disposal.

If the plan of the current year, raised by the ministry in setting the target, is not fulfilled but the level envisaged in the five-year plan for the given year is exceeded, the ministry receives its share of profit in accordance with the fixed normative. This system reinforces centralised planning of a

sector; the assignments of the centralised five-year plan for all the sections and major indicators are concretised by the ministry by the years of the five-year plan and dovetailed by the USSR Gosplan into the tasks and indicators of the national economic plan.

At the same time the ministry gains the opportunity, within the bounds of the set plan, to manoeuvre with resources, display initiative and take operational measures to raise labour productivity, reduce inputs and enhance the efficiency of production.

Study, generalisation and use of the positive features of the experience accumulated in implementing the economic reform and elimination of the disclosed shortcomings will make it possible to raise the efficiency of production in industry as a whole.

The 24th CPSU Congress noted the positive effect of the economic reform on the country's economic development and charted ways for further improving management, planning and economic stimulation and increasing their impact on the acceleration of scientific and technological progress and rise in the efficiency of social production.

## CHAPTER 9

### THE ECONOMIC REFORM AND THE DEVELOPMENT OF SOCIALIST EMULATION

The economic reform now under way in the Soviet Union affects not only fundamental questions of the further development of the economy and its management, but also many sides of improving production relations; it makes higher demands on the nature and content of human activity in all spheres of social life, on the level of consciousness and organisation of people. It also introduces much that is new in socialist emulation and creates new conditions for the stimulation of the working people's initiative and creative activity.

Socialist emulation represents a form of co-operation of people in production which is inherent in socialist relations based on the unity of the fundamental interests of the producers.

The reform closely links emulation with cost accounting, it prompts the participants in emulation to delve more deeply into the efficiency of production and improvement of the qualitative performance indicators. The mechanism of material and moral stimulation is becoming more effective in the new conditions. In view of reorganisation of management on the sectoral principle, new forms of emulation are being developed. Such an interconnection is determined by the very nature of socialist emulation which is above all an economic phenomenon.

#### 1. Socio-Economic Essence of Socialist Emulation

Socialist emulation is a powerful instrument for stimulating the labour initiative of the masses, for enlisting them in productive activity. Lenin saw in it gigantic

possibilities for directing the working people onto the road of new economic construction, new labour discipline and new organisation of labour.

The socialist conditions of production, eliminating the possibility of exploitation of man by man, radically alter the position of the workingman in production and his attitude to labour.

The purpose of socialism is to organise in a planned way the social production process in order to ensure the well-being and all-round development of all members of society. Hence it is understandable that the working people are vitally interested in constantly expanding production: they themselves enjoy the fruits of their labour. The more efficiently the economy develops, the higher the living standard of the people. Here the economic interests of the whole people turn into the motive force of the development of social production, and the unity of the social and personal interests of the workingmen is ensured in the main. It is on the grounds of the unity of the basic interests that relations of comradesly co-operation and mutual assistance develop and gain in strength. They serve as an objective basis for organising emulation, determine the possibility for the truly massive display of initiative and creative endeavour by the people aimed at the development and improvement of production and the growth of labour productivity.

It is this aspect that Engels had in view when he wrote that the "benefits which communist organisation offers through the utilisation of wasted labour power are not yet the most important. The greatest saving of labour power lies in the fusing of the individual powers into social collective power and in the kind of establishment which is based on this concentration of powers hitherto opposed to one another."<sup>1</sup> That is why the boundaries of the productive power which the working people develop under socialism as the social labour power are gigantically extended as compared with capitalism. It is characteristic of socialism that the workers are interested in the labour process, in their machines, in the factory, in their comrades on the job. This is displayed to an ever greater extent the more improved socialist production relations become.

<sup>1</sup> Marx/Engels, *Werke*, Bd. 2, Dietz Verlag, Berlin, S. 545.

The entire operation of the economy in the USSR shows that the activity of the masses is an objectively determined phenomenon upon which depends not only the degree of awareness, but also the practical application of economic laws. The method of stimulating the labour activity of the masses inherent only in socialism finds expression in socialist emulation.

A growth of labour productivity and a most rational and efficient use of the means of production and working time are a natural result of emulation. That is why Lenin attached special importance to the organisation of emulation in the economic sphere.<sup>1</sup> He saw the aims of this emulation in the steady rise of the organisation, discipline and productivity of labour, in the transition to more up-to-date machinery, to the saving of labour and goods and the gradual reduction of the working day.

It goes without saying that economic relations do not exhaust and do not characterise all the functions of socialist emulation. The latter represents a phenomenon that is not only of an economic but also of a general sociological nature and performs social and educative functions. The essence of its social function consists in that it is a form of enlisting the working people in managing production. The place of the working people in production and management is radically changed under socialism. It is impossible to imagine the management of a socialist enterprise, one of whose tasks is to develop the socialist mutual assistance and education of workers and other employees in the spirit of communist consciousness, without social forms of influence, without the initiative and the participation of the masses themselves. A socialist enterprise is not a simple production and technological combination of the workers and the means of production. It is a collective of workingmen who voluntarily pool their efforts and creative abilities to develop socialist production, i.e., production designed to benefit the entire society. Its activity organically includes such a method of influence as socialist emulation. This follows from the collectivist nature of socialist production. Management of production becomes a matter for the entire society, for all the working people. That is why socialist emulation plays a big part in

<sup>1</sup> V. I. Lenin, *Collected Works*, Vol. 27, p. 259.

its improvement. The 16th Conference of the Communist Party of the Soviet Union pointed out that "emulation must result in the reconstruction of the forms and methods of work of our mass and state organisations, in the first place of the trade unions and economic agencies, facilitating the wide enlistment of the masses in managing the economy".<sup>1</sup>

Emulation is the means which enables the working people to develop a sense of being master of production, of a person responsible for the common success. Facilitating a rise in labour productivity, it simultaneously achieves important tasks of communist ethics: it educates people on the best examples and models of serving the social interests and helps to root the rules of communist morality.

The moral functions of emulation, consequently, consist in educating and stimulating the self-education of people in the spirit of comradely co-operation. In the course of socialist emulation there are developed feelings of comradeship and mutual assistance, a striving to exchange experience and knowledge and a rational attitude to the use of reserves. The spirit of individualism or selfishness is alien to socialist emulation.

The possibilities of developing socialist emulation are inherent in the socialist system but they are not realised automatically. Tremendous organisational work of Party, trade union and economic organisations is required for their all-round utilisation. Lenin repeatedly stressed that favourable objective conditions are not enough for the development of emulation. What is important is ably to utilise these conditions and to organise emulation in a real way. The organisation of emulation on a socialist basis, he wrote, "should be one of the most important and rewarding tasks in the reorganisation of society".<sup>2</sup>

At all stages of socialist construction in the USSR the Communist Party encouraged in every way various forms of the initiative and activity of the masses and tried to raise the level of guiding socialist emulation.

As Soviet society advanced, more forms of socialist emulation were developed, and this movement became more massive and effective. The Eighth Five-Year Plan (1966-1970).

<sup>1</sup> *KPSS v rezolyutsiyakh...*, Part II, p. 618.

<sup>2</sup> V. I. Lenin, *Collected Works*, Vol. 27, p. 207.

as L. I. Brezhnev pointed out in the Report of the Central Committee of the CPSU to the 24th Congress, provided much that was new in this respect. Labour emulation assumed a truly all-out scope. The Communist Party, guided by the Leninist principles, is constantly striving to raise the role of socialist emulation in communist construction. A fresh striking manifestation of this concern is the decision of the Central Committee of the CPSU on the Further Improvement of the Organisation of Socialist Emulation. This document creatively develops the Leninist ideas of socialist emulation, sums up the rich experience of organising it in the USSR and draws important theoretical and practical conclusions which make it possible greatly to raise the efficacy of emulation in the new conditions. And to raise its efficacy means to intensify the process of consolidating and developing the productive forces and socialist social relations. Experience shows that every essential change in the productive forces brings into being new forms and ways of organising emulation, introduces changes into its content.

## 2. New Conditions for the Development of Socialist Emulation

The new system of planning, management and economic stimulation presupposes an enhancement of the role of economic stimuli in socialist production and of economic methods in management. It also presupposes a correct combination of material and moral stimuli, the development of emulation, stimulation of the initiative and constructive activity of production collectives and every worker and enhancement of their interest in, and responsibility for, observing the interests of the entire people.

The mechanism of the reform creates objective conditions for the further spread of socialist emulation and essential changes in its content, forms and methods of organisation. The granting to industrial enterprises and building organisations of greater independence in economic and productive activity is accompanied by the democratisation of management and the wide enlistment of the masses in it. Collectives gained the opportunity, without waiting for approval from above, effectively to decide many questions of developing production, improving their working and living conditions.

This releases the initiative of economic executives, of mass organisations and the collectives, compels them to manage things efficiently, economically, to display ingenuity and constructive effort in finding production reserves. Naturally, all this, given a competent approach to the matter, favourably affects socialist emulation and makes possible to organise it more flexibly and concretely. Today, as a rule, the undertaking of pledges and the conclusion of socialist emulation agreements are preceded by the exploration of reserves and precise economic calculations.

The attained level of production, available reserves and the five-year plan assignments form the initial basis for drawing up pledges. The economic substantiation of the pledges presupposes higher responsibility for drawing them up on the part of both the rank-and-file workers and executives at all levels. This enhances the democratic nature of emulation. The pledges become a genuine expression of the initiative and experience of the collectives and individual workingmen. The potentialities inherent in the pledges are increasingly reflected in current and five-year plans.

An analysis of production reserves is an important but not the only characteristic feature of emulation in the new conditions. Another of its distinctions is that it is oriented on raising the efficiency of social production and improving the qualitative performance indicators.

The Soviet economy has now entered a stage when a rise in the efficiency of social production, improvement in the qualitative performance indicators of all sectors on the basis of the latest achievements of science and technology, are increasingly becoming the main source of its growth. In these conditions fundamental questions of introducing new equipment and progressive production methods, modernisation of equipment and mechanisation of production advance to the fore. They essentially affect the content and forms of emulation. First, the content of emulation itself and the nature of its organisation are called upon to create in each production and scientific collective a climate of all-out creative exploration, intolerance for technical and scientific conservatism and stagnation. Second, the efforts of all emulation participants are now above all concentrated on reducing the period of developing and introducing new technology and progressive production methods, on the efficient reconstruction of operat-

ing enterprises, the accelerated designing and commissioning of new capacities, utmost rationalisation of production, its comprehensive mechanisation and automation and improvement of the organisation of labour and production. It is on this that the efficacy of emulation and its impact on production depend in the first place. That is why the Central Committee of the CPSU in its decision on the Further Improvement of the Organisation of Socialist Emulation emphasised the need for the utmost stimulation of the activity of the working people in accelerating scientific and technological progress.

Determining the content of socialist emulation pledges, agreements, and the personal and collective plans of raising labour productivity, the personnel of enterprises and scientific organisations strive to design articles which for their technico-economic parameters exceed the best Soviet and world standards, considerably to reduce the periods of the development, manufacture and introduction of new goods and steeply to raise the technical level and quality of their output.

The influence of scientific and technological progress on the content of emulation is also expressed in that scientists and engineering and technical personnel play a bigger part in the organisation of emulation. Emulation without the participation of the staff of research and designing institutes, designing offices and laboratories, without the participation of engineers and economists cannot be effective because in that case one of its main aims would not be achieved, namely, the attainment of steadfast scientific and technological progress. Technological progress concerns literally everyone: a worker, collective farmer, scientist, engineer, technician or office employee. Hence the great importance of socialist emulation assuming a mass character.

Every line of production has its specific features in raising its technical level. A study of the experience of the emulation participants shows that the main trends of their efforts in this sphere are, first, an improvement of production methods, introduction of the latest equipment and the scientific organisation of production and labour; second, the setting of justified consumption rates of raw and other materials and electric power, and strict accounting and control of their use; third, rational application of new materials.

The new system of planning and economic stimulation, particularly the evaluation of the activities of enterprises according to the volume of output sold, profit and profitability, has enhanced the interest of their collectives in the efficiency of production and in the elaboration of such conditions of emulation as would provide for better use of productive assets, a rise in the technical level and quality of output.

The economic reform has created serious economic prerequisites for introducing new equipment and has devised a definite system for stimulating the development and application of new plant. But it would be a mistake to assume that the reform as such automatically solves all problems and eliminates difficulties in technically improving and re-equipping production. Acceleration of technological progress depends on the efforts of people, their knowledge, experience and ability to organise the work. Where all these matters are handled competently and persistently the results are considerably higher. The movement for the early fulfilment of the production assignments of the Ninth Five-Year Plan on the basis of comprehensive plans for raising labour productivity at every work place has spread at enterprises of Moscow, Leningrad, Kiev, Minsk, Tbilisi, Riga, Tashkent, Frunze, Novosibirsk, Sverdlovsk and other cities. The fulfilment of these plans ensures a swift growth in labour productivity and the saving of materials and other resources.

Emulation for the planned and comprehensive modernisation of equipment, launched by the collective of the Ivanovo Melange Textile Mills, has been widely taken up. The Party organisation of the Mills has succeeded in drawing a wide range of specialists and workers into this important activity and in establishing contacts with scientists, designers and engineers at allied enterprises and institutions. This is how an efficient programme of renewing equipment has been drawn up and applied. In a brief period, without special investments, labour productivity has risen steeply and output has gone up considerably.

The experience of the Ivanovo Mills has been taken up by many other collectives. As a result many new looms and other machines were installed and thousands of units of equipment were modernised in 1971 in the textile industry of Ivanovo Region.

Many collectives have drawn up, and are coping well with concrete plans for the technical improvement of production. One of them is the Gorky Television Factory. Its collective has elaborated a plan for transferring to conveyor mechanised lines all articles formerly produced serially, for introducing progressive production processes and applying a whole complex of measures to eliminate arduous manual labour.

The personnel energetically tackled the reconstruction of shops so as to bring them in line with present-day demands as regards working conditions, industrial aesthetics, and so on; much is being done to improve the housing conditions and the social and cultural facilities available to the workers.

Highly valuable is the initiative of industrial enterprises in Rostov-on-Don which launched an emulation under the slogan: "Through the technical re-equipment of production and the cultural and technical advance of the workers to higher labour productivity". The working people of Lenin District have decided to carry out comprehensive plans for the technical re-equipment of 40 factories by 1975. Party organisations urge collectives to strive for being the best in their ministry or department. The achievement of this aim is facilitated by the movement of the workers for high efficiency of production. Every collective is working to win the title of a factory of high production efficiency.

The efforts of collectives aimed at introducing new equipment and production methods are also reflected in other forms of emulation. One of them is public reviews, designed to bring to light and utilise internal production potentialities, and inspection of the technical level of machines, instruments and other equipment. In the course of these reviews the technical level of the produced goods is widely and competently discussed, unutilised reserves are disclosed and measures are elaborated to improve production methods and master technological achievements and advanced experience. At many enterprises the overwhelming majority of workers, engineers and technicians are energetically seeking to improve production methods and equipment and raise the efficiency of production.

The present stage of emulation, more than ever before, is marked by the effort to improve the quality of goods, beginning with the stage of designing and the production methods

and ending with the work places in the shops. Hence it is natural that problems of the quality of output increasingly infuse socialist emulation and are reflected in all its forms. Specifically, this is expressed in introducing the system of producing goods without any spoilage, and acceptance by inspectors at the first delivery. This movement is based on the personal responsibility of everyone who participates in the production cycle, beginning with the designer who presents the blueprints, the processing engineer who charts the production method, the foreman who organises the work, and ending with the operator who produces a definite part. The introduction of this system has demanded of mass organisations and economic executives an improvement of educational work, a rise in the skill of engineers, technicians and workers and an improvement in the organisation of production and labour. Responsibility for the quality of goods is borne not only by the personnel of the technical inspection departments, as was the case in the past, but also by the workers, foremen, and shop superintendents themselves.

A state system of quality certification of goods is developing alongside the introduction of new methods of management. The USSR Council of Ministers has introduced a system of certification of quality at enterprises operating under the new system of planning and economic stimulation. Goods of the highest quality receive a special mark. For goods awarded this mark an enterprise gets an addition to the wholesale price which enables it to compensate for the additional expenditure involved in improving quality and also to increase the share of profit allotted for rewarding the best workers and engineers. A quality mark is also given to important lot-produced goods which for their properties exceed the demands of state standards and conform to the finest world models.

The effort to improve quality also requires more active participation of designers in emulation. The results in this sphere largely depend on their knowledge, experience and attitude to their work. It is necessary to consolidate the ties of designers with the personnel of factories and construction sites, to get designers to participate in industrial tests and the setting up of equipment.

In present conditions socialist emulation is called upon, to a much greater extent than before, to promote progressive

forms of scientific labour organisation. First, a scientific approach to production management, including the organisation of emulation, is inconceivable without the rational organisation of labour. Only on this basis is it possible to utilise successfully production reserves and to stimulate the initiative and activity of the collective. Shortcomings in the organisation of production, poor working conditions, rush work, idle time and overtime work cannot facilitate socialist emulation.

Second, this is also connected with the fact that at many enterprises the organisation of labour and production lags behind their technical level. This is displayed specifically in that the technical facilities of labour outstrip its productivity. The task is to eliminate this lag in the shortest possible time. Under the current five-year plan (1971-1975) labour productivity in industry is to rise by 36-40 per cent. Most of the planned increase is to come as a result of improving the organisation of labour and production, which puts these problems among the paramount economic and political tasks. A big part in their accomplishment can and should be played by socialist emulation for the introduction of scientific labour organisation.

Third, the development of emulation for the scientific organisation of labour is dictated by the principles of the economic reform themselves. The new conditions of planning and economic stimulation are now becoming an important source for raising the efficiency of labour and its proper organisation, for the display of initiative and the constructive efforts of the working people in production.

The main trends of emulation for the introduction of scientific labour organisation are: a) search for rational forms for the division and co-operation of labour, b) improvement of organisation and servicing of work places, c) study and spread of advanced ways and methods of work, d) training and advanced training of personnel, e) improvement of the conditions and the rating of labour, f) education of factory and office workers in the spirit of observing state and labour discipline.

More consistent combination of all forms of material incentives and the elaboration of an integral system of incentives, play an important part in the development of socialist emulation. This system of incentives organically combines

material and moral stimuli. At the socialist stage of the development of Soviet society preference must not be given to one or the other stimuli. Only when they are ably combined do they become a powerful motive force of communist construction.

The economic reform makes it possible more rationally to combine the interests of society, a collective, and individual workers and thereby raises the interest of every working-man in the results of his labour, in bringing to light and utilising production reserves.

It makes payment for work more directly dependent on the activity of an enterprise, links more closely the personal interests with the collective interests of all the workers of an enterprise and enhances the importance of these interests not only in the material but also the moral stimulation of labour. The better an enterprise operates (the more profit it makes, the bigger the volume of goods sold and the higher the level of profitability), the more possibilities there are for finding resources to raise the earnings of factory and office workers.

Material and moral encouragement is becoming more objective and justified. Thanks to this, people are able to understand more clearly and correctly the need for the unity of personal and social interests, their responsibility for the labour honour of the collective. While formerly the main guidepost for the participants in emulation was the overfulfilment of the plan for gross output, now collectives strive to fulfil the assignments for the sale of goods and the profitability of production, show concern for the rhythmic operation of the enterprise, for raising labour productivity and improving the quality of output.

Every worker is beginning to understand more deeply that the results of the labour of the entire collective and, consequently, the total size of the material incentive fund and the share which he can receive from it directly depend on his personal effort, attitude to labour and social property, on his concern for production. The more productively everyone works on his job, the more economically he uses raw and other materials and the more persistently he strives to improve the quality of output, the more successfully the entire collective works and, consequently, the enterprise receives greater resources for increasing labour remuneration.

A material reward is one of the main stimuli to activity. Nevertheless it would be wrong to absolutise this form of incentive. A rational system of incentives can be developed only by combining material and moral stimuli.

The existence of moral stimuli signifies a deep change in the social consciousness of people. By changing their living conditions people also change themselves, their consciousness. Awareness of the social significance of his work, devotion to the ideals of communism and energetic participation in social activity are inherent in a member of socialist society. These traits are developed not only as a result of economic measures but also with the help of ideological activity and all the measures designed to improve the relations of production. Under socialism, ideological and educational work becomes a major factor of economic development. The degree of fulfilment of production plans directly depends on the will, readiness and ability of the working people to cope with the economic tasks facing them. In present-day conditions greater attention is paid to moral stimuli, to the strengthening of labour discipline and the fostering of an attitude to work as a patriotic duty. Wide and regular publicity as to who participates in the emulation, what aims they want to achieve, how they live up to their pledges, who is in the lead and who lags behind, is an indispensable condition in the organisation of socialist emulation.

The system of public encouragement and glorifying of labour, the honour and respect accorded to front-rankers in production have greatly helped to enhance the spirit of emulation and to foster in people a conscious attitude to work. An individual or a collective engages in emulation with other individuals or collectives. To be the winner in emulation they must always know the results of others and how they were attained. Only wide publicity makes it possible to popularise and introduce the best experience.

The most diverse forms of publicity have been devised in the course of emulation. These are boards where the results are posted and "flashes" (published as part of the wall newspapers), radio newspapers, illuminated diagrams and many other sources of information. Well-conceived and ably organised publicity helps to make people interested in the results of emulation and stimulates initiative and organisation.

At the Urals Chemical Machinery Works every employee daily knows not only what has to be done, but also the results of the work by the entire collective, what the rhythm of output in different shops is, which groups are in the lead and which lag behind, and what are the qualitative performance indicators. Such information plays a big part in attaining achievements by the personnel, helps stimulate the constructive enthusiasm and striving to bring to light and utilise production reserves.

### **3. Forms and Methods of Organising Socialist Emulation**

The forms and methods of organising socialist emulation cannot be chosen arbitrarily. These forms are determined by the nature of the socio-economic system, of the social, above all economic relations. The effective organisation of socialist emulation presupposes a whole system of methods and forms of stimulating the initiative of the masses.

Of major importance among them are agreements, bilateral obligations between individual workers and between collectives. The essence of emulation is displayed in them most strikingly, namely, a feeling of contest, a striving to be ahead, to achieve better results. The agreements stipulate concrete tasks designed to raise labour productivity, swiftly to bring up production to the rated capacity, improve the quality of goods, introduce the best experience and raise the general educational, technical and cultural level of the participants.

The agreements help to make emulation more concrete and effective, to avoid formal elements and organise mutual control in a business-like way. For example, the Moscow Sickle and Hammer Steel Works and the Volgograd Red October Works have concluded an emulation agreement which provides for a reciprocal check of the results of the emulation, joint technical conferences, seminars and an exchange of technical documentation, letters and newspapers. This enables the personnel of both works swiftly to notice and introduce everything new and progressive.

Concrete agreements enable the participants attentively to

follow the course of the emulation, to compare the results and precisely determine the winners.

In some enterprises they assume the form of personal and team plans for raising labour productivity. At the Gorky Motor Works such plans are drawn up by most of the workers. The plans usually contain definite figures of an increase in output, saving of materials and tools, a reduction of losses from spoilage, the obligation to pass on experience, acquire greater technical knowledge and participate in rationalisation and social activity. These plans, on the one hand, reflect the obligations assumed by a worker or a team as regards: a) fulfilment of norms, improvement of the quality of output, reduction of losses from spoilage, rationalisation and a rise in the efficiency of production, b) improvement of skill, passing on of experience and mastery of the methods of innovators, c) saving of materials, tools and power. On the other hand, they contain proposals (organisational and technical) which the worker or the team considers necessary for the successful fulfilment of the plan. The two sides participating in emulation conclude an agreement. The factory and shop trade union committees control its fulfilment by both sides and, if necessary, render help.

These plans are an effective form of a conscious and constructive approach by the workers to their job and the display of initiative. What is important is that the plans be controlled by mass organisations, and that the carrying out by the management of organisational and technical proposals be checked.

In the USSR socialist emulation is organised on the scale of the entire national economy, its sectors and at every enterprise. In conditions of social ownership the working people interact in the course of labour both in one and the same production process and also within the bounds of entire state and co-operative property. The working people employed at socialist enterprises, regardless of where and what they produce, are bound by the unity of aim expressed in the single state plan obligatory for all. The concretisation of the plan as regards its parts creates a definite system of interconnections between separate links. This system ensures interaction in the work of many thousands of people and the possibility of emulation between them. Without detracting from the significance of different forms of emulation within

and between sectors, it should be stressed that the production collective forms its basis.

Socialist enterprises are the primary units of production co-operation. Here people are directly linked by the unity of both the common aim and the concrete production tasks. Being in definite relations with each other and with the collective as a whole, they best of all can display their labour energy, their possibilities. The spirit of contest, the desire to vie in skill, dexterity and resourcefulness can best of all be fostered at an enterprise, within a collective.

The economic reform and the introduction of the sectoral principle of managing industry have created favourable conditions for concrete emulation between enterprises in the same sector. Unity of production management and technological and economic policy in every sector makes for the swift and competent solution of questions linked with the application of everything valuable produced in a collective and for the extensive spread of emulation.

The organisation of emulation is a task of state importance. The level and scale of socialist emulation depend on how this task is accomplished by economic executives in all links of an enterprise and the state apparatus.

The new management system, for example, makes it possible to solve more correctly the problems of comparing the results of work by collectives. But this demands thorough and painstaking work. Only by deeply analysing all the conditions in which a collective works is it possible correctly to evaluate its activity and to avoid errors in summing up the results of emulation. The rewarding of a collective without sufficient grounds, far from stimulating, impedes socialist emulation. The elaboration of the best criteria for comparing the results decisively depends on economic agencies and boards.

The role of Party and other mass organisations in the development of socialist emulation rises in present-day conditions. Experience shows that where organisational and political work is conducted purposefully and is designed to bring to light and utilise production reserves and stimulate the activity of the masses, emulation is really effective and produces results. In such cases, formal elements in its organisation are usually ruled out, emulation is purposeful, the obligations and agreements are economically well grounded

and mutual assistance and control of their fulfilment are ensured. The level of ideological and educational work greatly influences socialist emulation.

The Soviet citizen treasures the ideals of communism, the principles of socialist patriotism and proletarian internationalism. He is irreconcilable towards violations of social interests and of humane relations between people. These moral traits play an important part in labour activity. It is in the attitude to work that all the facets of the character and spiritual world of man, the level of his consciousness and culture and vocational skill, are displayed.

To foster in every worker a highly conscious attitude to labour means to develop readiness and a desire to work well not because someone is driving him on, and not only because his earnings depend on it, but by virtue of high consciousness and moral duty to the collective, to all of society. Such an attitude to labour develops a creative, innovatory approach to the job, helps to turn labour into genuinely creative activity which spiritually regenerates people, enhances the professional interest in the content of labour, pride in one's work, in one's collective and a striving to raise one's professional skill and cultural level.

A collective exercises a great educative influence on its members. It happens at times that people have all the objective conditions for coping with their production tasks and nevertheless the collective cannot attain the results it wants. This means that due responsibility, discipline and a conscientious attitude to work are lacking there. And, conversely, if an atmosphere that makes everyone interested in the work of the team, shop or factory is created, and a feeling of pride in, and responsibility for, the common affairs and the honour of the collective is fostered, the collective attains achievements on the job. People wholeheartedly rejoice in the successes of their fellow-workers, severely denounce dishonest and lazy persons, exchange production know-how and take up at meetings questions related to improving production. Hence the great responsibility of a collective, mass organisations and management for shaping collectivist relations, for fostering a conscious attitude to labour.

Education on the best examples of work, on examples of a conscientious attitude to the job, is an important trend in labour education. A collective always has men who set

models of high skill and awareness of their social duty. The entire collective should try to emulate them. Of course, the impact of a positive example is not a spontaneous act; a great deal depends on the organisational, ideological and educational work of Party organisations and economic bodies.

The present economic reform creates the conditions for further advancing ideological and educational work. It promotes the improvement of democratic methods of management. Under its influence definite changes are taking place in the moral and political atmosphere in production collectives. The masses, independently searching ways and methods of solving concrete problems, learn to display socialist enterprise, initiative and a constructive approach. The new system of planning and economic stimulation also makes it possible to assess more precisely the contribution of every collective to social production, deeper to analyse its successes and shortcomings. This creates conditions for introducing greater clarity and concreteness in ideological and educational work, co-ordinating it more closely with economic problems, cost accounting and the organisation of socialist emulation.

Socialist emulation is inconceivable without firm labour discipline and organisation and the strictest order in a shop, factory, construction site, collective farm or state farm. Extension of the independence of enterprises, greater complexity of economic relations and the drawing of the masses into struggle for the fulfilment of production plans—all this promotes the further consolidation of labour organisation and discipline. Every violation of discipline, non-fulfilment of an economic contract and absenteeism spell losses for the collective, the state, for all of society.

The collectives of working people, their mass organisations have the decisive word in strengthening discipline. A high level of consciousness and discipline is ensured if a principled attitude exists in a collective, if no violation remains unnoticed and a harmonious and flexible system of educative and administrative measures is applied designed to foster an irreconcilable attitude to any slipshod work.

The consolidation of labour discipline is inseparably linked with rational labour organisation. Mere verbal condemnation of slackers and slovenly workers by itself does not solve the problem. What is needed is precise organisation.

The fostering of a conscious attitude to labour presupposes the strict observance of the principles of socialist labour organisation and struggle against any violation of discipline. Proper combination of persuasion and compulsion, of ideological and educational work with administrative measures is a true way for further consolidating labour discipline.

The movement for communist labour is one of the important means of communist education in present-day conditions. The rise and extensive spread of this movement is a result of the great development of the productive forces and advance of the consciousness and the cultural and technical level of the working people. The movement for communist labour is a practical expression of the striving of advanced Soviet people actively to participate in accomplishing the tasks put forward by the Communist Party.

Indeed, communist labour is labour of the highest productivity, labour provided with the latest machinery and of the highest organisation, constructive and conscious labour for the common good without expectation of reward, labour as a prime vital requirement. The road to such labour is not easy. As the building of communism spreads, the aim is to make a conscious, communist attitude to labour the standard among the mass of the working people. At the socialist stage of society's development a communist attitude to labour does not yet imply labour performed without expectation of a reward and is not always labour of the highest productivity, but it must be distinguished by a creative, innovatory approach to the job, by constant exploration of ways for raising labour productivity, improving the quality of goods and reducing costs. Great concern for the growth of labour productivity and search of ways for accomplishing this task are characteristic of the participants in this movement. To make their attitude to labour the standard of behaviour for the majority is the paramount task. The movement for communist labour is a school of communist education, a specific laboratory where the traits of the new man are moulded.

In the new conditions the role of socialist emulation in stimulating the initiative of the people, in successfully carrying out the sweeping tasks of economic development and moulding the new man will further rise.

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