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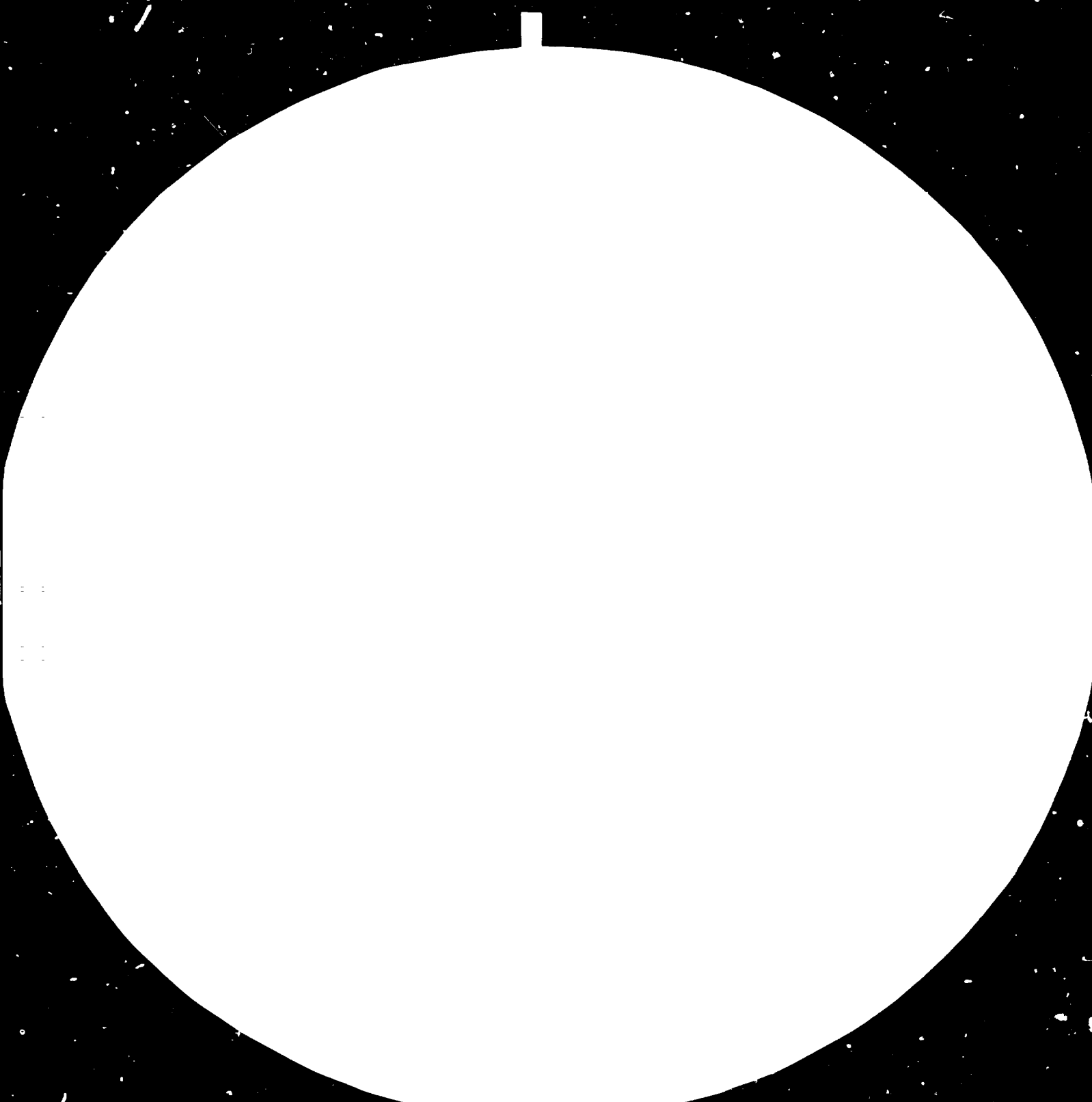
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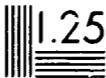
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DEVELOPMENT OF THE
CAPITAL GOODS INDUSTRY IN POLAND *

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I. Structural analysis of the national economy
in Poland, in 1945.

1. The state of national economy in Poland in the
pre-war period /up till 1939/.

Pre-war Poland was characterised by general industrial underdevelopment with distinct periodical tendencies to stagnation or even recession.

Poland was an agricultural-industrial country with high predominance of agriculture, which - generally speaking - was in itself very old - fashioned.

The level of development of industry in pre-war Poland featured above all low participation of industry in the gross national product /GNP/.

This is characterized by /among others/ the structure of population in respect of the main source of subsistence, which - in 1930 - was as follows:

- population dependent on agriculture 60%
- population dependent on other sources than agriculture 40% including:
 - population dependent on industry and trades 12.8%

In order to characterize the level of industry by the end of the 1919-1939 period, one may quote the indices of production of the basic industrial commodities per person in Poland and in some other countries, in 1937.

Production volume of commodities of more
significance, in 1937

Commodity	Unit of measure	Poland	Czecho slo- vakia	Italy	France	U.S.A.
Hard coal	kg	1054	1155	-	1076	3476
Raw steel	kg	43	162	49	192	398
Sulphuric acid	kg	5.3	12	24	31	46
Cement	kg	38	89	100	104	156
Cotton yarn	kg	2.3	6.7	3.3	6.1	-
Electric energy	kWh	105	285	362	485	1136

One can thus see that there was a considerable gap between the level of pre-war Poland and that of the highly - industrialized countries /U.S.A. , France/, as well as in countries of a more similar state of development /Italy, Czechoslovakia/.

In respect of industrial production per person in 1938, Poland ranked 17 in Europe.

The development of the Polish industry production featured the fact that during the 20-year interwar period, the country did not manage to reach the industrial production level which existed before World War I /i.e. before 1914/. The 1929-1933 great economic depression was experienced in the country with particular severity. In comparison to other countries it lasted longer and resulted in a very considerable drop in industrial production.

The table below shows the growth trend of Polish industry as against the world-wide industrial growth trend for the period 1926-1938 /year 1928 represents 100/.

Specifi- cation	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
world-wide production	89	95	100	106	94	84	74	83	91	102	118	127	119
Poland	71	88	100	102	90	78	63	70	79	85	94	111	119

As follows from the above, Polish industry in the inter-war period failed to create a basis for a dynamic development of national economy.

A more prominent role in the world-wide scale played only the mining industry with regard to:

- hard coal /placed 7th/
- zinc /placed 5th/
- salt /placed 10th/

and also with regard to the processing industry:

- potash salt industry /placed 4th/
- sulphuric acid industry /placed 8th/

2. Analysis of the means at our disposal after 1945

During the 1939-1945 war Polish industry suffered tremendous losses. The war destructions were estimated at 1/3 of the pre-war possessions.

Particularly heavy losses were sustained in the engineering, electric and chemical industries.

Such tremendous losses in material and personnel extensively complicated the reconstruction of the country.

During the war and occupation, more than 6 million people lost their lives and more than 2 million became invalids, unfit for active work.

It should be pointed out that the losses concerned mainly those people who possessed highest qualifications and the young.

In this situation, Poland made a start from a very unfavourable and low level. For there were no basic conditions /or even if there were, their level was insufficient/ which could serve the social and economic development of the country, such as:

- a/ industry manufacturing PRODUCTION GOODS
/investment goods/
- b/ developed manufacturing technology
- c/ skilled and experienced staff

The human and material losses influenced early post-war years which had to be devoted to the reconstruction of the country.

No sooner than after 5 years, i.e. after the completion of reconstruction of the basic war damages, it was possible to embark on a speeded-up social and economic development.

2.1. Labour force

In the years of reconstruction /1946-1950/, the average annual growth of population in the working age reached in some years 300.000 people. Later, that growth was systematically falling down till 1962, whereas in the years 1956-1962 it amounted to an average of just about 73.000 people per year.

This situation gave rise to an employment policy directed first of all to transformation of the social and occupational make-up of the population. The main point was to release the great reserves of human labour out in the country and organize on a large scale migration to towns, where at the same time intensification of the urbanization processes required a great effort to accept and employ an additional number of people and create for them a possibility to find employment and living conditions. General advance and modernization of the economy required people with better and better vocational qualifications.

The reform of the education system and the extension of the network of schools of various types, with a special emphasis on the vocational education, enabled the introduction of great changes in the qualification make-up.

The educational level of the employees was rising, as each year about 300.000 to 600.000 school

leavers /who came from schools of various levels/ took up work.

2.2. Raw materials and other materials

When Poland began its reconstruction, the only materials available in sufficient quantities on its territory were hard coal and brown coal, which provided fairly large possibilities in the field of energy supplies, and rocksalt which to a certain extent was going to the chemical industry.

As for metal raw-materials, our own beds of iron, zinc and copper ores were negligible while aluminium ores were non-existent. The production of raw steel, zinc and lead immediately after the war reached the level of about 0.5% of the world-wide production, whereas the production of copper and aluminium did not exist at all.

Being a country with a large share of agriculture, Poland had at its disposal fairly considerable resources of textile raw materials /except cotton/ and sufficient timber resources.

However, there was an acute shortage of materials coming from chemical processing.

2.3. Energy

The energy raw-materials resources /coal/ as well as the level of output and production of electrical energy following the reconstruction period were sufficient to undertake far-reaching development plans.

2.4. Industrial potential

By the end of World War II, industrial plants in the whole of Poland were either destroyed or to a large extent stripped of equipment. Besides, there was a shortage of suitably prepared and

skilled personnel.

That potential could only have been a sort of preliminary base for the implementation of multi-directional development plans.

2.5. Technological and constructional base

Apart from the weakness of the production potential, Polish engineering was characterized by a long tradition. Even before World War I, fairly well developed were the coal mining, textile, clothing and food industries as well as some sectors of the engineering industry. During the inter-war period, these traditions were further strengthened and and besides, production was then launched in the electrical, radio, motor, aircraft, chemical and metallurgical industries. On a fairly large scale was developed also the armaments industry.

In this industry worked Polish constructors and production engineers - who despite severe losses - constituted in 1945 a considerable source of knowledge and experience, which could have been utilized for the direct management of the commenced production as well as for the training purposes.

Some of the achievements attributed to Polish engineering before the last war were considerable on the European scale and the production technologies used were modern for that time.

There were however too few of them in view of the magnitude of the development tasks which were to be faced.

II. System conditions and the system of planning
the national economy in Poland

1. The system of planning

Two fundamental transformations having a character of revolution in the social and economic relations determined the conditions of economic activities in Poland since 1944:

- the land reform
- the nationalization of industry and remaining sectors of national economy.

The new economic model based on the structure shaped as a result of the land reform and general nationalization imposed the necessity of planning.

The planning system was shaped gradually, adopting for the main task an elaboration of nation-wide economic programs on a yearly scale, for five-year periods and finally longrange plans expressing the strategy of development for 10-year periods and longer.

The first long-range economic plan was the Three-Year Plan for the Restoration of the Economy, covering the 1947-1949 period, which - for the main aims - adopted a growth in the contribution by industry and services, development of foreign trade, increase in production of industrial consumer goods, assuming at the same time, that by the end of the period covered by the Plan there would be a shift of priorities towards the production of manufacturing goods i.e. towards the CAPITAL GOODS INDUSTRY.

The Three-Year Plan was successfully implemented, although distinct disproportions appeared in the development of industrial production, which exceeded the pre-war level, and agriculture which did not achieve that level.

The Three-Year Plan was followed by the elaboration

and implementation of a Six-Year Plan /1950-1955/ and then came systematically the next five-year plans.

Gradually, in the system of planned forming of the social and economic development of the country, take shape the three following and parallel elements:

- forecasting activity
- programming activity
- planning activity

2. Elaboration of economic development forecasts as the basis for taking decisions regarding strategic directions for the development of national economy.

The social and economic forecasting of the country's development is concerned with the forecasting of future activity conditions and the construction development concepts of a synthetic character.

The economy-wide forecasting covers a fairly broad range of forecasting work which concerns:

- general trend of the national economy growth
- level of country development
- structural transformations
- natural resources
- water resources
- demographic development
- etc

The purpose of forecasting a general trend of the national economy growth is to determine the probable values of economic indicators. These indicators include the national income produced and the sources /e.g. industry/ which give that income, the national income distributed and the methods of its distribution /accumulation and consumption/.

The forecasts worked-out constitute a basis for moves aiming at the mitigation of the existing disproportions in the development /harmony of development/.

Thus, these forecasts are strictly related to the laying-out of assumptions and orientations of the investing policy in the country and consequently to the determination of the tasks of further development of the economy's material base.

The forecasting research concerning future structural transformations is to reflect the desirable changes in the growth trend of individual sectors in order to ensure such mutual proportions between them as to maintain harmony and complementarity of the development in such conditions which will take place in the future under the influence of advancement in the engineering, organization and costs of social and economic activities and changes in demand preferences.

In comparison with forecasts comprising all the aspects of economy, the forecasts of the development of industry and its product groups, as the so called technical-economic forecasts, have a more detailed character.

Their subject is, first of all the forecasting of the growth trend of industry and individual groups of products manufactured by that industry and also the forecasting of structural transformations in industry as a result of the adopted concept of meeting the demand for the specified product groups in the national economy frame work /selective development of industry/.

There are close ties between the general-economy forecasts /comprising all the aspects of economy/

and those of the development of industry and its product groups.

The general - economy forecasts illustrate the future development of the entire national economy and become the starting point for forecasts concerning the development of industry.

The general - economic forecasts contain certain synthetic indicators featuring the future development of industry /e.g. participation of industry in the creation of national income, extent of total production by industry, etc/ as well as forecasts in the field of future raw-material resources and the possibilities of utilizing same. On the other hand, results of the development of industry and its product groups may cause a verification and complement of the general-economic forecasts.

3. Programming the development of the industry structure

Programming of the industry structure development takes into consideration the influence exerted by various factors on which depends the scale of the desired production effects and corresponding outlays which are indispensable for the implementation of the development intentions. The diversified and variable-in-time character of the factors and the diverse degree of their influence result in a necessity to introduce continuous changes in the structure of industry in a longer period of time.

That is why in the programming works one aims at the tracing out a sketch of the policy in the area of structural changes, to be obtained in a perspective of 5-10 years.

The basic factors that influence the shape of the industry structure are /among others/:

- raw-materials base
- manpower resources and qualifications

- level of engineering and production technology as well as the possibilities of further development of scientific-technological progress
- industry's manufacturing apparatus as shaped in the course of the development obtained hitherto

4. Programming the development of the engineering industry /as the CAPITAL GOODS INDUSTRY/

In such conditions where the basic tendency of the social and economic development in industrialization of the country, the engineering industry /and particularly that part of it which we shall define as the CAPITAL GOODS INDUSTRY/ becomes the factor which governs the rate of development.

That in the case, because the engineering industry is the supplier of equipment for complete plants, machines, appliances, instruments, tools and means of transport for all sectors of the national economy and also due to the fact that the products manufactured by that industry feature the highest degree of processing, thus creating a chance for the most effective utilization of raw-materials and materials. For that reason it is important to have a dynamic development of this industry on an absolute scale and to bring the participation of the engineering industry in industry generally to such a level which has been achieved in more developed countries, such as France, Sweden, U.S.A, Great Britain, etc /see table No 1 entitled "Share of engineering industry in total industrial production of selected countries in 1978"/. At present the engineering industry provides about 30% of the total industry's production. It is expected that this participation will exceed 33% in 1985.

Independently of the above defined development of the engineering industry as a whole, there is a constant

need to improve the development of its internal structure in conformity with the development needs of the national economy.

The national economy is supplied with engineering industry products from the two following sources, i.e.:

- home production
- imports

Obviously, if we want to import engineering industry goods, we must also export goods made at home.

The enclosed table No 2 illustrates:

- a/ Percentage share of exports in the production of engineering industry in Poland and selected countries in 1975,
- b/ Percentage share of imports in total deliveries of engineering products for domestic markets in Poland and selected countries.

It can be seen from the graphs, that the size of the shares /exports as well as imports/ is governed by the size of the country which is the subject of the analysis.

The smaller the country /in respect of population/, the higher shares.

III. Strategy of the national economy development in Poland /with particular regard to the development of capital goods industry/

1. Polish strategy of development

The Polish strategy has determined that industrialization of the country is the main direction of economic policy. Industrialization of a country is a result of a sensibly determined policy but on the other hand it has to be based on precisely calculated actual capabilities at a given stage of development. There are, as a rule, two ways of industrialization open for each country.

One of them is to start industrialization from the foundations, that is by developing such BASIC SECTORS of NATIONAL ECONOMY as:

- EXTRACTIVE INDUSTRIES /forming sources of raw materials/
- PROCESSING INDUSTRIES /forming materials resources and sources of energy/
- CAPITAL GOODS INDUSTRY, and at the same time emphasizing equipment development in such fundamental BRANCHES of NATIONAL ECONOMY as:
 - BUILDING INDUSTRY
 - AGRICULTURE AND FORESTRY
 - TRANSPORT
 - COMMUNICATION

and finally, when this BASE is constructed, developing the CONSUMER GOODS INDUSTRY.

The other way of industrialization is by conducting the policy of development of EXTRACTIVE INDUSTRIES and some CONSUMER GOODS INDUSTRIES / for instance textile and clothing industry etc/ and afterwards by gradually developing CAPITAL GOODS INDUSTRY and PROCESSING

INDUSTRY. Development of CAPITAL GOODS INDUSTRY is an essential driving power of industrialization processes. The kind of this development is, on one hand, framed by the conducted industrialization policy of a country and, on the other hand, it actually frames the policy.

It is obvious that the decision for industrialization policy to follow one or another of the two ways depends on the initial state of a country's national economy, and in particular on such means being at its command as:

- raw and processed materials
- sources of energy
- industrial foundations
- technological and constructional foundations
- manpower /incl. skilled manpower/

Depending on the state of the above fundamental elements when making decisions concerning the main strategic objectives of development / the measured objectives may comprise elements of both the above ways/ one specific strategy should be accepted and CAPITAL GOODS INDUSTRY should be developed accordingly.

In Poland at the country's disposal were:

- substantial resources of raw materials /coal, mineral and chemical materials/
- medium power generating capacity
- substantial numbers of skilled and unskilled manpower
- relatively large and diversified technological potential.

Therefore our industrialization policy followed the first of the previously described two ways, and that determinably influenced the further industrial

development of the country.

Industrialization process in Poland followed two basic rules:

- a/ resources of manpower were the main driving force for increasing industrial production
- b/ increased shares of investment outlays in ALLOCATED GROSS DOMESTIC PRODUCT were to result in quick growth of the PRODUCT in the future periods.

2. The first stage of industrialization /1950-1960/

Basing on the previously described industrialization policy, in the first stage of industrialization /1950-1960/ the broad development of material resources was started and production of highly refined materials was commenced. At this stage of industrialization priorities were granted to the following BASIC SECTORS of national economy:

RAW MATERIALS SECTOR

development of extractive industry /coal mines, ore and minerals mining/

MATERIAL RESOURCES SECTOR

development of: metallurgy, fuels refining, chemical industry and production of building materials.

POWER SECTOR

development of heating and power generating plants

CAPITAL GOODS SECTOR

development of electrical and engineering industry
The priorities were to result in formation of strong CAPITAL GOODS INDUSTRY which would enable carrying of large-scale investments and aim at economic development of Poland independent of capital goods import.

Thus it was a project of intensive industrialization of the country and therefore large scale material investments were so essential. Fuel and power industry,

non-ferrous ore mining and chemical materials exploitation were the first branches concerned. Also at that stage many new large industrial plants were constructed, especially for metallurgy, power generation, production of building materials and for transport. Engineering industry was developing, too. Particularly high investment outlays were directed to coal industry, and namely for construction of new coal mines, due to increasing demand for coal, both for home use and for export.

At that stage coal was positively the top export product of Poland.

Basic structural changes in investments were introduced at that stage. In the year 1953 total investments were more than doubled as compared with 1949, but investments in industry grew more than 3 times. The share of industrial investments in total investments was almost doubled, i.e. starting from 25.3% in the years 1947-1949 it achieved 40.2% in the early fifties. High rate of investments and intensive growth of employment resulted in 18% increase of industrial production.

It must be noted that realization of the investments brought about substantial development and reformation in the structure of industry, thus giving solid foundations to its further intensive development. Construction or enlargement of all basic branches of production was a result of the first stage of industrialization and an indispensable base for further industrial development of the country.

At the end of the fifties the share of investment outlays decreased and in 1960 it was 33.7%.

3. The second stage of industrialization /1960-1970/.

At this stage some stabilization of industrial investment could be noticed.

Together with the previous priorities, development of AGRICULTURE and CONSTRUCTION was intensified.

Although the share of investment outlays in Allocated Gross Domestic Product increased from 23.5% to 26.7% between 1950-1960, yet the share of capital investment directed for industrial development in total capital investment did not increase between 1960 and 1970 and was 33.7% and 32.9% respectively.

Still it should be noted that the share of capital investment directed to Capital Goods Industry in total investment increased from 5.2% to 7.5% between 1960 and 1970.

In the years 1960-1970 the annual growth rate of industrial production was about 8.4%. It is a high rate, even if compared to fast developing countries, yet it is clearly lower than the one observed previously.

The decreasing growth rate does not mean that the production decreased in absolute quantities; development of industrialization results in the fact that each one per cent of growth rate represents higher and higher absolute quantities of additional production. Decrease of industrial production growth rate was on the one hand due to running out of extensive growth factors /decreased flow of man-power out of the rural regions/ and on the other hand it was due to increased capital absorptivity of production/ demanding further substantial growth of investment capitals in national product/. Achievements of the stage discussed are outstanding. In the year 1968 the value of gross national product was 2.3 times higher than in 1958. During six weeks of 1968 the industry generated as much as during the whole year 1949. At the end of that stage generated about 50% of GNP.

A modification of industrial products quality could be noticed at the end of the fifties. The modification was reflected in enrichment of product scope and expansion of industrial production scope, as well as increase in quality of industrial products. At the beginning of the sixties Polish industry was ready to undertake

production of semi-conductor elements, automatic control equipment, television sets, etc. This could indicate the technological level of Polish industry. Yet it must not be forgotten that the growth of industrial production in the sixties was mainly due to such non-intensive factors as growth of manpower and equipment quantities. Characteristic for that period was the phenomenon of excessive investing, i.e. erection of new plants and factories designed for non-updated process and management systems. Thus the new objects made typical examples of extensive investments because they did not recognize adequately the improvement of processes and management.

Factors contributing to the Polish industry net output increase in the years 1961-1968

Contribution to the increase of industrial net output	1961	1962	1963	1964	1965	1966	1967	1968
					pe	rc	e n	t a g e
Increase of manpower	26.0	49.0	44.0	19.0	51.0	50.0	53.0	41.0
Increase of equipment	46.0	23.0	60.0	42.0	23.0	50.0	37.0	40.0
Improvement of processes and management								

So the years 1960-1970 were marked for extensive type of development, low effectivity of work and decreasing effectivity of utilization of resources. The main streams of investment outlays being directed for development of basic industries brought about

underinvestment of several sectors of national economy. Insufficient growth and modernization rates in light, foodstuff and automotive industries were direct results of such policy. And it is recognized that without development of Consumer Goods Industries neither the level of consumption may be effectively increased nor the structure of consumption may be modernized, both of which are required for quick and harmonious growth of national economy. Hence the next stage of industrialization was conditioned by a shift in the strategy of development.

It should be stated in a nutshell that the year 1970 terminated the stage of basic industrialization of Poland. The years that followed started a large scale modernization of the whole Polish economy and inaugurated optimum utilisation of modern factors of growth in development processes.

4. The third stage of industrialization /1970-1980/.

In the seventies Poland entered a new stage of its industrialization with a noticeable acceleration of economic development.

Modernization of economy and harmonization of its development was to be a characteristic feature of that period. Therefore investment policy differed considerably as compared to previous stages, because it was strictly linked with realization of specific goals and tasks. Improvement of living standards was accepted as the first objective and was to be achieved by realizing of the following specific tasks:

- continuation of the high rate of development and modernization of economy based on intensive factors of production growth, introduction of more effective methods of management and balancing of development by correction of proportion between group A and B of industries.

Note:

Group A are Capital Goods Industries

Group B are Consumer Goods Industries

Intensive factors of production growth are the following:

- a. Improvement of product construction/progress in the products' quality and modernity/
- b. Technological progress, which means introducing new production techniques, utilization of scientific achievements and application of new materials and man-made fibres.
- c. Management progress aimed at optimum use of such production factors as employees and equipment working time /and also concentration and specialization in production/
- d. Progress in equipment /intensive investments/ towards increasing the level of production techniques.
- e. Rationalization of investment processes aimed at shortening of construction cycles and shortening of periods necessary to achieve full production capacities.
- f. Improvement of professional qualifications of scientific and industrial workers, and their adequate employment.

High rate of capital investment growth was necessary to realize such ambitious tasks, therefore it was increased from 26.7% to 32% of Allocated Gross Domestic Product between 1970 and 1975. The share of industrial investment in total investment quotes was increased from 32.9 to 42.9 in 1975. The share of investment designated for Capital Goods Industry increased from 7.5% in 1970 to 10.7% in 1975.

It is also worth noting that investments increased most dynamically /in absolute numbers/ in capital goods industry, i.e. up to 330% in 1975/if compared to 1970=100/ less dynamically for industry in general /300% in 1975/, and the least dynamically for the whole national economy, i.e. 230% in 1975 as compared to 1970=100.

Recapitulating, it should be pointed out that develop-

ment and modernization of industry absorbed about 43% of investment funds and resulted in 400.000 millions of additional production capacities, including about 125.000 millions in engineering industry. All industrial investments, characteristically for that stage, were becoming more intensive, thus introducing a higher level of technology and production techniques enabling introduction of more effective processes and up-dating the products. The increase of accumulation in Allocated Gross Domestic Product /from 31.6% to 37.9% in 1970-1975/ brought about the decrease of consumption rate in Allocated Gross Domestic Product /from 68.5% to 62.1% in 1970-75/, although, in absolute numbers, consumption indicated an increase from 623.000 millions zlotys in 1970/in current prices to 1.079.000 millions in 1975/, considering the growth of consumer goods prices, great attention had to be paid to consumer goods production; as a result the share of investment funds in Allocated GDP was stabilized in the years 1975-80 at about 31% and the share of industrial investment in Allocated GDP was decreased from 42.9% in 1975 to 36.5% in 1978. Still it is worth nothing that the share of investment funds allocated to Capital Goods Industry remained unchanged at 10.5% till 1977 and decreased to 9.3% only in 1978.

At that stage the following directions of industrial investment policy were accepted:

- a. development of sources of raw materials and fuels /coal/
- b.1. development of sources of materials /non-ferrous metallurgy, sulphur industry and gas engineering/
- b.2. development of chemical industry /plastics,

- synthetic fibres and fertilizers industries/
c. further development of power generation based mainly on brown coal and water power stations.
d. erection, development and reconstruction of industrial plants producing goods for export or for substitution of machinery or products imports.

5. Development of the Engineering Industry in Poland against the background of Polish economic development between 1960-1978

In order to present the importance of the Engineering Industry in Poland in the years 1960-1978, the enclosed table No 3 - "Industry's Contribution to Gross Domestic Product /at current prices/ 1960-1978" presents contribution of the Engineering Industry to the whole Gross Domestic Product. In as much as the share of industrial activity is only slightly increasing /from 45.4% to 47.9%/, the share of the Engineering Industry indicates a remarkable increase /from 8.8% in 1960 to 15.7% in 1978/. Obviously enough the share of the Engineering Industry in the total Industrial Activity increased from 20.4% in 1960 to 32.8% in 1978.

The table No 4 "Allocation of Gross Domestic Product /at current prices/ 1960-1978" indicates the necessary structural corrections introduced in order to provide means for the intensive industrial development of the country. Thus the share of gross accumulation /directed mainly for investments/ increased from 29.4% in 1960 to 38.1% in 1976, and this had to bring about the decrease of total consumption in GDP Allocated from 70.4% in 1960 to 61.9% in 1976. Still it is worth noting that total consumption calculated in absolute numbers increased from 320.0 thousand million zls in 1960 to 1243.4 thousand million zls in 1976. Since 1977 the strategy of the national economy development is being modified and the rate of industrialization is becoming lower, the above is reflected in the decrease of accumulation in GDP Allocated / from 38.1% in 1976 to 35.3% in 1978/.

Table No 5 -"Capital Formation /at current prices/ 1960-1978" presents the flow of capitals directed to all the industrial activities and within this the flow of capitals directed to the Engineering Industry. The data in this table indicate that capitals directed to the Engineering Industry grew /in absolute numbers/ from 5.6 thousand million zlotys in 1960 to 68.5 thousand million zlotys in 1978.

It is obvious that increasing importance of the Engineering Industry to the national economy necessitated an increase in the share of capitals directed for the development of this industry. It grew from 5.2% of all funds directed for Industrial Activity in 1960 to 10.5% in 1976, but later the share decreased to 9.3% in 1978.

It is still remarkable that the share of capital investments in machinery and equipment increased from 50% in 1960 to 65% in 1978.

IV. Development of the engineering industry

1. General comments on the development of engineering industry during 1945-1980.

As compared to other branches of national economy, the development process of the engineering industry was slightly different due to some specific features.

The reason for this were as following:

- the function of the engineering industry within the national economy, as a manufacturer of means of production,
- the state of the engineering industry at the moment of liberation,
- extended cycle of production engineering.

The influence of these factors upon the development of engineering industry in the period of 1945-1980 resulted in that the development stages described in Chapter III were shifted in time and interconnected as follows:

Stage I - extending from the liberation until early fifties:

During this period, the existing manufacturing facilities and design solutions were organised and put into operation.

Stage II - extending from the early fifties until the end of the sixties.

This period saw intensive development of manufacturing capacities, and adaptation of manufacturing structure to the perspective needs of national economy backed by the domestic base of means of production and domestic design solutions, and also on collaboration with other socialist countries.

Stage III - extending from the end of the sixties.

During this period, a fundamental modernisation of

the engineering industry together with its vast development was implemented to a large extent through licence and co-production agreements with the world's engineering industry.

During the first stage, the development of the engineering industry was influenced by the following factors:

- the state and structure of manufacturing capacity attained after liberation /equipment, design solutions, personnel/,
- needs of national economy as regards the products of the engineering industry,
- investment capabilities of national economy.

The manufacturing capacity of Polish engineering industry after liberation was slight, and the structure formed according to the war needs of the occupant with an overwhelming share of armament and aircraft industry was ill^{suit}ed to the demands of the recuperating national economy, since it lacked manufacturing capacity in such essential branches as the manufacture of:

- road transport means,
- construction machinery,
- agricultural implements,
- food processing equipment,
- power generation means,
- chemical plants,
- machine tools.

The demand of the national economy during that period was concentrated upon:

- reconstruction of the destroyed transport means,
- providing basic implements for agriculture,
- providing basic machinery for construction,
- development of power industry.

The investment capabilities of the national economy were limited to a minimum.

In those circumstances the development of the engineering industry consisted in systematic starting of production in accordance with priority requirements. The first to start was the considerable production of railway rolling stock. The armament factories were reorganized for the production of construction machinery and agricultural implements. Simultaneously with the production of capital goods was also started the manufacture of consumer products. The existing electronic factories started the production of popular radio receivers, and manufacture was resumed of motorcycles and bicycles. In parallel with putting into operation of the existing manufacturing facilities work was also started on production engineering for trucks and tractors, and negotiations were initiated for licenced production of passenger cars. In the early fifties, a majority of the existing industrial plants were put into operation, and the only possibility for further development of the engineering industry was to construct new manufacturing facilities. The machine tool industry, reactivated in the preceding period and possessed of considerable experience of long standing, and also the industrialised construction industry organised after the war, made it possible for the engineering industry to be intensively developed and its structure adapted to the needs of the growing economy. During this period the development of the engineering industry was oriented towards increasing first of all the output of means of production. The manufacture of consumer goods by the engineering industry only started to develop at the end of that period, when the production was launched of such articles as washing machines, refrigerators and other household implements.

The most important development trends of that period were:

- construction of the manufacturing base for trucks and delivery vans,
- construction of the manufacturing base for agricultural tractors,
- construction of the manufacturing base for electronic products,
- construction of manufacturing base for components /such as anti-friction bearings, forgings and castings/,
- starting the manufacturing base for passenger cars,
- construction of manufacturing base for shipyard industry.

The output of capital investment goods attained in the sixties by Polish engineering industry not only covered the demand of the developing national economy but allowed for export of certain products.

Although the manufacturing capacity of the engineering industry, developed in the two preceding stages, catered for the principal needs of the national economy for investment goods in early seventies, it was characterised by low productivity and underdevelopment regarding consumer goods. This was caused by circumstances which governed the development of national economy in the preceding period /investment goods - in short supply - particularly those bought for hard currencies/and also by the aims to be attained /general development of the economy/. The development level of the entire national economy, attained in the seventies, made it possible for the development strategy of the engineering industry to be altered.

The results were:

- general modernisation and development of the manufacturing base created earlier, which doubled the productivity of the engineering industry,
- increased manufacturing capacity for consumer goods /passenger cars, electronic equipment, mechanised household implements/,
- development of the industry manufacturing modern agricultural implements allowing for mechanisation of agriculture,
- creation of manufacturing base for electronic equipment to be used in the economy.

During that period the development of the engineering industry was accompanied by profound structural changes illustrated in the attached statistical references. The engineering industry was linked by co-operation agreements with the world's industry, gaining access to new foreign markets, specializing in the manufacture of selected products, such as ships or construction machinery. The reorganization of the engineering industry, implemented in the seventies, made it possible for exports to be considerably increased.

2. Growth of capital goods production during 1970-1980

The division of engineering industry products into groups and their assignment to specific destinations is illustrated in Table No 10 /described further/.

For this purpose the ENGINEERING INDUSTRY PRODUCTS are divided into three basic groups:

1. MEANS OF PRODUCTION AND EQUIPMENT
2. CONSUMER GOODS
3. COMPONENTS AND STANDARD ITEMS / for MEANS OF PRODUCTION and CONSUMER GOODS/

In this paper to the CAPITAL GOODS INDUSTRY are assigned:

1. MEANS OF PRODUCTION AND EQUIPMENT
2. COMPONENTS AND STANDARD ITEMS.

The enclosed Table No 6 shows for 1970-75-80:

1. Domestic production /intended for domestic market and for export/,
2. Deliveries to domestic users /from national production and from import/ -

as regards the ENGINEERING INDUSTRY PRODUCTS as a whole and divided into:

- NON-CAPITAL GOODS INDUSTRY
- CAPITAL GOODS INDUSTRY

The Table No 7 shows the breakdown and growth rates of the above configuration.

From these tables it is evident that the domestic production of CAPITAL GOODS INDUSTRY increased in absolute figures 2.9 times within the period from 1970 /219.8 billion zl/ to 1980 /651.5 billion zl/. Nonetheless, as far as the total value was concerned, this increase did not cover the demand of POLAND's national economy defined by the deliveries to domestic users which increased within the period of 1970-1980 3.1 times /from 227.5 in 1970 to 712.3 in 1980/. This was caused, first of all, by an orientation of the engineering industry manufacturing capacities to a larger extent to the manufacture of consumer goods, the share of which in the domestic production increased from 29.7% in 1970 to 40.2% in 1980.

3. Contribution of the Capital Goods Industry to various sectors of national economy.

This chapter presents in more detail the development of the engineering industry within the scope of the

CAPITAL GOODS INDUSTRY.

The products of the CAPITAL GOODS INDUSTRY have been grouped into MEANS OF PRODUCTION AND EQUIPMENT intended for the specified NATIONAL ECONOMY SECTORS whose aim is the implementation of the basic targets of national economy.

These basic targets of national economy embrace the construction of:

I. RAW-MATERIALS BASE

II. MATERIALS BASE

III. POWER AND ENERGY BASE

IV. MEANS OF PRODUCTION MANUFACTURING BASE

and also of

V. BASIC BRANCHES OF NATIONAL ECONOMY:

- CONSTRUCTION INDUSTRY
- AGRICULTURE AND COMMUNICATION
- FORESTRY

VI. Remaining INDUSTRIAL SECTORS OF NATIONAL ECONOMY such as:

- Food processing industry,
- Textile industry,
- Clothing, leather and footwear industry,
- Glass industry,
- Paper and printing industry,
- Wood-based industry,
- Electronic industry,
- Automotive industry,
- Pharmaceutical industry,

VII. Other BRANCHES OF NATIONAL ECONOMY, such as:

- Trade in goods,
- Health service,
- Physical fitness programmes,
- Data processing and office equipment.

In the enclosed Table No 8 are the figures illustrating in billion zlotys the domestic production for 1970-1980

/intended for domestic market and for export/ and also deliveries to domestic users /from national production and from import/ as regards groups of products intended for the specific sectors of national economy, which in turn implements the basic targets.

To illustrate the role of the CAPITAL GOODS INDUSTRY in the construction of the national economy system presented above, the enclosed Table No 9 shows for the periods 1970-75-80 the share of:

- a/ domestic production /intended for domestic supply and for export/,
- b/ deliveries to domestic users /from national production and from import/ for individual NATIONAL ECONOMY SECTORS grouped for specific destinations.

From this Table it is evident that the role of the CAPITAL GOODS INDUSTRY is highly differentiated. These shares were as follows:

A. Regarding the MEANS OF PRODUCTION

for the RAW MATERIAL BASE	3.5%	approx.
for the MATERIALS BASE	3.0%	"
for the POWER AND ENERGY BASE	7.0%	"
MEANS OF PRODUCTION		
MANUFACTURING BASE	2.5%	"

B. Regarding the EQUIPMENT for:

the CONSTRUCTION INDUSTRY	3.0%	"
the AGRICULTURE AND FORESTRY	6.0%	"
the TRANSPORT	26.0%	"
the COMMUNICATION	2.0%	"

A. Regarding the MEANS OF PRODUCTION

for the remaining sectors of national economy /food processing, textile, clothing, etc industries/	3.0%	"
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B. Regarding the EQUIPMENT for:

the remaining branches of national economy /trade in goods, health service, data processing etc/ 3.0% approx.

C. Regarding the supply of components and standard items /see Table No 7/ 40.0% "

As may be seen from the above figures, the share of the CAPITAL GOODS INDUSTRY is particularly large as regards the production of:

a/ COMPONENTS AND STANDARD ITEMS	40%	approx
b/ MEANS OF TRANSPORT	26%	"

The Table No 9 also shows the growth rate of development of this group of CAPITAL GOODS INDUSTRY PRODUCTS which are intended for various SECTORS OF NATIONAL ECONOMY /with the data of 1970 assumed as 100/. This growth rate is highly diversified /from about 200% to about 600%/ and its analysis makes it possible to observe the change of priorities given during this period to specific sectors of national economy.

In order to present synthetically the role of the engineering industry as a whole, and also of its part designated as the CAPITAL GOODS INDUSTRY, the above data were set up in a single synthetic Table No 10 entitled "THE FLOW OF ENGINEERING INDUSTRY PRODUCTS INTENDED FOR DOMESTIC NEEDS during 1970-1980", using a structural and dynamic configuration.

This table shows the supply of engineering industry products, produced internally and imported, in the following groups:

A. PRODUCTION MEANS AND EQUIPMENT

B. COMPONENTS AND STANDARD ITEMS

Total A + B = CAPITAL GOODS INDUSTRY
divided into ECONOMY SECTORS:

A1 BASIC SECTORS:

- INDUSTRY: - RAW-MATERIALS BASE
- MATERIALS BASE
- POWER AND ENERGY BASE
- MEANS OF PRODUCTION MANUFACTURING BASE

OTHER BASIC SECTORS:

- CONSTRUCTION INDUSTRY
- AGRICULTURE FORESTRY
- TRANSPORT
- COMMUNICATION

A2 REMAINING SECTORS:

- INDUSTRY: - FOOD PROCESSING TEXTILE, CLOTHING, LEATHER AND FOOTWEAR, GLASS, PAPER AND PRINTING, WOOD-BASED, ELECTRONIC, AUTOMOTIVE, PHARMACEUTICAL.
- OTHERS: - TRADE IN GOODS,
- HEALTH SERVICE, PHYSICAL FITNESS PROGRAMMES,
- DATA PROCESSING, OFFICE EQUIPMENTs

C. CONSUMER GOODS AND OTHER PRODUCTS.

V Personnel training, research and innovation activities in development processes in the Capital Goods Industry

A. Labour migration and vocational training

Industrial development has a strong influence on social relations by creating new social and professional groups. It necessitates adaptation of society to the changes by furthering its professional and general education and modifications of its cultural and social habits. All the above are natural civilization processes connected with industrial development of a country; the processes will run properly if industry develops in a dynamic way. In Poland the adaptation was first of all necessary in case of rural population coming from petty farms to industrial centres. The adaptation processes included both basic professional training or gaining of new skills by millions of people and refashioning of their social and professional outlooks.

Population migration from rural to urban areas.

Specification	Y e a r s				
	1946	1950	1960	1970	1978
Population total /mil- ions,/includ.: inhabi- tants of urban areas	23.9	25.0	29.8	32.6	35.0
/millions/ Percentage of inhabi- tants of urban areas	7.6	9.7	14.4	17.0	20.1
in the total	31.8	39.0	48.3	52.3	57.5

Characteristic for industrial activities is a high demand for skilled manpower; it is particularly high in the Engineering Industry. This high demand is a result of variety and complexity of production techniques, direct contact of workers with work stands and production objects and also particular response of the industry to technological innovation. In Poland skilled manpower comes from three groups of institutions: vocational schools provide skilled workers for various trades, secondary technical schools provide administrative, attending and auxiliary scientific staff and technical and economic universities provide managerial, scientific and engineering staff.

Numbers of graduates of the above groups of institutions are increasing and amount /in thousand/:

Specification	1948/49	1977/78
vocational level	41.0	260.0
secondary technical level	14.0	220.0
university level	2.8	33.0

Employment of large numbers of foreign specialists, being the only alternative to extensive professional training in the country, has never occurred in the Polish economic practice; industrial development in Poland was carried on exclusively with the country's own manpower, including attending and managerial staff.

All the graduates of vocational schools employed in industry formed a base for a systematic improvement of personal qualifications of industrial staff. This was a condition for gradual modification of the structure of industrial production. The modifications were intended towards expansion of a highly intensive processing which also includes the Capital Goods Industry as a manufacturer of machinery, equipment and technical product elements. The present scope of products manufactured by the Capital Goods Industry, including many up-to-date capital investment goods, is conditioned by the structure of professional qualifications of CGJ employees. At present nearly 4.5% of the Engineering Industry Employees have university-level education, over 22% have secondary technical or general education and over 33% have basic vocational training. Such level of professional qualifications was achieved after 35 years of intensive activities

in the field of education, particularly in technical branches.

The after-war beginnings were very difficult.

In the year 1950 only about 3000 mechanical engineers were at command, which meant that at the beginning of industrialization no more than 1% of engineers could be employed in the Engineering Industry, which was not even enough to cover all managerial positions.

2. Research and development activity. Innovations.

Development of the Engineering Industry requires permanent inflow of new processes and constructions. Adequate level of qualifications of industrial staff is one of conditions of practical application of innovations; the activity of investigation institutes is the fundamental condition of technical and economic advancement. Realization of the whole investigation and development cycle, from process investigation to start-up of lot production, including designing of modernization and enlargement of plants, is the main task of investigation and development institutes. Even if technological development is based mainly on imported foreign know-hows, own investigation and development institutions are necessary to adapt and further develop the licences. This conclusion is based on Polish experience from the seventies when foreign licences and know-hows brought about increasing tasks set for the investigation and development institutes, reflected in the 65% increase in the number of scientific staff employed in the institutes. Characteristic for these institutes is their permanent trend towards integration with large industrial enterprises. Thanks to the trend the majority of large industrial enterprises have their own research institutes or

investigation and experiment centres. Scientific work carried on by the institutes is oriented mainly to meet the requirements of their sponsoring enterprises. Basic research work in the fields of production technology, product construction, materials engineering and organization of production is carried on by scientific research institutes administered by industry or technical universities.

Activities of all the units of the research-and-development facilities as well as the rationalization and innovation movements have caused an increase in the general technical level of industry. Some of the results obtained and the basic trend in the development of engineering are as follows:

In the years 1970-1978, nearly a threefold increase in production in the engineering industry division branches took place, whereas the index of consumption of the basic materials and semi-finished products dropped from 16.8 to 7.5 ton 1 mln, zł. worth of production sold /a change in the production structure/.

The consumption index of the iron-and-steel industry products per 1 million zł. worth of production sold, dropped in five years in the main branches of the capital goods industries by 15-20% and in 1978 amounted to / as an example/:

- in the engine and aircraft equipment branch: 4.5 t/1 million zł
- in the electrical machine and apparatus branch 7.8 t/1 million zł.
- in the construction machinery branch 13.5 t/1 million zł.

The quantities of the index, which features the technical complexity and defines the rate of innovation /viability/, are diversified according to the production range.

E.g. the index quantity was:

- in the construction machinery branch = /80-200 zł/ 1 kg, whereas the lower quantity concerns goods that have been manufactured for several years,
- in the truck, bus and diesel engine branch = /90-130/ zł/1 kg
- in the aircraft engine branch = /2900-5600/ zł/1 kg.

The index quantity in some branches of the capital goods industry is shaped as follows:

- electroplating and painting equipment = /5-7/ years
- motor vehicle accessories components/average = /5-8/ years
- metal working machines - over 10 years.

The average indices of production renewability, calculated as a ration of the production value to the value of new start-ups in the years 1970-1975 were as below:

- in the machine-tool and process equipment branch /8-11/ years
- in the electrical machine and apparatus branch /10-14/ years
- in the computer hardware and automatics equipment branch /3.5-6.5/ years.

a/ Basic changes which took place in the construction and production technology of capital goods:

- improvement /retention/ of utility functions of the products with simultaneous minimization of their weight and overall dimensions.

In order to illustrate this trend, the following examples may be quoted:

- the mass of 1.1 kW electric motor dropped by nearly 25%
- the weight of an excavator with 0.6 m³ bucket capacity by over 30%
- the weight per power rating unit index for diesel engines dropped by about 20%.

The progress of effectiveness of materials utilization took place mainly through the application of electronics components, which functionally replaced the mechanical components used hitherto, and the introduction of hydraulics and pneumatics components in the structures which transmit mechanical loads.

Also are used better and better and new metal and chemical materials whose shape and properties allow to "slim" the products considerably.

b/ Increase in the durability and reliability of products

- application of better methods of designing and the introduction of new materials,
- improvement of material properties in the technological process /modern methods of heat treatment, heat-and-chemical treatment and others/,
- application of appropriate protective coats,
- making constructional tolerances closer, which require the application of more accurate working methods.

Durability and reliability are of great importance for the raising of effectiveness of materials utilization, which results in the reduction /relatively, in a special time interval/ of the volume of goods production without any detriment to the satisfaction of the needs of the national economy.

The calculations performed on the basis of the example of diesel engines and gear boxes showed that in the specified time interval one would have to manufacture 2 or 3 times more goods of lower durability in order to reach an identical degree of meeting the needs.

c/ Modular design of products and aggregation of functions

This is imposed mainly by the necessity to streamline the working processes /enlargement of batches/ and also by the running convenience /a possibility to build various machine sets; simplification of repairs, transport, etc.

This is closely related to the problems of production automation /setting-up of working and assembly lines and groups/.

As an example one may mention here:

-digital computers, complex automation equipment, machining centres and assembly units.

d/ Development of control systems

This is the tolerance which at the earliest was developed in the application to machines and process equipment, mainly on account of the introduction of mechanization and automation of work.

At present, strong development is taking place also in the application to other machines, e.g. machines run in different conditions /the climate, aggressiveness of the environmen, etc/

e/ Increase in the accuracy of machining

The necessity to ensure an increase in durability of product operation enforces the application of more and more accurate methods of parts treatment. The rise in accuracy of treatment is illustrated in Graph No 1. To secure the higher and higher constructional and qualitative demands of products, there is a necessity to apply suitable manufacturing methods, including especially the abrasive treatment and also accurate measuring methods.

For that purpose, the following are used more and more often:

- grinders with spindles mounted in hydrostatic bearings
- preventive inspection equipment
- new materials for abrasive tools /synthetic diamond, boron nitride/
- honing, burnshing
- machine-tool adaptation control

f/ Development of treatment methods which increase the degree of useful utilization of material.

Development of treatment methods take place allowing for the increase of level of useful utilization of materials:

- pressure die casting, vacuum casting, for moulds made under high pressures
- manufacturing products from metal powders
- locked-die forging
- cold and hot extrusion, envelope curve pressing, upsetting
- shape rolling /teeth, splines, etc/

g/ Application of more and more efficient machines and process equipment

As shown in the Table below, the average output per machinetool in 1973 rose in relation to 1968, by 75%.

Item	Description	Y e a r s		
		1968	1970	1973
1	Value of production /in million zls/	115	142	217
2	Number of machine-tools /in th. zls/	110	114	119
3	Increase in output per machine-tool /in %/	100	118	175

h/ Wide introduction of work mechanization and automation in manufacturing processes.

So far, work mechanization and automation have been introduced mainly in the manufacturing processes associated with high noxiousness and ardnousness of work. At present, the scope of introducing work mechanization and automation has undergone such an expansion, that more and more commonly it covers all the stages of the product manufacturing process, starting with the designing of the construcional and technological documentation and finishing with the automatic control of the shipping warehouse.

Widely is being introduced the program controlling of machines and process equipment; also in conjunction with the controlling of the production flow.

i/ Changes in the technological structure of production

In connection with the quantities development of production, goes the increase in the share of mass and large-lot production which in turn causes changes in the technological structure of production /See Graph No 2/. This followed by a dynamic growth of part shaping by the methods involving a negligible loss of material, such as: the precision casting, metal powder sintering, plastic working by stamping and forging with a simultaneous limitation of the application of machining, particularly roughing. Mechanization and automation of assembly work result in the reduction of labour consumption by that work and consequently the share of assembly work in the technological structure with the strong development of the electrical engineering and electronics, the scope of application of specialistic techniques rises considerably.

3. The influence of structural changes on staff requirements in the capital goods industry.

The introduction in operation of new generations of capital equipment alters the character of work and requires higher qualifications /skills/ to perform it.

The constantly rising demand for automatic machines and facilities and the high reliability-and-qualitative demands imposed on these facilities cause a rise in the demand for:

- designers of modern control equipment based on reliable sub-assemblies, mainly electronic ones,
- designers of machines and equipment for the mechanization and automation of manufacturing processes and employees who know how to operate such equipment in actual production /engineers or technicians in place of the present employees with basic vocational education/.

The demand grows for specialists in automatics and electronics for the operation, maintenance and repairs concerning automatic machines and equipment.

An increase in the volume of production, with limited material and raw-material resources demands a constant increase in the degree of the effective utilization of materials. That is why there is a feeling of a considerable rise in the demand for specialists in the field of materials technology and process engineers in the field of lossless treatment.

The demands of efficient management result in a necessity to obtain and process quickly information of various kinds. Hence the need for a general use, in the field of the electronic calculation technique. In this connection, a considerable rise

in the demand for the following is envisaged:

- designers of electronic calculation technique systems
- programmers
- digital computer operators and maintenance men

Development of production in the capital goods industry increases the demand for after-sale service concerning machines and equipment in use.

Consequently there is an increase in demand for specialists in the area of repairing, servicing and running of the equipment.

VI. Forecast of further development of engineering industry in Poland

After a period of relatively intensive development of all sectors of national economy and branches of industry in the seventies, Polish economy shall now strive strenuously to attain complete harmonisation of development of individual sectors and relative structural stability.

in order to attain this aim. it shall be necessary in the period of 1981-1990 to concentrate efforts so as to ensure correct implementation of the following processes:

- equalisation of the disproportions which appeared between the strictly productional sectors and those that for the technical and service infrastructure /transport, power supply, health service etc/ and also between the areas of investment and consumption,
- further intensification of agriculture and food-stuffs production with simultaneous efforts being made towards lowering the employment in agriculture so that the labour resources released in this way could be utilised for the development of service sector,
- full utilisation and systematic updating of technologies introduced within 1971-1980 by purchasing foreign equipment and know how. This involves the need for increasing the intensity of continuous modernisation of the manufacturing processes in use and also of the design of the products so as to ensure appropriate frequency of their renovation. It also means that it is necessary to strengthen and increase the operational efficiency of the

research and development function, which utilising experience acquired during the implementation of leading foreign techniques /licences, purchase of manufacturing plant/ should pursue its own development efforts,

- considerable increase of export activities aiming at balanced trade, mainly of export of industrial products with the preference for machinery and equipment, making full use of the modern technologies acquired in the course of the past decade, of the program for economic integration of the socialist countries /CMEA/ collaboration with the leading world manufactures, and the manufacturing capabilities of the industry, strongly developed during 1971-1980.

The development activities of the engineering industry in 1981-1990 shall be subordinated to the targets assigned to it in the course of implementation of the abovementioned processes. The basic task shall be a continuous perfection of the manufactured products so that they meet the requirements posed by the process of continuous modernisation of technology within national economy and the demands of the world market. At the same time it will be necessary to increase the share in the structure of the manufactured products of these groups of products which serve the modernisation process, i.e. the products of the electronic and precision industries, computing equipment, automation components, robots and uatomated plant and equipment.

It will also be necessary to implement in parallel the tasks involved in the progress of agricultural mechanisation, modernisation of transport and extension of the power supplying infrestructure.

In general, it is anticipated that the rate of growth of production of the engineering industry shall continue

to be in excess of the average rate of growth of the industrial production to attain annually 6 % approximately; the share of exports in this production being systematically increased.

The rate of growth of production of the engineering industry shall be diversified for individual groups of products, in accordance with the signalled development priorities, and also in view of unequal development possibilities /technology, manufacturing capacities, capital expenditure/.

VII. Development of export with particular regard to the export of complete industrial plants and services to developing countries.

The fast development of the capital goods industry in Poland implemented in the first period mainly with the help of a large design-and-technology office base, scientific subsidiaries and later also on the basis of technical cooperation with companies and countries of a higher technical level, allowed us to amass a large amount of knowledge and experience in the designing, constructing, commissioning and running of industrial plants in many sectors of the economy.

The experience was concentrated particularly in those branches of industry which, while basing on indigenous raw-materials and industrial traditions simultaneously reflected the national economy needs and thus were subject to the fastest development. The increasing role of the foreign trade and cooperation in the national economy, beginning in the sixties in conjunction with the appearance in some sectors of a surplus of design and production capacities in respect of machines and equipment, and the constantly growing number of specialists, caused the launching of an active policy of exporting engineering services, machines and equipment and complete plants.

The plants and equipment supplied - considering in the present elaboration only the plants supplied to developing countries, often on the turn key basis, including a wide program for training the local personnel - covered in 1960-1978 the following main

industrial branches:

- metal industry: 30 plants, ranging from black tool factories to metal working machine production and assembly works, tool factories, aircraft repair shops, tractor assembly shops, etc. Plants of that kind were delivered to a score of countries in Europe, Africa, Asia and Central America.
- metallurgical industry: 17 plants in the field of ferrous and non-ferrous metallurgy, including especially iron foundries and drop forges, delivered to countries in Europe, Africa, Asia and Central America /e.g. the iron foundry of 1500 t/year cap. erected in Bombay or the steel foundry of 20.000 t/year cap. in Jugoslavia/
- chemical and petrochemical industry: 28 plants in many countries; particular significance is attributed in this range to the sulphuric acid factories operating with various raw-materials and reaching an annual output of up to 1100000 t. of acid. Such production plants are supplied also to developed countries /e.g. the Federal Rep. of Germany/ and to the U.S.S.R. too.
- food industry: 34 plants, including mainly sugar factories, and then yeast factories, breweries, distilleries, slaughterhouses and port-butcher's shops. The sugar factories supplied operate chiefly with sugar although there were also erected installations in Pakistan, Ghana, Indonesia, China and Ceylon which base themselves on sugar cane and have a throughput capacity of 1500-300 t. per day /the throughput of a beet sugar factory reaches 600 t/day /. Similarly as in the case of sulphuric acid factories, a large number of complete sugar factories is supplied also to socialist countries.
- wood and cellulose processing industry: plants of this industry include factories concerned with the manu-

facture of chipboards, plywood, laminates and fibre-boards, and paper and cellulose works. The consignees included /among others/: China, Iraq and Cuba. Besides the exports included several mining plants, building material processing plants, cooling and refrigerating installations sewage treatment plants, etc.

All in all, in the years 1960-1978 Polish industry built in 30 developing countries over 250 complete industrial plants, out of which a considerable percentage represented the production of capital goods or materials and semi-finished products for further processing in processing and refining plants. Number of plants built and equipped by the Polish industry in developing countries specially in the metal industry field operate as manufacturing and commercial joint ventures. Their production comprises very often simple but essential for small developing countries items like black tools, fittings, agricultural implements etc. Such production serves the needs of agriculture and small scale industry satisfying their demand for buckets, shovels, pickards, axes, machetes, woodworking tools, locks, padlocks etc. More than ten of such companies operate in Nigeria, Kenia, Ethiopia and Ghana. In many instances technical management of these plants comes from Poland, but as soon as the company gains enough experience and production becomes stabilised, local personell takes over. Also the export of ships, particularly the floating factory mother-ships and floating fish canneries may come under the category of complete plants in question /Polish industry exported in 1949-1979 -about 1200 ocean-going vessels having an aggregate tonnage of 8.5 million DW , and also main engines

with a total power rating of nearly 4 000 000 KM. Parallel to the complete plant and industrial installation supplies there is implemented a program for training in Poland specialists from developing countries and also in their own countries, within the framework of investment project contracts. This arrangement allows us to transmit our experience of the operational character and also in the field of designing and building industrial plants. The programs concerning further development of export of industrial plants are served by the foreign trade organization which has a wide agency network all over the world and about 30 joint companies operating in developing countries. Besides the trade agencies and joint companies operating in highly developed countries organize and prepare industrialization ventures in developing countries in co-operation with many Western concerns and contracting companies. The trend of development of the Polish capital goods industry assume a further intensive development of co-operation with developing countries in all the regions of the world on the basis of continuation of the already settled specializations, and an extension of the already settled specialization, and an extension of the offer list as the Polish industry achieves new experience and abilities.

And so, the industry which builds machines and equipment for the electronics production, light sources production and for the automotive industry, and has been considerably developed in the last ten-years period, already creates new export possibilities.

There is a similar situation in the industry which makes capital goods for the light industry /textile industry/ food processing and in a number of specialized

fields of the engineering industry technology, such as:
- the assembly belt, thermal treatment, fusion welding and pressure welding; surface treatment /electroplating and painting/, modern methods of plastic working and integrated manufacturing systems based on machine-tools or numerically and computer controlled machining centres and applying industrial work.

These technologies developed independently by the Polish electromechanical industry and also in co-operation with foreign companies are to-day widely applicable in the Polish industry thanks to the numerous and highly-qualified engineering and technical staff who may ensure a supply of indispensable application elaborations, including software, and secure the right operation and maintenance of modern equipment.

The development experience of Polish industry indicates that often it is only when the application problems are mastered that full introduction of utilization of the technology obtained is possible. Therefore, in the development programs of co-operation with the third world countries, Polish industry places very highly the problems of training the specialists and workers, considering these problems as an integral part of its own obligations towards the consignee. Parallel to the above mentioned program for the supply of complete industrial plants, there will be developed in our export - particularly with reference to developing countries - a form of engineering services in a wide range of industry branches and at varied level of complexity.

These services cover:

- consulting
- supervision of implementation
- designing of plants of whole industrial complexes in the

form of commission or in co-operation with local offices or agencies in the investor's country.

- designing of technological processes or specialistic systems,
- vocational training at various levels,
- improvement of staff in the area of managing and planning of industrial development.

These services will practically concern all the industry branches, however with particular regard to the aforesaid fields of specialization of our industry.

In the range of forms of co-operation; there is and functions a number of patterns covering from one side deliveries of complete plants or larger ventures implemented on the basis of international agreements, contracts concluded on the "company to company" basis, partial contracts implemented in co-operation with one or more other suppliers, multi-year agreements in industrial co-operation, or finally companies with a mixed capital with share proportions conforming to the local regulations which carry on commercial, manufacturing/commercial activities.

These various forms of activities may be successfully reconciled with the system of central planning of the national economy in Poland, allowing for instance to create in Poland a permanent market for certain products manufactured by a company in a developing country.

The activities described above have not only the significance defined by the possibility of obtaining financial revenues and a widened access to the sources of raw-materials supplies. They also constitute an essential element of industrial development which ensures - on the principle of feedback - information regarding the quality and correctness of the technical solutions adopted and enriches, on the basis of experience in operation and co-operation with the engineering personnel in developing countries, the achievements of own industry, which in turn enables its further and effective development.

VIII. Conclusions for developing countries, derived from the development experiences in Poland.

Poland's experiences gained in the process of development of the capital goods industry enable us to draw certain specific conclusions and suggestions which seem to be important from the point of view of the developing countries. This is so because they are relatively independent of the more general problems and conditions of country's social and economic development.

They centre on the questions of qualifications of labour and vocational training, problems of international co-operation and transfer of know-how, adequacy of technology and internal structural relations within the capital goods industry.

One of the main factors in accomplishing such unusually rapid reconstruction of greatly damaged economy in post-war Poland and subsequent dynamic development of all branches of industry was qualified labour force and though decimated but highly qualified cadre of technicians, engineers and scientists. Their numbers were being supplemented from the first post-war days with thousands of new graduates from reactivated and newly created vocational schools and universities as well as numerous vocational courses.

Creation of adequate system of vocational training and increasing qualifications of labour force seem to be the most effective investment in the industrialization process of any country.

Possessing even modest amount of technically qualified personnel is also essential in case the country decides to carry dynamic industrial development programme based mainly on the technical assistance from others highly developed countries what to certain extent was also pursued by Poland during seventies. Such situation enables more appropriate choice of new products and technologies that are being acquired and ensures higher degree of effectiveness of new industrial facilities.

Basing development of a country on imported technology whether with regard to new products or new manufacturing processes or both involves also decisions as to the choice of forms of collaboration and methods of their implementation, both of which are important for the end result of this process. Poland's experiences in this respect indicate high effectiveness when the following principles are maintained:

- use of central mechanisms in the negotiations with foreign partners to ensure sufficiently large volume of business and resultant attractive financial conditions of purchase /bargaining power/,

and utilisation of institutional forms of collaboration in a form of working groups or mixed commissions in the governmental bi- and multi-lateral arrangements. Also, cooperation arrangements with multinational corporations allow for uniformity and complexity of solutions being acquired in a given field /for instance cooperation Poland has with the FIAT company in the automotive industry/.

- long-term nature of agreements ensuring stable conduct of collaboration especially important in the area of technical cooperation covered by such agreements,
- mutual interdependence of the partners through industrial cooperation programmes counter-purchase and buy-back transactions which operate on the feed-back principles, thus ensuring licensor's interest in the degree of implementation of the technology. From economic point of view these forms are essential in increasing states capability to finance industrial development. On the other hand too much dependence on the transfer of technology from other countries may lead to some negative phenomena characterized by:
 - frequent preference of technological solutions which are not justified by genuine needs of the national economy, but increase development costs and disharmonize industrial structure creating gap between technological level of selected plants, manufacturing end products and subsuppliers infrastructure of this industry or supplying domestic market with the products which are too expensive or too sophisticated at the given technological level of the country /for instance large and sophisticated agricultural machinery not suited to fragmented structure of small private farms/,
 - emergence of slowing-down trends in domestic research and development activities and reduction of creative capabilities in small and medium scale industries resulting in decreased flexibility of the industry's response to the needs of national economy and its increased dependence on foreign assistance.

These phenomena are not present in the cooperation arrangements between countries of the similar political and economic system and comparable technological level what can be illustrated by the cooperation between Poland and other CMEA countries. This cooperation carried out successfully on bilateral and multilateral plans is characterised by:

- complexity which covers all stages from the planning through marketing of the products,

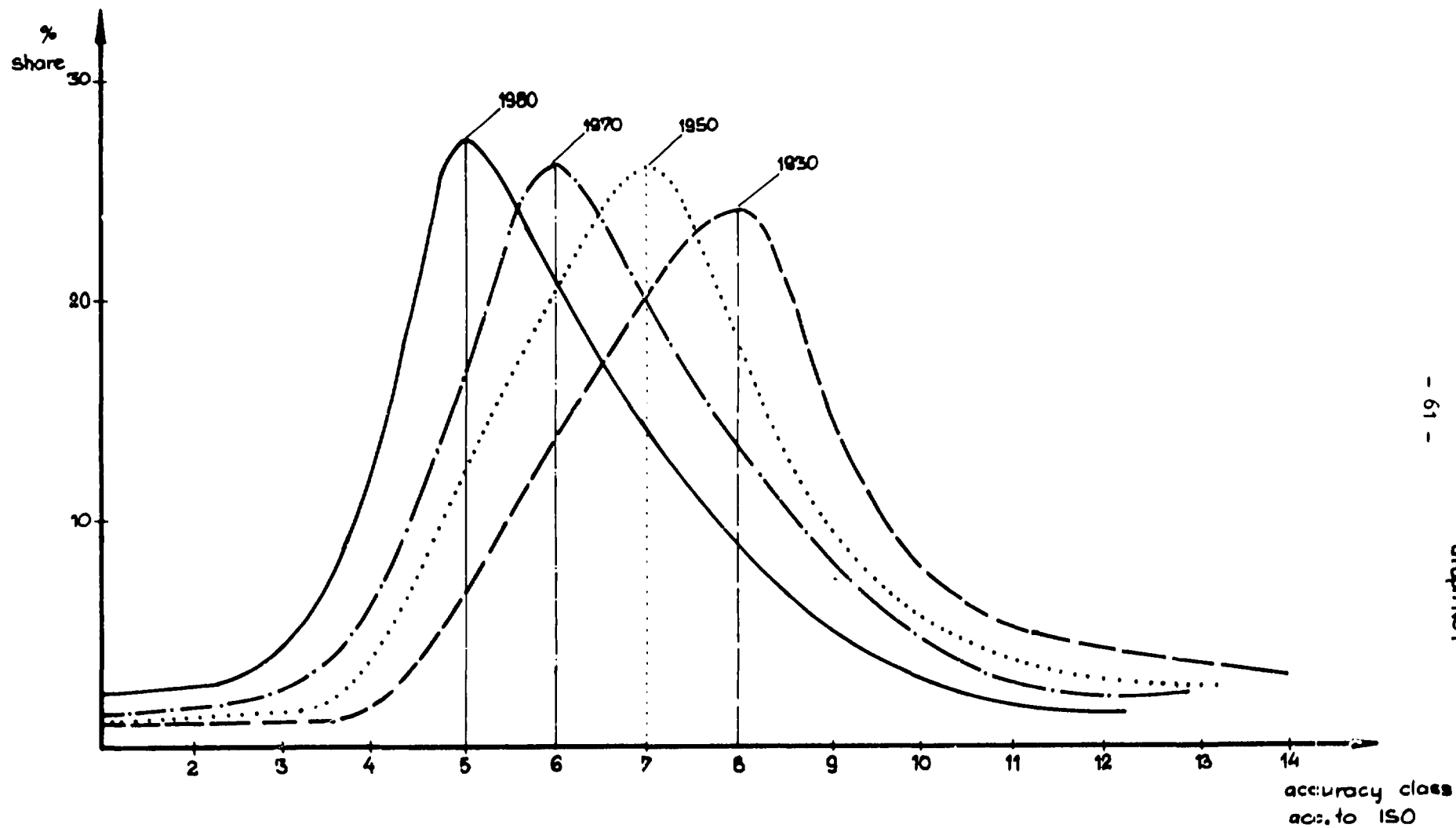
- farreaching division of labour among partners established through specialisation and cooperation agreements,
- close cooperation and coordination of the activities.

Important aspect of the industrial development process, especially in the sphere of technology transfer is, as already mentioned the appropriateness of technology from the point of view of needs and industrial conditions. Rapid development of world technology over past three decades resulted in extension of the technological gap between world's most developed countries and the poorest countries of the third world. This gap is especially evident in the capital goods industry, its products and manufacturing methods.

This create natural tendency on the part of those responsible for industrial development of a country to apply most modern /often in absolute form/ technology in the form of products, equipment of manufacturing techniques, which are not only inappropriate for the country's needs, but due to the level of its complexity cannot be successfully implemented on the industrial level.

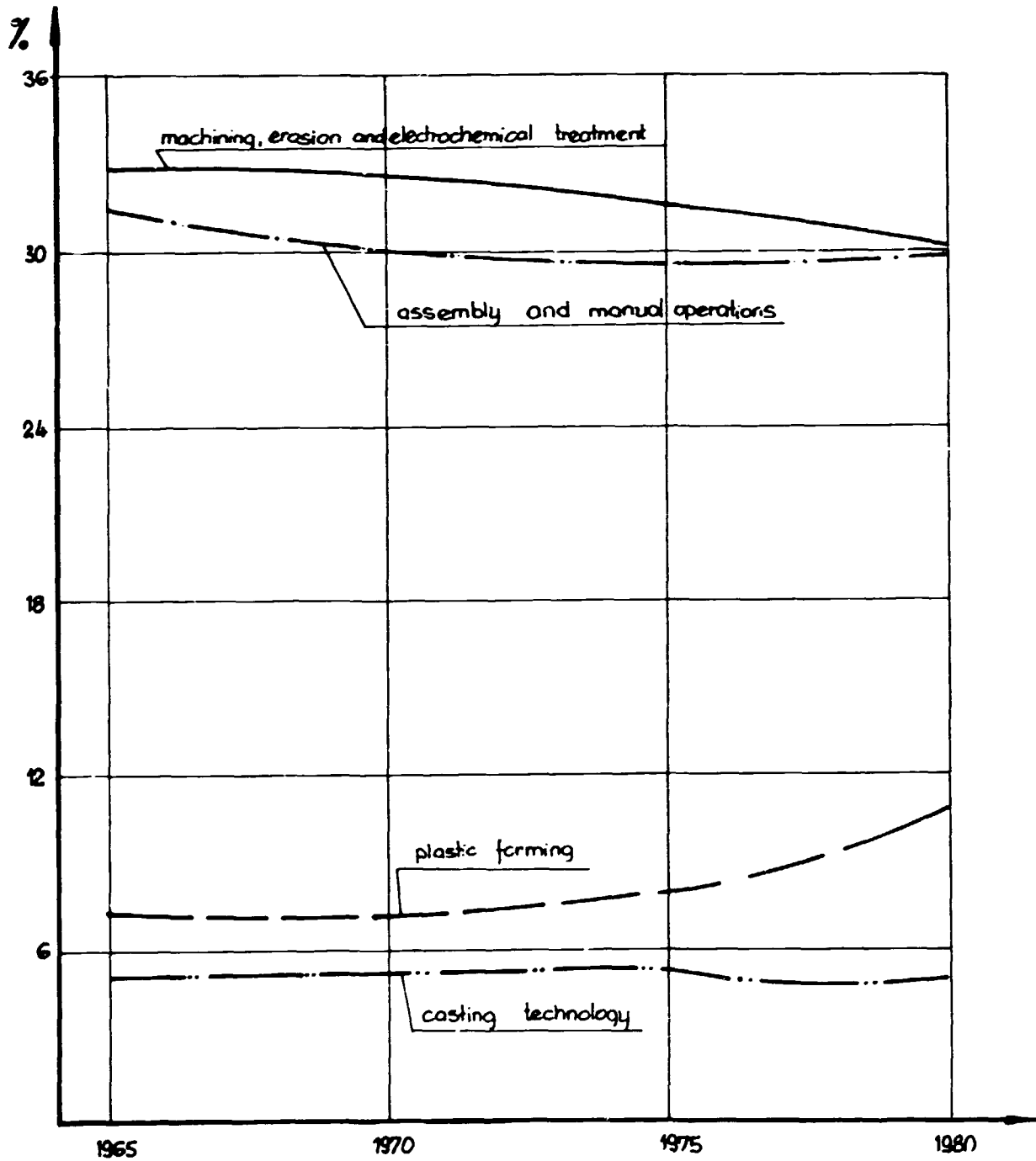
Another important issue in the development process of the capital goods industry is what has often been experienced, ability to balance internally capacity of the industry in respect of machinery and equipment one hand with that for components, semi-products and standard item on the other, another words with the capacity of the industry's infrastructure. Dynamic of growth of infrastructre should exceed that of the manufacture of end products, thus creating pumping force supplying components and technical solutions to the industry assembling final products rather, then, as is often the case final product manufacturers sucking components from industry's infrastructure and depriving of other sectors of national economy of necessary items, spare parts, etc.

Balanced situation between those two categories of products within industry should exist not only in quantitative terms but what is equally important in the level of technology and quality they represent. Creation of strong, technically advanced manufacturing base of semi-products, components and standard items together with the potential of locally trained and educated personnel enables every country to develop quickly capital goods industry and speed up process of industrialisation.



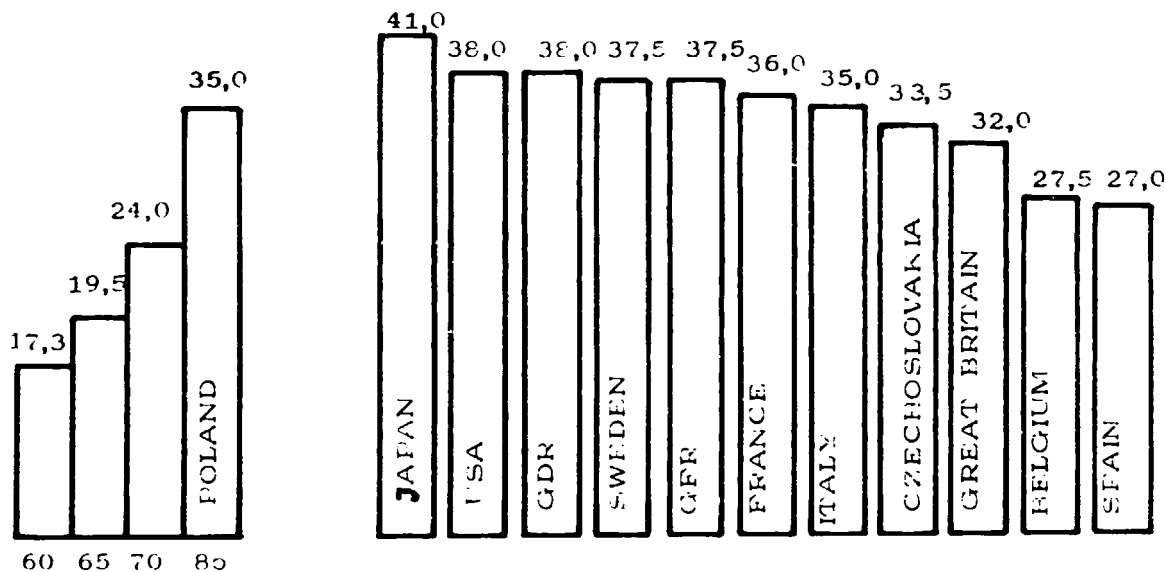
Changes in the distribution of accuracy class in the Polish engineering industry

Changes in the structure of manufacturing processes in the engineering industry in Poland (based on the Ministry of Machine Industry)

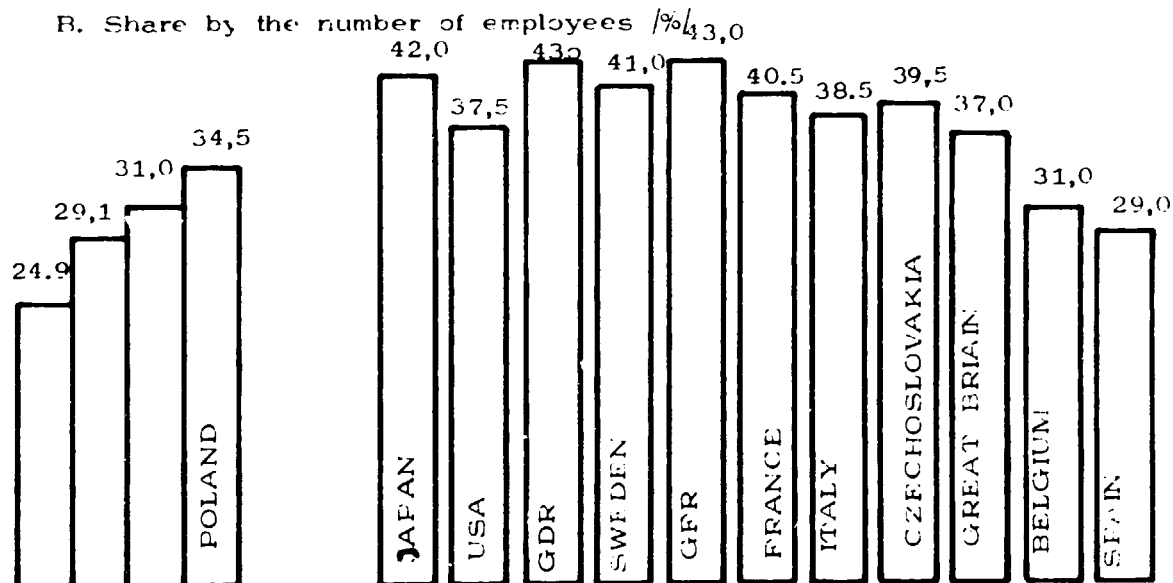


SHARE OF ENGINEERING INDUSTRY IN TOTAL INDUSTRIAL PRODUCTION OF SELECTED COUNTRIES IN 198

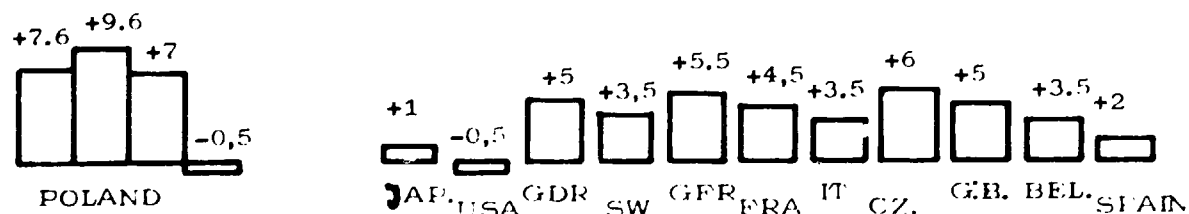
A. Share by gross value added of production / % /



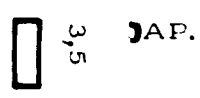
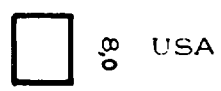
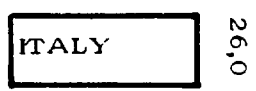
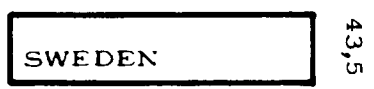
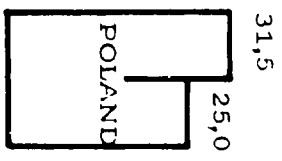
B. Share by the number of employees /%/



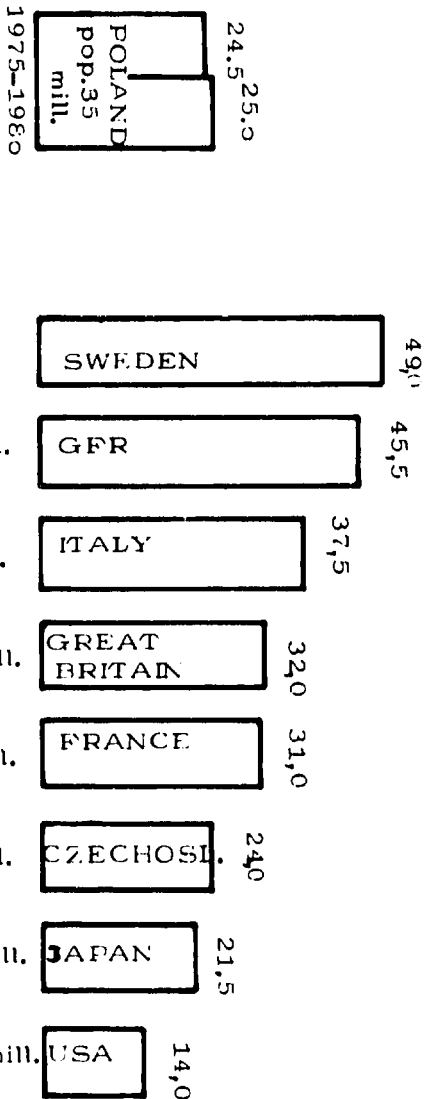
C. SURPLUS / DEFICIENCY OF THE EMPLOYMENT SHARE OVER SHARE IN PRODUCTION



1975-1980



A. PERCENTAGE SHARE OF EXPORT IN THE PRODUCTION OF ENGINEERING INDUSTRY IN POLAND AND SELECTED COUNTRIES IN 1975



B. PERCENTAGE SHARE OF IMPORTS IN TOTAL DELIVERIES OF ENGINEERING PRODUCTS FOR DOMESTIC MARKETS IN POLAND AND SELECTED COUNTRIES IN 1975

INDUSTRY'S CONTRIBUTION
GROSS DOMESTIC PRODUCT / AT CURRENT PRICES /
1960 - 1978

TABLE No 3

No	Item	Unit	1960	1965	1970	1975	1976	1977	1978
1	2	3	4	5	6	7	8	9	10
1a	GROSS DOMESTIC PRODUCT - WHOLE ECONOMY	000' mill. zls	454,3	650,0	925,0	1635,0	1910,0	2100,0	2290,0
1b	- " -	000' mill.S	14,9	28,3	42,2	88,8	98,5	115,0	131,6
2	GDP - ALL INDUSTRIES / INDUSTRIAL ACTIVITY	000' mill. zls	196,8	308,6	459,1	872,8	904,5	1001,6	1097,7
3	GDP - ENGINEERING INDUSTRY	000' mill. zls	40,2	70,2	111,8	234,9	242,9	317,1	360,6
4	SHARE OF THE INDUSTRIAL ACTIVITY IN THE COUNTRY'S GDP	%	45,4	46,5	49,6	53,4	47,3	47,6	47,9
5	SHARE OF THE ENGINEERING INDUSTRY IN THE COUNTRY'S GDP	%	8,8	11,0	12,1	14,3	12,7	15,1	15,7
6	SHARE OF THE ENGINEERING INDUSTRY IN THE TOTAL INDUSTRIAL ACTIVITY	%	20,4	23,1	24,3	26,9	26,8	31,6	32,8

Note: The table presents Gross Domestic Product calculated in accordance with the System of National Accounts (SNA) excluding balance of foreign trade in goods and material services.

TABLE No 4

ALLOCATION OF GROSS DOMESTIC PRODUCT / AT CURRENT PRICES/
1960 - 1978

No	Item	Unit	1960	1970	1975	1976	1977	1978
1	2	3	4	5	6	7	8	9
1a	Gross Domestic Product Allocated - whole economy	000 mill. zls	458,8	911,1	1737,5	2009,5	2194,4	2349,3
1b		000 mill. \$	28,6	41,6	94,5	103,8	118,6	135,2
2a	Gross accumulation	000 mill. zls	134,8	287,9	658,6	766,1	777,9	831,6
2b		000 mill. \$	6,0	9,6	26,5	28,0	30,3	33,2
3a	Share of gross accumulation in the country's GDP Allocated	% /zls base/	29,4	31,6	37,9	38,1	35,4	35,3
3b		% / \$ base /	21,0	23,0	28,0	26,9	25,5	24,5
4a	Total consumption	% / zls base /	320,0	623,3	1078,9	1243,4	1416,5	1517,7
4b		% / \$ base /	22,6	32,0	68,0	75,8	88,3	102,0
5a	Share of total consumption in the country's GDP Allocated	% / zls base /	70,4	68,5	62,1	61,9	64,6	64,7
5b		% / \$ base /	79,0	77,0	72,0	73,1	74,5	75,5

Note : The table presents Gross Domestic Product Allocated , which includes balance of foreign trade in goods and material services

TABLE No 5

CAPITAL FORMATION / AT CURRENT PRICES/ 1960 - 1978

No	Item	Unit	1960	1970	1975	1976	1977	1978
1	2	3	4	5	6	7	8	9
1	TOTAL GROSS FIXED CAPITAL FORMATION	000' mill. zls	108,1	243,9	266,6	636,8	684,9	735,4
2	GROSS FIXED CAPITAL FORMATION AS A PERCENTAGE OF THE	%	23,5	26,7	32,0	31,7	31,2	31,3
3	GROSS FIXED CAPITAL FORMATION IN INDUSTRIAL ACTIVITY OF THIS: machinery and equipment	000' mill.zls	36,44	80,4 37,7	239,1 129,1	273,4 144,4	271,2 146,2	268,8 149,0
4	GROSS FIXED CAPITAL FORMATION IN INDUSTRIAL ACTIVITY AS A PERCENTAGE OF TOTAL	%	33,7	32,9	42,9	42,9	39,6	36,5
5	GROSS FIXED CAPITAL FORMATION IN ENGINEERING INDUSTRY OF THIS: machinery and equipment	000' mill.zls	5,6 2,8	18,2 10,2	59,7 38,4	67,0 42,9	71,1 46,6	68,5 44,5
5	GROSS FIXED CAPITAL FORMATION ENGINEERING INDUSTRY AS A PERCENTAGE OF TOTAL	%	5,2	7,5	10,7	10,5	10,4	9,3

TABLE No 6

ENGINEERING PRODUCTS MANUFACTURE AND DELIVERIES
TO DOMESTIC USERS IN 000 MILL. ZLS
AT CURRENT PRICES

No	Product category	Year	Domestic Production	Total deliveries to domestic users x/
1	2	3	4	5
/A+B and C	ENGINEERING PRODUCTS:	1970	308,5	317,7
	TOTAL	1975	626,1	687,0
	IN THIS:/A+B/ AND C	1980	1090,0	1080,0
C	NONCAPITAL GOODS:	1970	88,7	90,2
	CONSUMER GOODS:	1975	223,5	185,2
	AND OTHERS:	1980	438,9	368,1
A+B	CAPITAL GOODS:	1970	219,8	227,5
	MEANS OF PRODUCTION EQUIPMENT	1975	402,6	501,8
	COMPONENTS AND STANDARD ITEMS IN THIS: A and B	1980	651,5	712,3
A	-- MEANS OF PRODUCTION AND EQUIPMENT	1970	126,3	129,4
		1975	245,8	331,7
		1980	387,7	441,5
B	-- COMPONENTS AND STANDARD ITEMS	1970	93,5	98,1
		1975	156,8	170,2
		1980	263,8	270,8

X/ INCLUDING IMPORTS

TABLE No 7

ENGINEERING PRODUCTS: - PRODUCTION AND DELIVERIES TO DOMESTIC USERS
BREAKDOWN AND GROWTH RATES IN %

No	Product Category	Year	Domestic production		Deliveries to domestic users X/	
			Share in total	Growth rate 1970=100	Share in total	Growth rate 1970=100
1	2	3	4	5	6	7
/A+B/ and C	ENGINEERING PRODUCTS: TOTAL IN THIS:	1970	100	100	100	100
		1975	100	203	100	216
		1980	100	354	100	341
C	- NONCAPITAL GOODS: CONSUMER GOODS AND OTHERS	1970	29,7	100	28,4	100
		1975	35,6	252	26,9	203
		1980	40,2	495	34,0	409
A+B	- CAPITAL GOODS: MEANS OF PRODUCTION, EQUIPMENT COMPONENTS AND STANDARD ITEMS IN THIS:	1970	71,3	100	71,6	100
		1975	64,4	183	73,1	220
		1980	59,8	297	66,0	312
A	- - MEANS OF PRODUCTION AND EQUIPMENT	1970	57,7	100	56,9	100
		1975	61,1	195	66,1	256
		1980	59,5	307	62,0	341
B	- - COMPONENTS AND STANDARD ITEMS	1970	42,3	100	43,1	100
		1975	38,9	168	33,9	174
		1980	40,5	282	38,0	276

X/ INCLUDING IMPORTS

TABLE No 8

ENGINEERING PRODUCTS OF THE CAPITAL GOODS NATURE
 PRODUCTION AND DELIVERIES TO DOMESTIC USERS
 IN 000 MILL. ZLS.

No	Number of the sector of national economy	Product category	Year	Domestic Production	Deliveries to domestic users X/	
1	2	3	4	5	6	
A+B		CAPITAL GOODS IN TOTAL: MEANS OF PRODUCTION EQUIPMENT, COMPONENTS AND STANDARD ITEMS OF THIS DESIGNED FOR:	1970	219,8	228,5	
			1975	402,6	501,8	
			1980	651,5	712,3	
I		- RAW MATERIALS BASE OF THIS:	1970	7,5	8,6	
			1975	11,5	17,3	
			1980	23,5	38,0	
1		MINING SECTOR	1970	7,5	8,6	
			1975	11,5	17,3	
			1980	23,5	38,0	
II		- MATERIAL AND SEMIPRODUCT BASE OF THIS:	1970	6,7	12,0	
			1975	13,0	36,8	
			1980	21,4	43,5	
	2		METALLURGY AND CASTING SECTOR	1970	1,2	1,2
				1975	4,1	15,3
				1980	7,8	19,8
3		CHEMICAL PRODUCTS SECTOR	1970	3,7	8,5	
			1975	5,5	12,6	
			1980	8,9	16,4	
4		BUILDING MATERIALS SECTOR	1970	1,1	1,1	
			1975	2,4	7,1	
			1980	3,7	4,5	
5		LUMBER PROCESSING SECTOR	1970	0,1	0,2	
			1975	0,2	0,3	
			1980	0,2	0,5	
6		GLASS MANUFACTURE SECTOR	1970	0,1	0,2	
			1975	0,1	0,2	
			1980	0,2	0,8	

X/ INCLUDING IMPORTS

No	Number of the sector of national economy	Product category	Year	Domestic production	Deliveries to domestic users X/
1	2	3	4	5	6
	7	MANUFACTURE OF CELLULOSE	1970	0,4	0,8
			1975	0,4	0,8
			1980	0,4	0,9
	8	TANNING INDUSTRY	1970	0,57	0,3
			1975	0,50	0,4
			1980	0,70	0,5
	9	FUEL PROCESSING	1970 1975 1980	INCLUDED UNDER SECTOR 3	
III		POWER AND ENERGY BASE OF THIS :	1970 1975 1980	12,8 32,4 47,0	11,3 31,6 41,8
	10a	ELECTRIC POWER GENERATION	1970 1975 1980	2,7 12,6 14,3	2,5 14,5 17,2
	10b	ELECTRIC POWER TRANSFORMATION	1970 1975 1980	3,1 6,9 13,0	2,3 4,9 7,1
	10c	ELECTRIC POWER DISTRIBUTION	1970 1975 1980	7,0 12,9 19,6	6,5 12,1 17,6
IV		MEANS OF PRODUCTION MANUFACTURING BASE OF THIS:	1970 1975 1980	5,3 9,9 16,6	8,0 29,5 39,1
	11	ENGINEERING INDUSTRY	1970 1975 1980	5,3 9,9 16,6	8,0 29,5 39,1

X/ INCLUDING IMPORTS

TABLE No 8 cont'd

PAGE 3

No	Number of the sector of national economy	Product category	Year	Domestic production	Deliveries to domestic users X _i
1	2	3	4	5	6
V		OTHER BASIC BRANCHES OF NATIONAL ECONOMY	1970	51,9	72,7
		OF THIS:	1975	154,2	167,8
			1980	241,2	226,3
	12	CONSTRUCTION INDUSTRY	1970	4,9	4,7
			1975	10,6	14,2
			1980	19,2	19,0
	13	AGRICULTURE	1970	14,4	15,9
	14	FORESTRY	1975	25,3	30,0
			1980	40,2	44,7
	15	TRANSPORTATION	1970	60,6	50,2
			1975	118,3	122,5
			1980	168,5	149,4
	16	COMMUNICATION	1970	2,1	2,1
			1975	7,6	8,7
			1980	13,3	13,3

X/ INCLUDING IMPORTS

TABLE No 8 cont'd

PAGE 4

No	Number of the sector of national economy	Product category	Year	Domestic production	Deliveries to domestic users X/
1	2	3	4	5	6
VI		OTHER BASIC BRANCHES NATIONAL ECONOMY OF THIS:	1970 1975 1980	8,9 12,2 19,0	12,1 29,4 32,9
	17	FOOD PROCESSING INDUSTRY	1970 1975 1980	5,2 4,7 7,8	5,5 11,5 10,7
	18	TEXTILE INDUSTRY	1970 1975 1980	2,4 4,0 5,9	4,7 9,0 10,5
	19 20	CLOTHING INDUSTRY LEATHER AND FOOT- WEAR INDUSTRY	1970 1975 1980	0,2 0,3 0,4	0,6 2,1 1,7
	21	GLASS INDUSTRY	1970 1975 1980	0,1 0,1 0,2	0,2 0,2 0,4
	22 23	PAPER INDUSTRY PRINTING INDUSTRY	1970 1975 1980	0,6 0,8 1,4	0,9 3,1 4,1
	24	WOOD-BASED INDUSTRY	1970 1975 1980	0,5 2,1 3,3	0,6 3,5 5,6
	25 26 27	ELECTRONIC INDUSTRY AUTOMOTIVE INDUSTRY PHARMACEUTICAL INDUSTRY	1970 1975 1980	INCLUDED UNDER SECTOR 11	

X/ INCLUDING IMPORTS

TABLE No 8 cont'd

PAGE 5

No	Number of the sector of national economy	Product category	Year	Domestic Production	Deliveries to domestic users X/
1	2	3	4	5	6
VII		OTHER BASIC BRANCHES OF NATIONAL ECONOMY OF THIS	1970	3,2	4,7
			1975	12,6	19,3
			1980	19,00	19,8
	28	TRADE IN GOODS	1970	1,2	1,3
			1975	2,9	4,5
			1980	4,0	5,3
	29	HEALTH SERVICE AND PHYSICAL FITNESS PROGRAMMES	1970	1,1	1,5
			1975	1,5	2,4
			1980	2,5	3,5
	30	DATA PROCESSING AND OFFICE EQUIPMENT	1970	0,9	2,0
			1975	8,1	12,6
			1980	12,4	11,0

X/ INCLUDING IMPORTS

TABLE No 9

ENGINEERING PRODUCTS OF THE CAPITAL GOODS NATURE - PRODUCTION AND DELIVERIES TO DOMESTIC USERS
BREAKDOWN AND GROWTH RATES BY SECTORS IN %

No	Number of the sector of national economy	Product category	Year	Domestic production		Deliveries to domestic users x/	
				Share in A+B	Growth rate 1970 = 100	Share in A+B	Growth rate 1970 = 100
1	2	3	4	5	6	7	8
A+B		CAPITAL GOODS IN TOTAL:	1970	100	100	100	100
		MEANS OF PRODUCTION EQUIPMENT COMPONENTS	1975	100	183	100	220
		AND STANDARD ITEMS OF THIS DESTINED FOR:	1980	100	297	100	312
I		- RAW MATERIAL BASE	1970	3,4	100	3,7	100
		OF THIS:	1975	2,8	154	3,4	201
			1980	3,6	313	5,3	442
1		Mining Sector	1970	3,4	100	3,7	100
			1975	2,8	154	3,4	201
			1980	3,6	313	5,3	442
II		- MATERIAL AND SEMIPRODUCT BASE	1970	3,0	100	5,2	100
		OF THIS:	1975	3,2	194	7,3	306
			1980	3,2	320	6,1	361
2		METALLURGY AND CASTING SECTOR	1970	0,5	100	0,5	100
			1975	1,0	327	3,0	1277
			1980	1,2	630	2,7	1653
3		CHEMICAL PRODUCTS SECTOR	1970	1,6	100	3,7	100
			1975	1,3	148	2,5	148
			1980	1,3	238	2,3	192
4		BUILDING MATERIALS SECTOR	1970	0,4	100	0,4	100
			1975	0,6	242	1,4	677
			1980	0,5	345	0,6	428
5		TIMBER PROCESSING SECTOR	1970	0,05	100	0,07	100
			1975	0,04	150	0,05	166
			1980	0,03	191	0,06	250
6		GLASS MANUFACTURE SECTOR	1970	0,03	100	0,07	100
			1975	0,03	193	0,04	143
			1980	0,03	293	0,1	479

x/ INCLUDING IMPORTS

TABLE No 9 cont'd

PAGE 2

No	Number of the sector of national economy	Product category	Year	Domestic production		Deliveries to domestic users X/	
				Share in A + B	Growth rate 1970 = 100	Share in A+B	Growth rate 1970 = 100
1	2	3	4	5	6	7	8
	7	MANUFACTURE OF CELLULOSE	1970 1975 1980	0,1 0,1 0,06	100 106 115	0,3 0,1 0,1	100 095 103
	8	TANNING INDUSTRY	1970 1975 1980	0,2 0,01 0,01	100 122 122	0,1 0,07 0,07	100 143 206
	9	FUEL PROCESSING	1970 1975 1980	INCLUDED UNDER SECTOR 1 AND 3			
III		POWER AND ENERGY BASE OF THIS:	1970 1975 1980	5,8 8,0 7,2	100 253 367	4,9 6,2 5,8	100 279 370
	10a	ELECTRIC POWER GENERATION	1970 1975 1980	1,2 3,1 2,2	100 469 534	1,1 2,8 2,4	100 573 680
	10b	ELECTRIC POWER TRANSFORMATION	1970 1975 1980	1,4 1,7 2,0	100 223 422	0,9 0,9 0,9	100 219 314
	10c	ELECTRIC POWER DISTRIBUTION	1970 1975 1980	3,1 3,2 3,0	100 184 280	2,8 2,4 2,4	100 186 271
IV		MEANS OF PRODUCTION MANUFACTURING BASE OF THIS:	1970 1975 1980	2,3 2,4 2,5	100 188 315	3,5 5,8 5,4	100 366 486
	11	ENGINEERING INDUSTRY	1970 1975 1980	2,3 2,4 2,5	100 188 315	3,5 5,7 5,4	100 366 486

TABLE No. 9 cont'd

PAGE 3

No	Number of the sector of national economy	Product category	Year	Domestic production		Deliveries to domestic users X/	
				Share in A+B	Growth rate 1970 = 100	Share in A+B	Growth rate 1970 = 100
1	2	3	4	5	6	7	8
V		OTHER BASIC BRANCHES OF NATIONAL ECONOMY	1970	37,2	100	31,7	100
		OF THIS:	1975	38,3	188	33,4	230
			1980	37,0	294	31,7	311
	12	CONSTRUCTION INDUSTRY	1970	2,2	100	2,0	100
			1975	2,6	218	2,8	301
			1980	2,9	394	2,6	402
	13	AGRICULTURE	1970	6,5	100	6,9	100
			1975	6,2	175	5,9	109
	14	FORESTRY	1980	6,1	279	6,2	200
	15	TRANSPORTATION	1970	27,5	100	21,9	100
			1975	29,3	195	24,4	244
			1980	25,8	278	20,9	257
	16	COMMUNICATION	1970	0,9	100	0,9	100
			1975	1,8	360	1,7	405
			1980	2,0	632	1,8	619

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TABLE No 9 cont'd
PAGE 4

No	Number of the sector of national economy	Product category	Year	Domestic production		Deliveries to domestic users	
				Share in A+B	Growth rate 1970 = 100	Share in A+B	Growth rate 1970 = 100
1	2	3	4	5	6	7	8
VI		OTHER BASIC BRANCHES OF NATIONAL ECONOMY OF THIS:	1970 1975 1980	4,0 3,0 2,9	100 136 213	5,2 5,8 4,6	100 243 272
	17	FOOD PROCESSING INDUSTRY	1970 1975 1980	2,3 1,1 1,2	100 091 151	2,4 2,2 1,5	100 209 194
	18	TEXILE INDUSTRY	1970 1975 1980	1,0 1,0 0,9	100 170 246	2,0 1,8 1,4	100 190 220
	19	CLOTHING INDUSTRY	1970	0,06	100	0,2	100
	20	LEATHER AND FOOTWEAR INDUSTRY	1975 1980	0,07 0,06	200 286	0,4 0,2	340 281
	21	GLASS INDUSTRY	1970 1975 1980	0,03 0,03 0,03	100 194 293	0,07 0,04 0,05	100 139 246
	22	PAPER INDUSTRY	1970	0,2	100	0,3	100
	23	PRINTING INDUSTRY	1975 1980	0,1 0,2	122 215	0,6 0,5	341 453
	24	WOOD - BASED INDUSTRY	1970 1975 1980	0,2 0,5 0,5	100 427 653	0,2 0,6 0,7	100 578 925
	25 26 27	ELECTRONIC INDUSTRY AUTOMOTIVE INDUSTRY PHARMACEUTICAL INDUSTRY	1970 1975 1980	Included under sector 11			

TABLE No 9 cont'd

PAGE 5

No	Number of the sector of national economy	Product category	Year	Domestic production		Deliveries to domestic users	
				Share in A+B	Growth rate 1970=100	Share in A+B	Growth rate 1970=100
1	2	3	4	5	6	7	8
VII		OTHER BASIC BRANCHES OF NATIONAL ECONOMY	1970	1,4	100	2,0	100
		OF THIS:	1975	3,1	392	3,8	414
			1980	2,9	592	2,7	425
	28	TRADE IN GOODS	1970	0,5	100	1,9	100
			1975	0,7	240	0,8	348
			1980	0,6	332	0,7	423
	29	HEALTH SERVICE AND PHYSICAL FITNESS PROGRAMMES	1970	0,5	100	0,6	100
			1975	0,3	140	0,4	167
			1980	0,3	230	0,4	242
	30	DATA PROCESSING AND OFFICE EQUIPMENT	1970	0,4	100	0,8	100
			1975	2,0	902	2,5	638
			1980	1,9	1381	1,5	560

TOTAL ENGINEERING GOODS	1970 - 100 / 100
	1975 - 100 / 184.7
	1980 - 100 / 279.8

CONSUMER GOODS	1970 - 9.7 / 100
	1975 - 12.0 / 228.8
	1980 - 12.1 / 340.3

CAPITAL GOODS	1970 - 71.3 / 100
	1975 - 85.6 / 219.6
	1980 - 80.3 / 311.7

CAPITAL GOODS	1970 - 100 / 100
	1975 - 100 / 219.6
	1980 - 100 / 311.7

MEANS OF PRODUCTION AND EQUIPMENT	1970 - 56.6 / 100
	1975 - 66.1 / 255
	1980 - 62.0 / 341

COMPONENTS AND STANDARD ITEMS	1970 - 43.4 / 100
	1975 - 33.9 / 172
	1980 - 38.0 / 273

MEANS OF PRODUCTION
MANUFACTURING BASE
CAPITAL GOODS INDUSTRY

ENGINEERING INDUSTRY AS A
MANUFACTURER OF:
A. MEANS OF PRODUCTION AND
EQUIPMENT FOR:
A1. BASIC SECTORS OF
NATIONAL ECONOMY
A2. OTHER SECTORS OF
NATIONAL ECONOMY

1970 - 56.6 / 100
1975 - 66.1 / 256.2
1980 - 62.0 / 341.1

CONSUMPTION

50
1970 - 9.7 / 100
1975 - 12.0 / 228.8
1980 - 12.1 / 340.3

CONSUMER GOODS
MANUFACTURING BASE
ENGINEERING INDUSTRY AS A
MANUFACTURER OF:
C. CONSUMER
GOODS

1970 - 9.7 / 100
1975 - 12.0 / 228.8
1980 - 12.1 / 340.3

A1. BASIC

BRANCH OF NA

MINING
INDUSTRY

RAW -
MATERIAL
BASE

MINING OF: ores, coal,
chemical and mineral
raw - materials

1

1970 - 37 / 100
1975 - 34 / 201
1980 - 5.3 / 44.2

1970	37 / 100	0.5 / 100	37 / 100
1975	34 / 201	3.0 / 1227	25 / 14
1980	5.3 / 44.2	27 / 1653	23 / 10

NUMBER OF NTL
ECONOMY
SECTOR

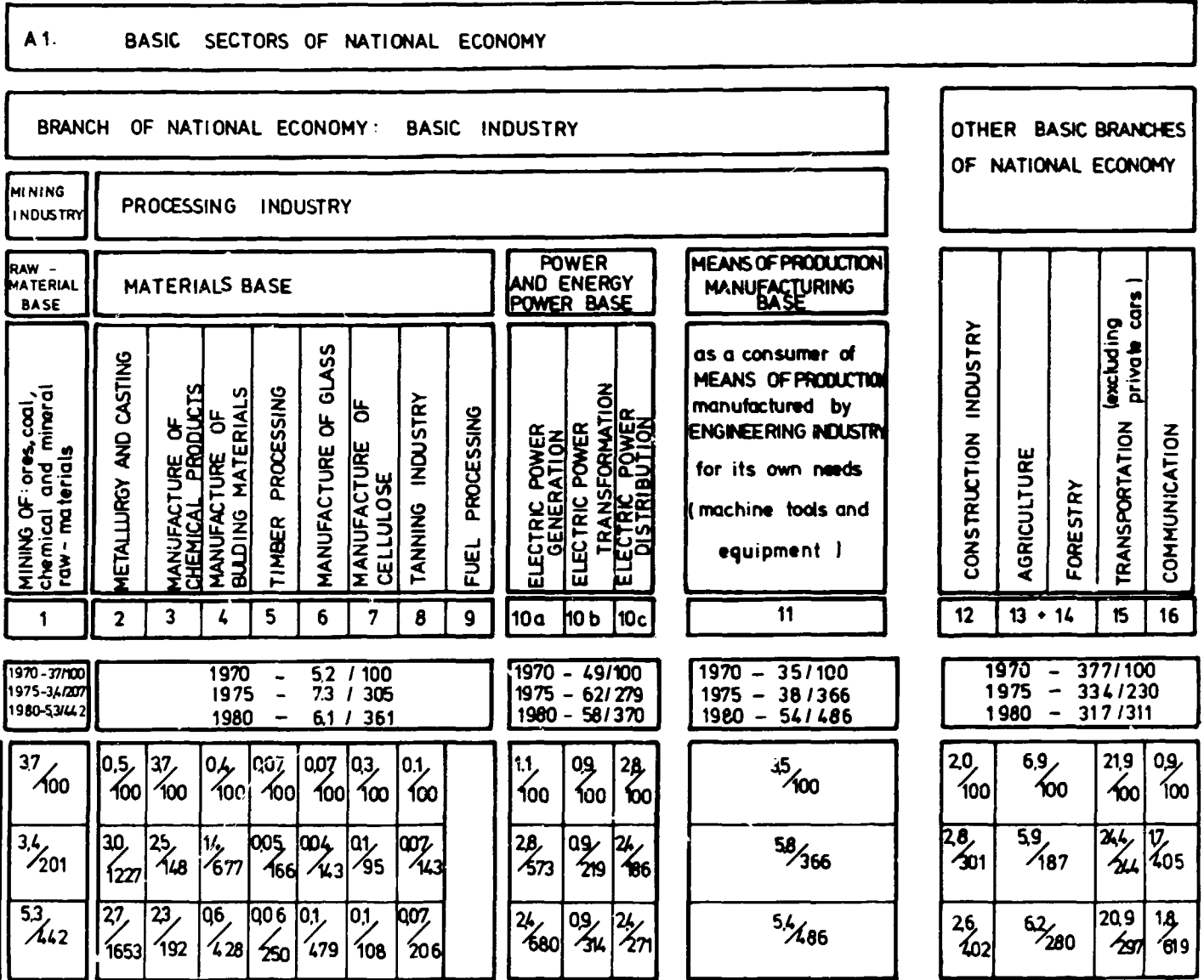
MEANS OF PRODUCTION
MANUFACTURING BASE
CAPITAL GOODS INDUSTRY

ENGINEERING INDUSTRY AS A
MANUFACTURER:
B. COMPONENTS AND STANDARD
ITEMS FOR:
A. MEANS OF PRODUCTION AND
EQUIPMENT
B. CONSUMER GOODS

1970 - 43.4 / 100
1975 - 33.9 / 171.7
1980 - 38.0 / 273.3

SECTION 1

THE FLOW OF ENGINEERING INDUSTRY PRODUCTS INTENDED FOR DOMESTIC NEEDS DURING 1970-1980



Note:

first numbers represent proportion of DELIVERIES of capital goods (i.e. DOMESTIC P for given BRANCH of NATIONAL ECONOMY in the TOTAL DELIVERIES of ENGINEERING II (i.e. MEANS of PRODUCTION EQUIPMENT COMPONENTS and STANDARD ITEMS) second numbers represent growth rates of given GROUP of PRODUCTS taking 1970

SECTION 2

ENGINEERING INDUSTRY PRODUCTS CAPITAL NEEDS DURING 1970-1980

ENGINEERING INDUSTRY PRODUCTS											A2 OTHER SECTORS OF NATIONAL ECONOMY										
OTHER BASIC BRANCHES OF NATIONAL ECONOMY											BRANCH OF NATIONAL ECONOMY										
MEANS OF PRODUCTION MANUFACTURING BASE											PROCESSING INDUSTRY										
as a consumer of MEANS OF PRODUCTION manufactured by ENGINEERING INDUSTRY for its own needs (machine tools and equipment)																					
CONSTRUCTION INDUSTRY											FOOD PROCESSING INDUSTRY										
AGRICULTURE											TEXTILE INDUSTRY										
FORESTRY											CLOTHING INDUSTRY										
TRANSPORTATION (excluding private cars)											LEATHER AND FOOTWEAR INDUSTRY										
COMMUNICATION											GLASS INDUSTRY										
											PAPER INDUSTRY										
											PRINTING INDUSTRY										
											WOOD-BASED INDUSTRY										
											ELECTRONIC INDUSTRY										
											AUTOMOTIVE INDUSTRY										
											PHARMACEUTICAL INDUSTRY										
											TRADE IN GOODS										
											HEALTH SERVICE AND PHYSICAL FITNESS PROGRAMMES										
											DATA PROCESSING AND OFFICE EQUIPMENT										
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
1970 - 35/100 1975 - 38/366 1980 - 54/486	1970 - 377/100 1975 - 334/230 1980 - 317/311				1970 - 5.2/100 1975 - 5.8/243 1980 - 4.6/272							1970 - 20/100 1975 - 38/414 1980 - 27/475									
35/100	20/100	6.9/100	21.9/100	0.9/100	2.4/100	2.0/100	0.2/100	0.07/100	0.3/100	0.2/100							1.9/100	0.6/100	0.8/100		
58/366	2.8/301	5.9/187	26.4/244	17/405	22/209	18/190	0.4/340	0.04/139	0.6/341	0.6/578							0.8/348	0.4/167	2.5/668		
54/486	2.6/402	6.2/280	20.9/297	1.8/619	1.5/194	1.4/220	0.2/281	0.005/246	0.5/153	0.7/925							0.7/123	0.4/242	1.5/560		

↑ represent proportion of DELIVERIES of capital goods (i.e. DOMESTIC PRODUCTION EXPORT+IMPORT)
 ↑ PERCENTAGE SHARE of NATIONAL ECONOMY in the TOTAL DELIVERIES of ENGINEERING INDUSTRY'S CAPITAL GOODS
 ↑ (PRODUCTION EQUIPMENT COMPONENTS and STANDARD ITEMS)
 ↑ represent growth rates of given GROUP of PRODUCTS taking 1970 level as 100.



81 09 30