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IDENTIFICATION OF OPPORTUNITIES TO STRENGTHEN  
MANUFACTURING SYSTEMS OF SELECTED INDUSTRIES  
THROUGH AUTOMIZATION OF PRODUCTION PROCESS

TF/RER/90/001

POLAND

Terminal report

Part I

Prepared for the Government of ~~Hungary~~ Poland  
by the United Nations Industrial Development Organization

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New Technologies Unit

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## I. INTRODUCTION

### UNIDO Mission to Poland and Hungary

This report is based on UNIDO Technical Assistance Project TF/RER/90/001 "Identification of Opportunity to Strengthen Manufacturing System of Selected Industries through Automation of the Production Process" which was implemented through a series of UNIDO missions, following requests made by the Polish as well as the Hungarian Governments.

The UNIDO Missions were fielded on aspects of the electrical and electronics as well as the pharmaceutical industries from 17 October to 8 November 1990, and on the automobile industry from 6 to 15 January 1991. For the preparation and arrangement of the above specialists missions, two short-term staff member missions were fielded in 1990.

The specialists comprised a UNIDO staff member from the New Technologies Unit in the Industrial Technology Development Division, Project Team Co-ordinator, Seichi MINURA, Consultant for electric and electronics aspects, Masahiko YOSHITAKE, for pharmaceuticals, Akira OGI and Hironori TACHIMORI for the automobile industry.

The Missions worked in good co-operation and assistance with the national experts in Poland, MM. Jan POTEGA and Krzysztof DABROWSKI, and in Hungary, MM. Dr. János SOMLO and Barna MEZEY.

Special thanks go to Mr. Ryszard BANDOROWICZ, Managing Director of PROMASZ, Poland, and to Mr. Tamás Sómjen, Deputy Director General of the Ministry of International Economic Relations, Hungary, for all the arrangements they did in line with the preparation and implementation of the project.

### Background and objective

In Eastern Europe, the economic system used to be very much different from the market economy in the past, though some countries, namely Hungary, have introduced a number of changes pointing towards market economy. According to its system, the central plan was deciding on the economic policy of the country and allocating the whole production to individual enterprises. The pricing system had been established completely independently from the international

price level for natural resources and energy resources. There was no linkage with overseas markets. The level and pattern of investment was decided according to the priorities of the central plan rather than to consumers' demand and need of profit-oriented production enterprises. In practice, prices had remained unchanged, which caused severe shortages of industrial as well as consumer goods.

As a result of this policy and socio-economic structure, industries in east European countries were mainly based on resources, primary products and labour-intensive subsectors at the expenses of consumer goods and service sectors. Consequently, the heavy and defence industries were showing a good growth.

Poland and Hungary are undergoing rapid political and economic reforms. Since 1990, the Governments have endeavoured to overcome the economic difficulties and to gradually introduce new economic policies which are concentrated on a "market economy" and "foreign trade" liberalization.

The objectives of this project are to identify and assess the needs of selected industries to upgrade their product quality through automatization as well as to improve their production efficiency and performance. Within the framework of a fact-finding and project identification mission, diagnostics, approaches to ailing manufacturing industries and identification of corrective measures for immediate and long-term action were carried out.

The Missions, in co-operation with the Governments involved have identified three industrial subsectors to be assessed in this project: they are the electrical and electronics, pharmaceutical and automobile industries.

The Missions have conducted a short survey by visiting and discussing with persons concerned their related production and research organizations and enterprises.

In the area of electrical and electronics industry these persons were:  
in Poland: Unitra Serwis, Software houses (6 companies), MERA BLONIE, WAMEL, EMA ELESTER, ELWRO and IOPM.  
in Hungary: MEDICOR, SZAMALK, MTA SZTAKI, VIDEOTON Automatika, VIDEOTON Audio-technikai and VILATI.

In the area of pharmaceutical industry:

in Poland: POLFA in Terchomin, POLFA in Starogard Gdaanski, PABIANICKIE Zaklady Farmaceutyczne POLFA,

in Hungary: BIOCHIM Biotechnological Company, BIOREX Research and Development Co., MEDIPHARMA/BIOPHARM, Institute for Drug Research; CHINOIN, GEDEON RICHTER, the Institute HUMAN for Serobacteriological Production and Research, BIOGAL.

In the area of auto industry:

in Poland: TRANSBUD, POLMO ZELMOT, PZL WOLA

in Hungary: SPIRÁL Autojavító Vallat, HUGAROSZERVIZ, CONTREX, MERKUR (as trading company), TUNGSRAM IKARUS Autokonzern.

At the time of the UNIDO Mission's arrival in the respective country, an orientation meeting was held with a counterpart organization where a programme of visits was discussed and enterprises were selected to be visited. Following this meeting, the Mission was sent immediately to visit the enterprises. Although the stay of the UNIDO experts in each country was very short, no longer than a week in one case, only a couple of days in the other, the Mission could achieve a very fruitful outcome of the survey and prepare this report, due to a well arranged programme organized by the national experts and due to the latter's very effective co-operation.

The observations made by the Mission were based on their very short visits and limited information collected in the field, but the survey led to a preliminary conclusion that many of the enterprises must solve other basic problems before they can successfully introduce automated production processes and apply modern technology. These basic problems are:

- marketing and market-oriented management,
- introduction of new production system and capabilities,
- training programmes at all employees levels, for managers, and for technical and skilled workers.

Recommendations have been formulated in this report on aspects of each of the respective industries and they are shown in the corresponding chapters.

This report is also intended to serve for potential overseas investors who may be interested in finding out about local co-operation in view of possible future joint ventures or simply for market co-operation.

## II. RECENT ECONOMIC ENVIRONMENT

The present economic situation in Eastern Europe and the Soviet Union is not so much a cyclical or short-term phenomenon as the most recent stage in a generally deteriorating performance which reaches back over two decades or more. Economic growth rates had been very high in the fifties or sixties and, to a large extent, they reflected a successful recovery from the destruction and dislocation caused by the Second World War. Although a slow-down in such "recovery" growth rates could be regarded as normal, planners in the Eastern countries introduced the notion of a transition from extensive to intensive growth in the late sixties as a means to maintain rapid expansion rates. These were required in order to close the gap in economic development levels between the East and the West. The possibility of extensive growth, i.e. growth based on a simultaneous expansion of labour and capital, had diminished as the available reserves of labour became fully employed. Growth would therefore become intensive through a more efficient use of available resources.

The rates of fixed-capital formation did in fact accelerate and, from the mid-sixties onward, investment ratios were often higher than envisaged in the 5-year plans. As ratio to net material product, the gross fixed investment in the Eastern countries averaged 33 per cent in the first half of the seventies and about 30 per cent in the first half of the eighties. The early seventies saw the fixed investment rates rise to a double-digit annual level in Eastern Europe but slow down sharply thereafter and fall between 1979 and 1982, as a result of the adjustment that followed the second oil shock and the accompanying international debt crisis. In the Soviet Union, the fluctuation was less volatile than in Eastern Europe but there was still a sharp fall in the investment rate. Some recovery occurred in the latter half of the eighties but, compared to the seventies, fixed investment was relatively modest all over the region.

Despite considerably expanded investments, especially in the seventies, the slowed down rates of output were not reversed (except for a short period in the late sixties and early seventies) and the growth of labour productivity fell steadily from the early seventies onward. Capital productivity also fell persistently in all Eastern Europe after 1976 and, in most countries, since 1971. In the first half of the eighties, the contribution of changes in total factor productivity to the growth of NMP was generally smaller than in the early sixties.



There are many reasons to the inefficiency of investments: lead times were long and tended to increase in the eighties (i.e. the proportion of unfinished, non-performing investment projects in gross fixed investment had risen); the latter was partly due to a systemic tendency to start an excessive number of new investment projects in order to get them "to the plan" and thus lay a claim for future investment funds: equipment often turned to be out of date by the time it was actually installed and put into operation; there appears to have been widespread coordination failures in balancing supplies of labour, material inputs and energy consumption per unit of output, the latter ones being very high in comparison with the market economy, owing partly to a structural bias in the development process which favoured the nurturing of up-stream sectors of "heavy" industry, but also generally reflecting lower levels of efficiency and technology throughout the production process. Imports of Western capital goods do not appear to have eased these problems significantly. The Eastern economies found it difficult to absorb Western technology and improve their economic performance. These and other factors, such as inadequate transport and communication systems, point to a general systemic inefficiency which only increased with time.

The basic system of economic organization which had prevailed in the Soviet Union since the late twenties and, generally, in Eastern Europe since the early fifties is very different from the market economy system. Its main features must be recalled briefly: the central plan was the main policy instrument and it basically decided what individual enterprises were to produce. Prices were determined bureaucratically and were used very little as a planning instrument; producer prices had little influence on allocation of resources since the level and pattern of investment was allocated according to the priorities of the plan rather than to the perceptions of enterprises as to which opportunities could be profitable; consumer prices gave some attention to demand insofar as the turnover taxes were supposed to be set at rates which adjusted demand to availability of supplies which, in turn, was determined by the central plan. Prices were based on average rather than on marginal costs and, therefore, were unreliable as indicators of true social costs. Moreover, prices had remained practically unchanged for long periods of time, thus contributing to severe shortages. In the traditional model, trade policy was essentially autarkic and foreign trade, which was monopolized by the State, was seen as meeting the residual needs of the system. The whole system was enclosed in a state where

political party, state and economic hierarchies were intermingled but where one party supervision was predominant.

The incentive structure of this system was such that micro-inefficiency was widespread and responsible for the endemic shortages which characterized centrally-planned economies. More fundamentally, enterprises were not eager to adopt new technologies and raise efficiency, simply because there was no strong incentive to do so. The incentive structure, which reflected the restricted, non-allocative role of prices, also meant that new enterprises could not be set up in response to profitable opportunities and/or failures of established concerns. Entry and exit of firms were controlled by the plan and industrial structures tended to be dominated by large, inefficient and inflexible enterprises. In general, widespread failures on the supply side had provided enterprises with strong incentives to meet their own needs for intermediate goods; this, in turn, had led to a lack of specialization, overstocking of materials, etc., and a lowered efficiency throughout the production system.

Attempts to remedy the deficiencies of this basic model were made more or less continuously since the late fifties. At first, reforms were focused on improving the traditional model, especially in regard to improving enterprise incentives (for example, replacing gross-output targets with various bonus-setting indicators or even some degree of profit), but the basic planners' sovereignty over the price mechanism never came into question. More radical reforms were introduced in some Eastern Europe countries since the late sixties, especially by Hungary who introduced a significant degree of decentralization into the economic system in 1968. However, all these reforms failed to alter the behavioural patterns of enterprises significantly. Most of the reforms introduced before 1989 still left the central authorities with considerable power to control and influence the economic behaviour of individual enterprises. Because of the closely related political and economic structures, reforms were always checked for fear that any further change in the economic system might challenge the established interests of the party and its hierarchy.

This is why the 1989 events represent a radical break with the past: the end of a one-party rule opening up the possibility to establish decentralized market economies where the principal (but not necessarily the only) economic role of government is to pursue macro-economic goals using indirect methods of

fiscal and monetary policy. This is now stated as objective in Poland, Hungary and Czechoslovakia, not to mention the former German Democratic Republic.

The economic performance in Eastern Europe in 1989 was probably the worst since the immediate post-war period: apart from Czechoslovakia and the German Democratic Republic, the Eastern Europe output fell or stagnated; in the Soviet Union, it did rise but much less than planned. Domestic imbalances were also worse than at any other time since the post-war recovery. Economic problems were partly responsible for and, certainly compounded by, widespread social unrest which took a variety of forms ranging from strikes to large-scale emigration.

In 1990, the Eastern countries are facing a formidable array of problems. Policy makers are currently preoccupied with restoring political and social stability, and implementing economic stabilization programmes which will impose heavy burdens on the population. At the same time, they are introducing or planning to introduce fundamental reforms to replace central planning by a decentralized market system. All this must be done against the background of short-run economic outlook which is far from encouraging for the Eastern economies. However, despite the sombre prospects, a social consensus has already emerged in some countries to adopt harsh economic stabilization programmes. Moreover, for the first time ever, the Western market-economy countries have clearly stated their readiness to support the reform process in the East.

In the centrally-planned economy, foreign trade has been seen as a source of uncertainty which, mainly because of unexpected changes in foreign demand and the terms of trade, was liable to upset the calculations of domestic resource balances in the plans. Consequently, the Eastern countries trade was largely motivated by the necessity to meet residual needs, to supply goods for which there had been no adequate domestic substitutes. Thus a major feature of the economy in the Eastern countries is their relatively low trade level in relation to their economic size and national output. The reduced imports have severely affected domestic output and supplies.

Trade performance has been affected by different trade arrangements with the Western, convertible-currency countries and with other Eastern countries within the CMEA. CMEA members have accounted for some 40 to 80 per cent of the total trade in Eastern Europe countries, although most of it consisted of

bilateral exchanges with the Soviet Union rather than trade between smaller economies. Since Eastern currencies were not freely convertible, most of the intra-CMEA trade remained bilateral and subject to 5-year and annual negotiations between governments. The prices used in these transactions were usually negotiated around a moving average of past prices on world markets. Arrangements for intra-CMEA trade are now the subject of considerable controversy among CMEA members, both as to prices and the consequences of past investments and investment decisions which, by giving priority to block needs, were not in line with the comparative advantages of particular countries. It is widely asserted that most member countries gave low priority to their CMEA trade commitments and complaints were frequent that supplied goods were of low quality, delivered too late, etc. The existence of such "soft" markets, both in terms of currency and in terms of demanded products and distribution standards, has considerably (negatively) influenced competitiveness of the Eastern economies on world markets.

Despite the autarkic tendencies inherent in the traditional centrally-planned economy, trade with the Western countries grew rapidly at various times over the past few decades. Nevertheless, their share of Western markets remained quite small and their export competitiveness deteriorated considerably and fairly steadily over time. On Western markets, Eastern countries were overtaken by newly industrialized economies of South East Asia and, within the European Community, by countries of Southern Europe.

The general characteristics of Eastern economies fully apply to Poland. After a period of rapid expansion during the seventies, the country went into the eighties with a declining level of national output, a very difficult social situation, and the untenable balance of payments deficit in convertible currencies. After imposing martial law, the Government launched a stabilization programme and initiated a reform of the economic system. Sharp constraints imposed on investments and imports resulted in progressive further decline in domestic output, and by 1982 domestic output amounted only about 75 per cent of the previous 1978 peak. Recovery was gradual with an annual growth of net material product at about 5 per cent; by 1986, the real output was about 10 per cent below that of 1978 and the per capita consumption almost regained the previous peak of 1980. Internal balances improved, while rationing was gradually being eliminated for most consumer goods and the scope of centrally allocated materials progressively reducing. However, shortages persisted and the price structure remained distorted. Poland shifted from trade deficit to a small

surplus with the convertible currency areas in 1982, mainly by severely constrained imports; the trade surplus increased to about 1 billion US\$ per year during 1983-1987. During this period, Poland devoted about one third of its exports to debt service and negotiated repeated debt reschedulings.

The economic reform introduced in 1982 was aimed at the decentralizing of economic structures and increasing the role of market mechanisms. However, the introduction of the reform at a time of political and social crisis inhibited the central authorities from fully pursuing the proposed measures. The central authorities continued to exercise a major role in pricing and resource allocation at the micro-economic level. Some important progress was made toward greater security and growth of the private sector, greater use of contractual and international prices, greater liberalization of the external trade regime, and increased enterprise economy. By the mid-1986, the Government sought to reinvigorate the reform process by launching a "second stage" to the reform programme. A draft of the economic policy measures to implement the second stage was prepared in the summer of 1987 and formed the basis for a referendum to be held in November 1987, the outcome of which did not provide the government with strong endorsement for the rapid implementation of the reform. A revised pace for reform implementation was elaborated, some institutional changes were approved, including reorganization of the central government and reduction of the number of branch ministries (which was expected to reinforce enterprise autonomy and eliminate the traditional role that the branch ministries had held as lobbies for the enterprises they were supervising). Major price increases were also ordered, with an overall rise of 40 per cent in 1988. Energy prices underwent an even sharper adjustment in April 1988 and coal prices increased by 55 per cent for industry and by 200 per cent for consumers; gas and electricity prices were increased by 100 per cent. A number of other measures were also formulated: credit policy which was to be more restrictive; interest rates, which were to be made positive in real terms, wage policy with the incomes tied more closely to productivity; and taxation, which was to be made more uniform and streamlined through the eventual introduction of a VAT.

Because of inconsistent and intrinsically contradictory economic policies, unchanged political priorities in personal policy, but most of all due to a lack of natural economic environment and incentives, this reform was a failure. Although sharply reduced, the central planning mechanism continued to falsify the real image of economy, interdependency between economic sectors, prices and

signals given by the market. Inflation became a serious threat to the economy and stability of the country. Increasing from 60 per cent in 1988 to an annual rate of 150 per cent for the first half of 1989 and close to 1000 per cent for the whole of 1989, it was causing distortions, inefficiencies, output declines, market disruptions, uncertainties and loss of welfare for consumers, and weakened external trade.

The dramatic political changes that happened in Poland in 1989 and the formation of a non-communist government, the first one since 1945, also opened the way to essential and consistent economic reforms. The country now enjoys full political autonomy to determine national priorities and objectives to implement programmes to reach them. However, maintaining a widespread political consensus during the months ahead represents a difficult challenge for the Government who is tackling some of the most serious economic problems ever seen in Europe.

When the economic situation marked by hyperinflation and severe external payment problems turned to be untenable in the second half of 1989, a sharp break with the past became necessary. The Finance Minister and Deputy Prime Minister, Leszek Balcerowicz gave his name to the most ambitious and radical plan in Eastern Europe to create a free market economy. The 1990 programme, supported by IMT through stand-by arrangements, proposed two main objectives: (a) to stabilize economy, bringing about a rapid deceleration of inflation, and eliminate shortages; and (b) to accelerate the transformation of the economic system towards market mechanisms. Economic stabilization is a prerequisite for success in pursuing systemic changes and without systemic changes and enhanced supply response, stabilization will not succeed in restoring output growth, improving living standards, and strengthening the external position over the medium term. Initiated on January 1 1990, the programme includes a number of stabilization measures and a first set of measures for further economic systemic reform. The main elements of the stabilization component are the following:

- (a) Attainment in 1990 of an approximate fiscal balance by the general government, mainly by reducing the central government deficit to about 1 per cent of GNP, by way of a drastic cut in subsidies;

- (b) Significant tightening of credit policy, introducing interest rates that, with time, will be positive in real terms, in order to induce a progressive shift from foreign currency deposits to zloty financial assets, and reducing preferential credit while simultaneously eliminating associated financial costs from the accounts of the banking system;
- (c) Unification of the market in terms of foreign exchange for most payments and transfers performed in current account transactions. After a sharp devaluation, the exchange rate was fixed to provide a nominal anchor to fight against inflation; competitiveness will be maintained in exports through (small) adjustments of the exchange rate after inflation has been abated;
- (d) As a complement to the exchange rate policy, and as a second important anchor, limitation of wage increases to a fraction of price increases.

The main elements of the programme bringing structural and systemic changes that have already been initiated in parallel with the stabilization efforts are:

- (a) Abolition of almost all remaining price controls, as of January 1 1990, except for rents, public utility, public transportation, coal, and some foodstuffs representing about 5 per cent of sales of consumer goods and services (recently removed);
- (b) Removal of limits on sale and size of private farms and assurance of equal access of private agriculture to inputs and credit; the same rules apply to private business;
- (c) Elimination of remaining elements of the former central resource allocation, preferential government procurement, and monopolies in the distribution sector;
- (d) Restructuring and privatization of most State-owned enterprises, promotion of foreign capital investments in national economy;

- (e) Establishment of a labour fund (December 1989) to extend unemployment benefits as well as to improve the protection of elderly and poor people.

In addition to the above-mentioned measures, the Government has initiated legislation in a number of key areas to introduce deep changes in the business environment and move towards a market-based system with greater participation by the private sector, both domestic and foreign. Most of these initiatives were completed during the first half of 1990 and they form the backbone of the structural reform and systemic transformation programme. The main components of these transformations are: liberalized prices and competitive trade regime to signal scarcity values; a fiscal system which allows these scarcity values to appear on the market without significant distortions; an enterprise system with increasing private ownership, which will be guided in using resources efficiently by market-based incentives to meet market demands; a labour market including an unemployment insurance scheme to permit workers to seek attractive jobs; finally, a financial system to marshal savings and facilitate the flow of capital towards most productive uses. All these programme elements are geared to stimulate supply response throughout economy.

Previously imposed on goods and services comprising 80 per cent of GNP, for the first half of 1989 and 50 per cent for the second half, price controls have been lifted on all goods and services, except for some items representing about 10 per cent of GNP: public transportation, energy and a few other items which are still controlled and subsidized, but their number and relative share have been consequently reduced.

The foreign exchange regime was fundamentally changed to support the stabilization programme. All current account transactions have been liberalized, except for the restrictions imposed on the transfers of dividends from foreign investment to home market activities (being progressively phased out over time) and travel abroad. All export proceeds must be surrendered but purchases of foreign exchange are freely allowed for current account transactions. Moreover, a fixed exchange rate at a substantially depreciated level (9,500 zI per US dollar compared to an official rate of 6,500 zI per US dollar at the end of December and an average official rate of 1,400 zI per US dollar for all of 1989) was sustained as an important anchor to the stabilization programme.



The process of systemic transformation is complicated and time consuming: numerous and far-reaching changes in the legal system have been required to lay the ground for the new system; substantive changes in a number of sectors have to be coordinated to minimize frictional costs; monopolies need to be dismantled and conditions have to be created for small competitive businesses to operate; the political process has to be fostered to secure majority support. The role of the State is now changing from commands and direct, discrete interventions to generally applicable regulations and the rule of law.

Another aspect of market development is the necessary change in attitudes. Ordinary citizens are surprised when prices differ from one store to another; learning to shop is an important aspect of market development. Management skills also need to be developed at all levels of economy although many managers have managed costs and returns and are using factors of production efficiently within the context of changing patterns of demand.

Fiscal reforms have been essential to a long-term adjustment programme. Relative prices were being distorted by the existing subsidy and taxation system, and could not guide resources efficiently, even if other distortions were removed. Reducing and restructuring subsidies, which had grown rapidly, and improving lagging revenue collections are essential. Producer subsidies have to be cut and consumer subsidies allocated on the basis of need rather than commodity. The taxation system has to be thoroughly reformed to be built around two non-distortionary pillars, a VAT and a personal income tax. The new taxation system should then minimize market distortions and focus on mobilizing resources needed for government expenditures. This is a complete departure from the system still in existence which operates with mechanisms such as tax turnover, itself designed to interfere with market signals.

Trade policy has been improved and the previous trading monopoly owned by the State no longer exists (with few exceptions on home market). Export customs have been removed and import customs considerably reduced.

Economic competition is badly needed; without it, efficiency cannot be achieved. Monopolies pervade the economy; some natural monopolies may need to remain in the public sector under appropriate regulatory environment, but in most sectors, monopolies need to be eliminated lest they should vitiate other reforms. Monopolies in service sectors such as marketing, processing, and

distribution are particularly harmful. The same goes for agriculture where they stiffen competition, even with privately owned farms, and they deregulate prices. Many of these monopolies are in the socialized, i.e. State-owned and co-operative sector; agriculture offers many examples. Wherever possible, these monopolies are divided into smaller units, also using administrative measures to create competition, and with a view to partial or total privatization.

In addition to monopolies, other socialized sector enterprises need to be dismantled, restructured, and reformed because of price deregulation. While these operations will ultimately have to face the test of the market, there may be instances where transitional arrangements may be required prior to privatization or full exposure to market forces.

Socialized sector enterprises are still belonging to the State, an unsatisfactory situation because nobody or no organization is in fact playing the owner's role. Privatization is the most important mechanism to promote efficiency. It is constrained essentially by the absence of a capital market and lack of sufficient domestic capital. Therefore, it is being assumed that the ownership structure will also be transformed with the help of foreign capital eventually flowing in. According to the Privatization Act, most State-owned enterprises will be transformed into joint-stock companies where the State Treasury at first will own all stocks. Gradually, however, these stocks will be offered for sale on the capital market, both for Polish and foreign investors. Some smaller State-owned enterprises will be transferred into limited liability companies and offered for sale or lease; in the case of unprofitable enterprises, they will be liquidated and their property sold at auctions.

At the same time, Polish and foreign investors are able to establish new companies or set up joint-ventures with existing enterprises.

The results obtained so far in the implementation of reforms are encouraging. Inflation, once running at an annual rate exceeding 1.000 per cent, had dropped to 3 per cent monthly, only nine months after the beginning of the reform. Queues to buy anything have disappeared and the zloty currency is trading with a narrow margin of no more than 5 per cent against major currencies. The retail price index over 1990 and the first quarter of 1991 is the following (previous month = 100 per cent):

Table 1: Retail price index for the year 1990  
and the first quarter of 1991  
(previous month = 100%)

I	II	III	IV	V	VI	VII	VIII
179.6	123.8	104.9	107.5	104.6	103.4	103.6	101.8

IX	X	XI	XII '91	I	II	III
104.6	105.7	104.9	105.9	112.7	106.7	104.5

This reduction in inflation, achieved inter alia by means of higher interest rates, has influenced domestic demand and production. After the preliminary 30 per cent fall of output, the lower interest rate and already observed sound market mechanisms have brought some recovery to economy. During three quarters of 1990, the production volume was 25 per cent lower than the year before. Now, a 23-24 per cent decrease in production is being forecast for the whole 1990. The private sector has proved its competitiveness by increasing sales by 7.5 per cent and raising its market share to 10.5 per cent. The inert State-owned enterprises have had to find their way to survive. They have begun to care about costs and look for customers and, faced with a rapidly shrinking internal demand, they have looked for foreign markets. Within nine months, the socialized enterprises have increased their exports by 7.4 per cent, whereby hard-currency exports have gone up by 27 per cent (exports to CMEA countries fell by 13 per cent). The private sector has achieved even better results by increasing its share in total exports from 8 per cent up to 20.5 per cent. The trade surplus with market economy countries should amount to 3 billion US\$ in 1990.

In the near future, the Polish economy must face new challenges. Since August 1990, the Gulf crisis has burdened the trade balance. The reunion of Germany and transfer of all accounts with CMEA countries into hard currencies will cause further decreases in trade with the Soviet Union and Eastern Europe

countries, and bring some problems to Polish exporters. Nevertheless, Polish foreign trade enterprises are well established on these markets, especially on the Soviet one, and long-term prospects are rather good.

Now, the second phase of the governmental programme centers on restructuring economy, mainly by rapid privatization and by creating competition. It is planned that in the years 1991-1993 several thousand state-run enterprises will be sold to private investors. This should stimulate competition and change people's attitude toward work.

### III. RECENT INDUSTRIAL SITUATION

#### A. General description of industry

The industrial sector (the Polish industrial classification includes fuel and electric power, metallurgy, electro-engineering, chemicals, minerals, wood and paper, light and food-processing industries) has been the leading sector of Poland's economy since 1960. It has contributed about 44 per cent of the country's net material product and employed 23 per cent of its labour force. In 1987, the socialized, i.e. State-owned and co-operative, industrial enterprises, produced almost 94 per cent of industrial net production and employed about 90 per cent of the industrial work force. Private industry, which had been on a constant and more rapid growth since the early eighties, is mainly concentrated on handicrafts and industrial enterprises owned by non-residents and accounts for about 5 per cent of net industrial production.

Electro-engineering industries are representing about 40 per cent of both manufacturing value added and manufacturing employment, followed by food processing and light industries, together sharing one third of value added and employment. While the electro-engineering industries produce a wide range of manufactured goods, their predominant products are transport equipment and engineering products (machinery and equipment). The chemical industry has almost doubled its share, from 5 per cent in 1960, to 9.4 per cent in 1985, mainly as a result of the growth of basic chemicals, such as sulphur, and the expanded production of fertilizers, petrochemicals, pesticides and pharmaceuticals. The combined mineral and wood-based industries share about 10 per cent of manufacturing value added and some 12 per cent of employment. The remaining industrial production is provided by various industries.

The balance of payments and social crisis of the late seventies and early eighties have resulted in a decline of around 14 per cent in production output between 1978 and 1982. After 1982, the manufacturing sector along with the rest of the economy started to recover, although at a very slow rate, due to the social crisis and severe shortages of foreign currency. In 1985, the net manufacturing output was still some 4 per cent lower than its 1978 peak. In the last 15 years, industrial exports have maintained a predominant share in total exports (around 74 per cent in 1975 and 1986). Some 40 per cent of industrial exports were directed to the non-socialist countries. While these exports grew

by 14.3 per cent in 1986, they were still about 30 per cent lower than their 1981 peak level. Also, they continued to be concentrated in a few industries: in 1986, electro-engineering, chemicals and processed food products accounted for about 58 per cent of such exports.

Poland's efforts to recapture the convertible currency markets lost in 1982 were constrained by: suspended licensing agreements with Western partners, the Polish exporters' inability to ensure timely and regular deliveries, and a decline in product quality resulting from the forced substitution of imported components and raw materials.

Efficiency levels in industry have been highly variable across and within sub-sectors. According to the World Bank study on Polish industrial competitiveness, 30 per cent of the industrial output is clearly competitive in international terms under current conditions.

The salient characteristics of the industrial environment that has constrained industrial performance have included systemic distortions such as in pricing, subsidies, taxation and wage policies which have limited incentive for superior enterprise performance and constrained the mobility of resources from uneconomic to economic activities, thus maintaining existing shortages and impeding efficient growth. Secondly, industrialization efforts have favoured large enterprises and neglected the development of small and medium-size ones, thus preventing the development of a deeper industrial structure, a more dependable supply of spare-parts and intermediate goods, and a more competitive production environment. Furthermore, shortages of intermediate products have often inefficiently encouraged the vertical integration of production and auxiliary services in existing enterprises. Thirdly, the centrally allocated materials such as energy (coal and electricity), as inputs to production or to the physical construction of new facilities, have brought substantial delays in goods deliveries or in civil works, these delays being further intensified by complex planning and monitoring systems that existed both at the central and local levels. Fourthly, the lack of autonomy at the enterprise level, attributable to the administrative authority of branch ministries, has caused hesitancy and delays in decision-making and led to other inefficiencies. Finally, lack of foreign exchange has hampered modernization, efficient improvements and upgrading of obsolete plants.

It should be stressed, however, that in Polish economy, unlike in that of other socialist countries, the private sector has never ceased to exist. Predominantly present in agriculture (roughly 75 per cent in area and output), it also survived in repair services (automobiles, electronic and electric consumer goods, home appliances and installations, clothing, footwear etc.), transportation (taxicabs and vans), retail trade (shops and restaurants), and also in manufacturing. Contrary to the State-owned mammoths, private business employs a strictly limited number of personnel. Therefore, the private manufacturing sector consists mostly of one-man or one-family handicraft shops rather than industrial works. In 1975, there were over 11,000 State-owned industrial enterprises in Poland, with an average employment of 365 persons, 32,800 cooperative enterprises (practically fully State-owned and managed), employing 20.5 men each, and 118,800 private enterprises with 1.7 employees each (owners included). Eleven years later, the respective numbers were: 9,800 State-owned, 17,700 cooperatives and 210,000 private enterprises employing 378, 30.5 and 2.25 persons respectively. Incidentally, these figures clearly show the process of concentration in "nationalized" (i.e. State-owned and co-operative) industrial sectors. The 1986 figures show that the private sector was active in electro-engineering industry (over 65,000 enterprises with 2.1 men each), chemical industry (over 10,000 works with 3.5 men each), light industry (clothing, leather, textile) (almost 60,000 enterprises with 2 employees each) and wood industry (30,000 shops with 1.7 employees each). This coincided with the fourth year of the first and still inconsistent attempt to liberalize economy and the conditions to establish and run one's own business were already considerably better than in previous decades.

During the period 1960-85, the industrial policy was characterized by several distinct stages of growth and contraction. A strategy of industrialization through large-scale investment (extensive growth) had been clearly pre-eminent up to 1978. In the sixties, emphasis was put on heavy industry (iron and steel, heavy machinery and chemicals), continuing the approach of the fifties. There had been little development of more advanced activities such as electronics and petrochemicals. The investment strategy of the sixties was based on domestic accumulation of forced savings. By 1970, there was dissatisfaction with industrial performance - investments were not leading to improved living standards. The proposed solution was to increase investment further and base it this time on foreign savings through the inflow of imported machinery and technology. The massive centrally-planned investment was directed to a

wider range of activities and the engineering sector became more important. Simultaneously, consumption was increased in an attempt to provide incentives for increased labour productivity.

By 1978, this development had proved to be a failure, partly because investment rates had been too high and the system could not absorb the massive inflow of foreign technology and licences. The scope of investment projects was too diverse and imported technology was in most part obsolete. Most important, due to the nature of its system, economy was sheltered from the events occurring in the rest of the world such as the oil price increase. As a result, as border prices changed, larger price distortions and greater inefficiencies in terms of resource allocation crept into industry.

The programme of economic reform was approved in 1982, with as major component a change in the nature of the central plan. Direct targets and commands were no longer to be included in the central plan. Instead, only general outlines were to be issued and decision-making was to be decentralized to independent, self-financing, and self-managed enterprises. Two main elements determined the industrial policy framework within Polish-operated industrial enterprises. The first one was the body of legislation passed in the early years of the reform, which provided for a fundamental change in the legal status of enterprises and in their operational objectives. With the exception of those enterprises in sensitive sectors such as coal, they were to be given greater autonomy and subjected to greater financial discipline, including the possibility of bankruptcy; at the same time, the role of central administration and of the central plan was to be reduced. Streamlining branch ministries and creating a single Ministry of industry reduced the central control and gave more autonomy to enterprise management. The second main element comprised a vast set of policy measures aimed at providing a better financial management framework for enterprises. While the extent of the initial reform was limited and had slowly moved along, there was some economic recovery resulting in an improved level of material product. The failure of reforms and the large fiscal deficit in 1989 caused hyperinflation and disturbed the industrial activities. The 1990 governmental reform plan, aiming at fighting inflation in the first place, caused a dramatic decrease in demand on the internal market and a decline in production output, as side effect.



At the same time, a number of new legal acts were being implemented. First, the Law on Undertaking Economic Activity placed the private and state sectors on equal legal status, removed all limits of the private sector (e.g., maximum number of employees to be hired), and allowed private activity in practically all sectors of industry and economy, including foreign trade. Secondly, the law on stocks allowed individuals to issue stock and purchase and sell company shares. Thirdly, the law on foreign investment abolished all limits on the percentage of capital held by foreign investors (fully owned foreign subsidiaries are now accepted) and offered some incentive for foreign investment. Fourthly, the law on banking established independent commercial banks and transformed the National Bank of Poland into a standard central bank. It strengthened the supervisory role of the National Bank (in order to ensure liquidity of commercial banks) and allowed for a majority of foreign ownership in banks. Finally, the Privatization Act allowed citizens and companies, including foreign ones, to purchase shares of formerly State-owned industrial enterprises.

Industrial restructuring is a crucial component of an effective supply response. As market signals are improving with realistic exchange and interest rates and relaxed price controls, many enterprises face the immediate choice of corporate restructuring or bankruptcy. Some enterprises should go bankrupt because there is no chance for them to become competitive. In these cases, there is a need for efficient divestiture of assets and redeployment of labour force. For a few large enterprises, an active divestiture plan may well be more efficient than market forces in the sense that market signals could be anticipated (by reference to work market prices and competition) and "premarket" actions taken. For other enterprises for which survival with appropriate restructuring is desirable, on the basis of economic, financial and industrial analysis, active programmes may be efficient including corporate restructuring, planning and financing. These programmes are similar to those pursued in Western countries but they are designed for Polish circumstances where competitive capital markets and large-scale private entrepreneurs are not yet present. Stringent corporate business feasibility tests must be applied in such cases.

Concerning specific sectors, supply responses may be most rapid in agriculture, export industries, and perhaps the construction sector. Industry and mining will also have important roles to play in generating a rapid supply response. Exports of engineering products, chemicals, textiles, wood products, are responding vigorously to more realistic exchange rates and liberalized trade

regime. In addition, some immediate divestiture of ancillary activities of the State-owned enterprises (spare parts and maintenance facilities, social services etc.) promotes factor mobility and competitive markets. The Hard Coal Board (WWK) has been dissolved into small, independent companies and budget transfers from profitable to unprofitable mines are being limited, accepting the possible closing of the least profitable ones. Many enterprise managers are operating well, given the existing system and the still remaining constraints. But a new market environment makes a new set of skills more and more important, and managers need training in modern business methods.

According to the forecast prepared by the Central Planning Office, the most important targets for the next two years are:

- Renewal of fixed assets in industry,
- Modernization of technological processes,
- Rehabilitation and adaptation of research and development institutions to restructured industry,
- Essential improvements in organization of production,
- Developing management system and skills needed in market economy environment,
- Developing support services and physical infrastructure.

Progress possibilities depend on the sources of financing available. The internal capital is limited. Changes in foreign market geography could cause transitory decrease of exports. In favourable conditions, the achievement of the goal should create open market environment, competition and proper labour market, supported by a limited intervention of the State (privatisation, promotion and supervision, development of infrastructure, environmental protection, harmonization of standards). Among advantageous factors are also included: skilled and relatively cheap manpower, favourable international climate for capital investments in Poland. The main results of the new industrial policy should be improved efficiency and international competitiveness. Five broad areas have been selected which could obtain guarantees from the Polish Government or the National Bank of Poland:

- I. Export-oriented projects in all economic sectors;
- II. Infrastructural projects improving international contacts, including:
  - (a) telecommunication and post,
  - (b) banking and financial services,

- (c) airports,
  - (d) road and ferry border checkpoints.
- III. Indirectly export-oriented projects, i.e. undoing the export supply bottlenecks in other branches or enterprises, including:
- (a) packaging,
  - (b) quality control, product marking (implementation of UPC system), spreading standards.
- IV. Modernization projects in six interrelated economy sectors with energy and raw material consumption ranking highest according to international standards:
- (a) iron and steel industry,
  - (b) fuel and energy sector (without petrochemistry and natural gas processing),
  - (c) cement industry,
  - (d) heavy industry,
  - (e) ship-building,
  - (f) railway system (i.e. railway network, back-up facilities, equipment production).
- V. Petrochemical projects and natural gas processing.

The general restructuring of economy provides a substantial reduction in the relative and absolute role of the six sectors mentioned earlier, but at the same time, thorough modernization and internationalization both in the sense of export and import specialization, and in respect of ownership and institutional changes. The important issue is to define the proportions between liquidation or reduction of some enterprises, types of activities and organizational forms, and to point out which of them cannot become effective; production structure and ownership transformations in existing industry; and promotion and development of new activities and organizational forms. In this respect, the whole industry will be divided into three groups.

The first group consists sometimes of whole sectors or groups of enterprises, the industrial activities of which are very strongly dependent on the existing structure of their fixed assets, supply sources and markets. The value of their fixed assets is generally relatively high, the rate of depreciation and technical standard, low. To this group belong the above-mentioned enterprises and priority sectors, mining and electric power in the first place. Their

restructuring costs are very high, so despite their rentability, they cannot be restructured without external financing.

To the second group belong enterprises and/or industrial activities that have little chance of adjusting to the new economic environment and undergoing a successful restructuring. They are characterized by high fixed assets engagement and high rate of depreciation (especially equipment). Their ability to survive is doubtful. This group comprises some enterprises in the electric power and fuel sector, iron and non-ferrous metal, metallurgy, textile and transportation equipment. The Government's attitude is not to interfere and let things happen in the competitive environment. The privatization of these enterprises will be difficult.

The third group of enterprises, roughly half of all industry, has already proved to be susceptible to some extent to market signals and be flexible enough to adapt to changing external conditions. However, their reaction to the sinking internal demand has been decreased production and rapid reorientation towards exports. The Government wants to stimulate and assist the restructuring and adjustment processes in these enterprises, aiming mainly at improving their efficiency. The monetary, credit, income and tax policies have been shaped with regard to this goal.

In parallel, establishing new private companies is being promoted and encouraged as an instrument to create competitive business environment and to restructure industry generally - increasing the share of small and medium-size enterprises. These incentives apply both to Polish and foreign investors. The economic policy of the government provides for the creation of the necessary business environment including a stock exchange, public investing institutions, free economic zones, antimonopoly legislation and agencies, supporting economic, trade and industrial chambers and employers associations.

The most important data concerning the Polish industry are shown in the following "Statistical Information".

#### B. General information concerning electronics industry

According to the Polish industrial classification, the electronics industry includes enterprises manufacturing electronic materials and components, specific

technological equipment for the electronic industry, electronic consumer goods, computers and peripherals, automation components and equipment, high power electronics, measuring and control equipment. It consists of 146 state-owned production enterprises (2.8 per cent of all industrial enterprises in Poland), 18 non-manufacturing enterprises such as R & D institutions and centres, design offices, trade enterprises, several companies established by state-owned enterprises and several dozens of small private companies. Because of the economic reform, the number of private companies is rising rapidly but their relative importance remains small. The most important 71 enterprises were formerly grouped in three industrial unions (later associations) with names such as UNITRA (electronic components and materials, technological equipment, consumer electronics), MERA (computer, automation, measuring and control instruments) and TELKOM (telecommunications). Those enterprises are quite independent now but the branch designation often still exists in their names, accompanied by the "first" name of the enterprise, e.g. MERA-BŁONIE, TELKOM-TELETRA.

The industrial activities of these 71 enterprises are distributed as follows (some are busy in more than one sub-branch):

	<u>No. of enterprises</u>
(a) Electronic materials	1
(b) Electronic components	25
(c) Technological equipment	15
(d) Consumer goods	12
(e) Computers and peripherals	15
(f) Automation components and equipment	9
(g) Telecommunications	11
(h) Power electronics	9
(i) Measuring and control equipment	12

In 1988, the electronic industry had a total output of 981.4 billion zł, therein 91.3 per cent of the 71 most important enterprises; its share in total State-owned industry output amounted to 3.4 per cent. Exports of electronic products were close to 300 billion zł, i.e. 4.9 per cent of total industrial exports. It employed more than 140,000 people - 3.3 per cent of all industrial employment.

Table 2: Production of most important products

		Number						
of pieces		1970	1980	1985	1986	1987	1988	1989
Mainframes	pieces	60	29	42	45	31	41	.
Exchanges (local)	millions	62	203	269	276	303	305	264
Telephones	thousands	635	1520	1702	1916	2009	2110	2036
TV sets	thousands	616	900	610	631	647	749	771
colour	thousands	-	147	158	169	211	215	237
Radio receivers	thousands	987	2695	2690	2729	2833	2684	2523
portables	thousands	448	993	830	941	1066	956	784
Tape recorders	thousands	184	806	384	405	361	357	438
Gramophones	thousands	274	370	242	263	229	273	285
Semi-conductors	millions	26.5	262	289	307	323	368	375
ICs	millions	.	28.3	35.3	43.9	50.8	60.3	62.0
transistors	millions	10.6	88	105	112	116	128	105
Resistors	millions	190	518	563	683	747	900	1039
Capacitors	millions	265	703	723	825	782	749	815

The recession in the first half of 1990 caused a decline of about 25 per cent in electronic production, only three enterprises increasing their output and exports during that period.

Table 3: Production and exports in the electronic industry (1988)

	Production	Exports	
		CMEA	market
		countries	economies
	(billion zI)	(million SUR)	(million US\$)
All electronic industry together	3 023.4	1,362.0	108.1
- consumer goods	810.7	30.4	30.5
- telecommunications	149.0	140.4	1.2
- components	906.7	194.6	33.5
- computers	380.0	618.2	5.3

In comparison with 1988, exports of electronics to the CMEA countries grew by 21 per cent and to market economies by 8 per cent.

### C. Computer industry

The application of computers and computer systems in Poland does not match the level of highly developed countries. The quantities of computer equipment are comparably small, their quality is poor and most of them work individually instead of being interconnected in local and remote networks. The share of capital outlays in Poland for computer technology and applications in the national income accounted only for 0.38 per cent in 1986; in France, already in 1979, this share was 2.72 per cent. In 1988, there were 100 microcomputers per 100,000 inhabitants in Poland, while in Bulgaria 190, and in the German Democratic Republic 290. Most personal computers were imported by private companies and individuals. In Poland, the share of data transmission equipment in all computer equipment is less than 5 per cent compared to 40-70 per cent in West European countries. All these data confirm the considerable delay in development of the Polish computer sector. The economic transformations under way should, first of all, rapidly accelerate both demand and applications of computers; this represents a big challenge and new opportunities for the Polish computer industry. Rough assessments of the future demand for computer equipment foresee 1,200 billion zI in 1990, 2,800 billion zI in 1995, and 5,200 billion zI in 2000. Although subject to alterations, depending on the country's pace of economic recovery, these figures reflect the future situation of the market.

The Polish computer industry consists of 15 state-owned enterprises formerly grouped in MERA and UNITRA Industrial Unions (later Associations) and a fast growing number of private enterprises and companies, some of them with foreign capital involved. The private enterprises are rather small and their role in manufacturing is still insignificant, compared to their role in trading, particularly for imported equipment. But the situation is changing rapidly and many manufacturers are already busy completing computer systems based on home-made equipment, or establishing companies for computer equipment assembly and for completion of systems.

In the computer sector, the following state-owned enterprises are active:

1. Zakłady Elektroniczne ELWRO (Electronic Works) Wrocław - mainframes, microcomputers.
2. Fabryka Mierników i Komputerów ERA (Measuring Instruments and Computers Factory) Warszawa - minicomputers, PCs.
3. Warszawskie Zakłady Urządzeń Informatyki MERAMAT (Warsaw Computer Equipment Works) - tape memories, terminals.
4. Zakłady Urządzeń Komputerowych MERA-ELZAB (Computer Equipment Works) Zabrze - CRT monitors, terminals, home computers.
5. Zakłady Mechaniczno-Precyzyjne MERA-BŁONIE (Precision Mechanics Works) Błonie - line and dot matrix printers.
6. Centrum Naukowo-Produkcyjne Systemów Sterowania MERASTER (Scientific and Production Centre of Control Systems) Katowice - mini- and microcomputer systems, plotters.
7. Korakowska Fabryka Aparatury Pomiarowej MERA-KFAP (Cracow Measuring Instruments Factory) Kraków - floppy-disk drives, microcomputers.
8. Przedsiębiorstwo Systemów Komputerowych MERA-SYSTEM (Computer System Enterprise) Warszawa - completion of computer systems.
9. Zakłady Mechanizmów Precyzyjnych MERA-POLTIX (Precision Mechanisms Works) Łódź - printers.
10. Lubuskie Zakłady Aparatów Elektrycznych MERA-LUMEL (Lubuskie Works of Electrical Apparatus) Zielona Góra - plotters.
11. Zakłady Kineskopowe UNITRA-POLKOLOR (Kinescope Works) Warszawa - TV picture tubes, CRT monitors, terminals.
12. Gdańskie Zakłady Elektroniczne UNITRA-UNIMOR (Gdańsk Electronic Works) - CRT monitors, terminals.



13. Białostockie Zakłady Podzespołów Telewizyjnych UNITRA-BIAZET (Białystok TV Subassemblies Works) - CRT monitors.
14. Łódzkie Zakłady Radiowe UNITRA-FONICA (Łódź Radio Works) - floppy-disk drives.
15. Zakłady Wytwórcze Magnetofonów UNITRA-LUBARTÓW (Tape Recorder Works) Lubartów - tape recorders as tape memories.

Only the first eight enterprises have computers and/or peripherals as their main activity. The fixed assets engaged in computer equipment manufacturing and services in 1988 were worth 39 billion zł, therein machines and equipment over 20 billion zł (1988 prices). The average shift factor was 1.2, and the coefficient of relative work-place utilization, 72.5 per cent.

Those 15 enterprises employed 14,000 people (in the production of computer equipment only), out of which 5,300 workers on the factory floor. In 1988, the production of most important products were (estimations for 1989 are in brackets):

- computer central processors	181	( 230 )	pieces
- minicomputers	1 152	( ... )	pieces
- microcomputers	6 804	(6 700)	pieces
- printers	53	( 98 )	thousand pieces
- calculators	227	( 234 )	thousand pieces
- disk drives	8 300		pieces
- cassette memories	2 500		pieces
- tape memories	400		pieces
- magnetic heads	19 700		pieces
- tape readers	4 100		pieces

The manufactured computer equipment and services were valued at 143.3 billion zł in 1988, and 380 billion zł in 1989 (current prices); therein, exports to the CMEA countries amounted to 391.3 SUR and 618.2 million SUR, and to market economy countries, 2.9 and 5.3 million US\$ respectively (compared to 273.9 million SUR and 3.1 million US\$ in 1985). The share of exports accounted for 66.1 per cent of total output in 1988.

It has been mentioned before that one of the challenges that some enterprises are going to face next year will be decreasing exports to CMEA countries, and first of all to the Soviet Union. Computer manufacturers having a high share of exports in their total sales belong to this group. The most heavily export-dependent enterprises are:

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Company	Share of exports to CMEA (1988 - %)	Share of USSR in CMEA (1989 - %)	Exports to CMEA (1989) th SUR	Exports to market economies (1989) th USD
NERA-BŁONIE	76.7	66.7	130,255	99.8
ERA	79.3	98.3	117,443	923.6
NERASTER	87.2	99.5	56,680	29.1
NERA-ELZAB	74.0	85.4	107,013	10.4
ELWRO	44.8	62.1	18,070	343.6

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This dependency is the result of former agreements on specialization and co-operation concluded within the CMEA frames and also of the relatively high technological level of Polish-made equipment.

The multilateral co-operation on computer sciences and technology in CMEA countries has been organized and coordinated by the International CMEA Commission for Computation Technology. This commission was established over 20 years ago to coordinate the development and manufacturing of Unified System Computers (RIAD) compatible and, as it was assessed, competitive to actual IBM mainframes. The Commission dealt with partners specialization, distribution of production of various computer models and peripherals, development of material and component supply, and development of unified software for the whole family. Later on, the Commission activities were spread over other types of computer equipment, including the SM family of minicomputers (PDP compatible) and microcomputers (IMB PC clones).

The relatively high level of Polish technology was achieved by Polish own research and development activities. At one time in the fifties and sixties, the Polish computer technology used to be far ahead of other Eastern Europe countries, and, at least in some areas, the Soviet Union. The Polish computer

industry is supported by three scientific institutes and several faculties in technical universities. More institutes, faculties and companies develop software systems for various applications. Poland's own research and development has been complemented by know-how and licences purchased from Western countries (and also Japan). It all began in the sixties, when licences for ICL computers and line printers were bought; there followed a boom for licences in the seventies. Core stores, disk and cassette memories, dot-matrix printers, CBT monitors, floppy-disk drives, CNC-systems for machine tools, logic controllers, and some other licences were bought and implemented, giving the Polish computer industry a competitive edge on Eastern markets. In the eighties, this sector got worse like all the rest of economy and lost its good position in the country.

Poland has held a very special position in microcomputer industry. Due to its liberal trade and foreign currency regulations, in comparison with other socialist countries, private Polish importers were able to bring into the country already in 1983-84, first 8-bit home and personal computers, and soon after IBM PC compatibles. Following these imports, several private companies and some State-owned enterprises began assembling the PCs. The result was that Polish people became quite familiar with personal computers at a time when these were almost unknown in neighbouring countries (except in Hungary). Large quantities of microcomputers have been exported (or reexported) to the Soviet Union by many Polish private and State-owned companies for the last two or three years.

Although strong connexions with the Soviet market represent a challenge for the Polish computer industry in the near future, once hard currency-based trade has been established with the USSR, these connexions are also advantageous for mid-term trade. Polish products are well known and Polish enterprises, METROMEX ranking first in all foreign trade enterprises, are well established on this market. The situation is not that the Polish industry only depends on Soviet buyers but, having already bought a lot of Polish-made equipment and using Unified System equipment, the Soviet customers still need spare parts, components and some peripherals made in Poland.

It remains that the Polish computer industry must be radically changed. Its most important advantage is the high level of its qualified personnel, both on the factory floor and in R & D institutions. The engineering staff is fairly familiar with the latest achievements in computer technology and they are well

prepared to implement new technology into industrial practice. Skilled industrial designers are also there to join the engineering staff.

In such a changing industrial and economic situation, it is impossible to elaborate precise prognosis. The last forecast (and programme) for the computer industry has been developed earlier this year when many factors and effects of the implemented economic reform were still unknown. According to this programme, production is to be implemented and developed with a focus on the following equipment:

- 16-, 32- and 64-bit microcomputers,
- compact, high density floppy-disk drives,
- hard-disk memories,
- thermal and laser printers,
- graphic printers,
- colour CRT displays,
- plate and roller plotters.

The fastest growing branch is foreseen to be microcomputers and hard- and floppy-disk drives. In ten years, the total computer industry output should have grown 5.5 times, exports approximately 4 times, employment by around 25 per cent, fixed assets almost 3 times and productivity 2-3 times. For the time being, however, this forecast can only be considered as very general recommendation. It is most likely that the new economic environment and hard-to-predict economic growth will amend the forecast data.

#### D. Electronic industry

##### 1. Electronic components

The Polish industry of electronic components comprises 25 state-owned enterprises manufacturing semi-conductors, passive and electro-mechanical components and TV picture tubes; no private enterprise is active in this subsector. The most important firms and their products are:

- CEMI        semi-conductors: ICs, transistors, diodes, optoelectronic devices;
- LAMINA     microwave tubes, power semiconductors: thyristors and power diodes;
- CERAD      ceramic capacitors, piezoelectric components;

- ELWA electrolytic capacitors;
- MIFLEX plastic (wound) capacitors;
- ELTRA connectors, switches;
- UNITECH electromechanical components;
- TELPOD resistors and potentiometers, thick-film hybrids;
- OMIG quartz resonators, piezoelectronic components, resistors;
- POLFER ferrites and other magnetic components, inductive components;
- ZATRA transformers, inductances;
- TORAL printed circuit boards (single and multilayer);
- POLKOLOR colour TV picture tubes;
- ZELOS monochrome picture tubes, oscilloscope tubes;
- TONSIL loud-speakers, microphones, headphones.

In 1988, the total sales of electronic components accounted for 194.7 billion zL (current prices), where the following quantities of particular products (pieces) were:

	<u>Number of pieces</u>
- semiconductors	368 million
integrated circuits	60 million
discretes	295 million
optoelectronic devices	13 million
- hybrids	11 million
- resistors	900 million
- capacitors	749 million
- TV picture tubes	1 458 thousand
- colour TV picture tubes	630 thousand
- printed circuits	330 thousand sq.m.
- transformers and coils	4.6 million
- piezoelectric components and quartz	10.7 million
- electro-mechanical components	100 million
- microphones	1.12 million
- loud-speakers and sets	7.33 million

In 1988, electronic components worth US\$ 23.5 million and 142 million roubles were exported to market economy and CMEA countries respectively; in 1989 these exports increased to US\$ 33.5 million and 194.6 roubles. The electronic component industry employs 42,000 people.

The quality and quantity of Polish semiconductors are far from satisfactory. The technical level of manufacturing equipment is still at the level of the seventies. Only 8-bit microprocessors are being produced and the capacity of manufactured memories does not exceed 16k, the quality of semiconductors is not comparable to world standards and their price is not competitive. The reasons are obsolete manufacturing equipment (averaging 10 years old) and poor technological environment. Yet, the factory floor is not fully nor properly used.

The manufacturing of semiconductors has strong R&D support from seven institutes and research and development centres, some institutes at technical universities, a total of some 2,400 people. The most advanced R&D is conducted by the Institute of Electron Technology working on CMOS and BICMOS technologies and the semiconductor chips with paths to 3  $\mu\text{m}$  wide. Research and engineering staff both in the institutes and in the manufacturing are well acquainted with more advanced technology; many Polish specialists used to work in Western laboratories, factories and universities. However, their possibilities to reach higher technological level in industrial practice are limited, mainly for lack of modern technological equipment and instruments, partly caused by CMEA restrictions, and also partly because of financial deficiencies. The whole economic policy was disadvantageous for hi-tech industrial sectors and there was no incentive for creative and diligent people.

In the first half of the seventies, a relatively good level of technology was achieved for semiconductors, as a result of individual development activities and the purchase of some licences (from France, Japan and the USA). Since then, technology and equipment were developed mainly by Polish institutes and R & D centres, but due to insufficient financing and systemic restrictions, the progress in terms of output, quality and implementation of modern products was far from satisfactory. The programme elaborated in 1989 assumed the development of 1.5  $\mu\text{m}$  technology, radical increase in yield, quality and reliability of semiconductors, and important growth in volume of production; mainly integrated circuits to be increased 4-6 times, power semiconductors 2-3 times, and optoelectronic devices 5-9 times within ten years. With the new economic environment, these programmes have become unrealistic simply because competitiveness cannot be secured in this industrial subsector. For this reason, the Polish semiconductor industry is one which needs to be restructured most urgently.

Picture tubes are manufactured according to two American licences (for screen and tubes) purchased in the late seventies. At that time these licences were implemented in a brand new factory designed and equipped jointly by American and Polish specialists. This implementation was successfully developed in co-operation with the American partners. The production of colour kinescopes has not decreased in 1990 and exports to Western countries grew by 17.8 per cent between January and May 1990 (a value of US\$ 6 million), compared to the same period the previous year. The production of monochrome kinescopes, however, is steadily falling because of the decline in production of black and white TV sets.

The enterprises, which numbered 15 in 1989, are manufacturing passive components and employing 32,000 people. Their activities are supported by 1,100 highly qualified researchers in one institute and three R & D centres. The manufacturers' technological level for passive components varies from case to case but the average is significantly better than that of the semiconductor industry. Of the several licences and large equipment bought from Western concerns in the seventies, all licences have been fully implemented and most of them considerably developed. In some cases, the once interrupted technological and commercial co-operation with licensors has been resumed and it is likely that it will extended considerably under the new economic conditions. Together with Poland's own achievements (e.g. licences for Polish ferrite technologies sold abroad), they form a solid base for further development.

On the other hand, the slow implementation of surface mounting technology in manufactured equipment slows down the increase in production of home-developed surface mount devices. Profitable exports and implementation of new equipment (joint ventures and foreign-assembly plants) should improve this situation.

Electronic components are supplied, in small quantities, to manufacturers of domestic consumer goods mostly. But those requiring higher-level technique and reliability are purchased by telecommunications, computer and other professional electronic factories. Exports amount to about 20 per cent of production and, according to adopted programmes, should increase to almost 30 per cent by 1995. The best selling components on the Western markets are loud-speakers and loud-speaker sets, colour TV tubes, fixed resistors, ferrites, quartz resonators and some types of capacitors.

In order to improve its competitiveness, the electronic component industry should implement several technological innovations, apply new materials and develop new products. With the exchangeability of Polish currency, many manufacturers have already purchased better materials (plastics, aluminium foil, magnetic materials, contact and spring materials) which will help improve the quality and reliability of their products. This is the most urgent manufacture modernization for electrolytic, ceramic and plastic capacitors, potentiometers and electromechanical components. But equally important are organizational improvements that should increase productivity by 20-30 per cent without further capital investments. Many manufacturers of components have multi-plant enterprises and the work is done in branches sometimes located on sites far away from the main factories. In the past, the reason for establishing branch work was to make up for local shortages of manpower and administrative decisions aiming at concentrating industry. Now, in the face of declining demand and, in order to minimize costs, enterprises tend to bring production back to their main facilities. Or they are eager to split up elaborate structures and encourage branch work to separate and become independent enterprises. That is highly desirable since new, smaller and more flexible enterprises, when they emerge, will bring healthy competition.

ii. Electronic consumer goods

In Poland, most electronic consumer goods are manufactured in 12 State-owned enterprises employing 38,200 people, therein 13,200 workers on the factory floor:

- Z.R. DIORA                      radio receivers (home and automobile), tape recorders, video recorders
- Z.R. ELTRA                      radio receivers (portable), radio sets (with tape recorders)
- Z.R. KASPRZAKA                tape recorders, walkmen, video recorders, tuners, amplifiers, sets, towers
- Z.R. UNITRA RZESZOW          radio receivers (portable)
- Z.W.M. LUBARTOW                tape recorders
- Z.R. RADMOR                    tuners, amplifiers, amplituners, sets
- Z.R. FONICA                    gramophones, amplifiers
- C.Z.E. UNIMOR                 TV sets
- WZT                              TV sets
- Z.K. POLKOLOR                 TV sets, video recorders



- Z.W.C. TONSIL            loud-speakers, amplifiers
- B.Z.P.T. BIAZET        TV sets.

In 1988, the total sales accounted for 212.5 billion zł (current prices), therein 10.5 per cent in exports. Goods were exported to CMEA countries in the amount of 46.6 mln roubles, and, to hard-currency markets for US\$ 28.5 million.

The future home market for electronic consumer goods is assessed at 630 billion zł and exports at 150-200 billion zł by 1995. About 25 per cent of the market should be top-class products, 50-60 per cent standard goods, and 20-25 per cent cheap popular equipment. Electronic consumer goods are utilizing about 70 per cent of the manufacturing capacities, with an average work time of 1.07 shifts. Rough assessments show that improved utilization of production facilities, better organization of work and material supply, easier access to cheaper imported materials and components, and better adherence to technological discipline could more than double production without any further investments. Furthermore, there are reserves of factory floor workers in many enterprises who are ready to install new manufacturing equipment. The technological level of manufactured goods was limited i.a. by lack of electronic components. Due to restricted access to hard currencies imposed by Poland's central plan and administration and by centrally-planned imports from CMEA countries, enterprises had to use Polish-made components only and could import components in limited assortment from socialist countries. For this reason, many modern products developed in laboratories, like video recorders, digital radio and TV receivers, satellite broadcast, could not be manufactured or have been made in limited quantities. Now, the exchangeability of Polish złoty has removed these obstacles but it takes time to make up for delays, especially facing weakening demand.

The electronic consumer equipment industry is supported by 4,500 engineers, R & D workers and designers who possess good knowledge of the latest technological achievements and tendencies in developed countries. They have developed many (home) market hits, and successfully implemented, modernized and developed a few licences bought in Western countries. The very old German licence on reel tape recorders and the Japanese one on loud-speakers have brought prosperity to their buyers for many years (the loud-speakers and columns have been one of the best selling and most competitive merchandise on Western markets for already

15 years). Some enterprises co-operate with foreign partners to develop or implement new products jointly.

Under the new economic conditions, the Polish electronic industry will face competition coming from overseas manufacturers, also on the domestic market and on the Eastern-Europe markets. However, Poland's share of the latter has not been important and changes occurring in the whole region will create new opportunities to increase this share. The forecast prepared at the end of last year assumed that the production would grow 2.5-3 times and exports 4-6 times between 1990 and 1995. Fastest progress should be achieved in colour TV sets, video tape recorders, satellite and cable TV receivers. Technical solutions to existing problems are well known the world over: surface mount technology, digital techniques, automation processes, frequency synthesis and a plethora of commodities that make their use easier and improve the servicing of equipment. To be competitive, the Polish industry must undergo serious organizational and management transformations but its highly qualified manpower and the valuable experience gathered on international markets should allow enterprises to survive and develop.

### Automobile industry

#### Cars and assemblies

The tradition of the Polish automobile industry goes back to 1934 when a licence was bought from FIAT to manufacture car Model 508. In 1938, 1,900 cars were produced along two models: 500 and 508. Following World War II, car production was resumed in 1951 according to a USSR licence, in the "Zerań" Factory of Warsaw (now FSO - Fabryka Samochodów Osobowych). The model was named Pobjeda-M20, and renamed later "Warszawa". This model was produced until the year 1968 with a maximum production of 16,000 cars annually.

The power unit of this car was also applied to the Polish mini-bus and delivery vans which are still in production.

In 1957, the same FSO factory started producing Polish cars named "Syrena" (with two-stroke engine) and this production lasted until 1972. It was removed to WSM Bielsko-Biała (now FSM-Fabryka Samochodów Małolitrażowych) where production lasted till 1983, with a maximal output of 38,500 cars in 1979.

In 1968, FSO started producing a new car on the FIAT licence: Model 125p.

In 1979, a new car called POLONEZ was designed, based on Model 125p, and with significant assistance from FIAT. This car has partly replaced Model 125p in production and on the Polish market.

The second producer of Polish cars is FSM (name given on 1.01.1972) which was previously called WSM (Wytwórnia Sprzetu Motoryzacyjnego). FSM started by producing engines for the Syrena cars and later (after 1972) went on with the production of its own cars.

In 1973, FSM started the production of a new car Model 126p on the FIAT licence.

In the period 1968-1976, the whole automotive industry, especially the above-mentioned producers underwent expansions and attained a good position to continue and develop their models. Up to now, during and after the licensing period, their activity has been very poor. This is why Polish car producers (amongst others) lost their position very soon against foreign manufacturers with regard to technological and construction levels. The important factors which influenced and limited technical progress have been:

- lack of advantage for factories to attempt technical development (in the former economical system); this only involved risk and responsibility for them;
- financial and organization facilities held by the State; when a new manufacturing licence was bought, there was opposition to technical development initiated by the factory itself;
- shortness of production series and poor progress in engineering technology,
- limited right concerning technical development of models, reserved by licence agreements to the licensor's decision.

Just now, preparations are under way to resume the production of new cars at FSM, again with a FIAT licence.

Assembling and production of specialized parts for all vehicles (including cars) are being carried out by 30 factories, mostly independent producers and

suppliers. They supply Polish final producers, distributors of spare parts and exports (foreign co-operation). These products include:

- batteries,
- electrical equipment,
- gear boxes,
- clutches,
- bearings (rolling and slide),
- pumps (water, fuel, oil),
- shock absorbers,
- carburetors,
- elements of the braking system,
- pistons,
- cylinder liners

and many others.

Most producers of the above products are potential co-operation partners for foreign firms. Their production has been based mostly on sub-licensing or know-how bought from well-known Western producers, in connexion with licences for cars, buses and diesel engines.

Assembly producers are the main suppliers of cars, buses, trucks, tractors, vans and other vehicles and machines. They have connexions with foreign receivers.

In spite of central planning and central co-ordination in all spheres of the Polish industry, including automobiles, components producers have never been successful in co-ordinating their production with the Polish demand. This has always been rather detrimental to users of final products (lack of spare parts).

The components producers for the automobile industry were dependent on the vehicle producers. In addition, the administrative system made it impossible to develop independent production. This is the reason why, up to now, their contacts with foreign partners have been very limited. Besides, the situation of these producers was worse than the final producers' as far as financial participation in the State investment expenditures was concerned.

The Polish "new deal" should bring a chance to remove old structural irregularities in the Polish automotive industry. But to reach that objective,

it is necessary to get in touch with the right partners who have money and access to foreign markets.

Taking into consideration the already existing co-operation with Polish producers of vehicles, new additional buyers must be found. This is the core of the problem.

The second question is to have access to modern technical designs by way of co-operation with one of the producers of cars or components.

Another very important problem of the Polish automobile industry is the lack of high technical-level engines for all means of transportation, diesel and carburetor engines as well. The engines now being produced were designed 20 to 50 years ago or even earlier.

There have been few trials in the past to start producing original Polish engines because the working process, from the first conception of design to the moment of serial production, always lasted so long that an engine was already obsolete before production began. This is especially so with diesel engines for vans and mini-buses. The problem of petrol engines over 0.7 l is still open, because the new stage of co-operation with FIAT from the side of FSO is doubtful up to now. There are some options (G.M.) including total bankruptcy.

To summarize, the Polish motorization (including automotive industry) has a lot of gaps which need to be filled and one partner only is not able to remove all difficulties and solve all problems.

The quantity of cars produced by the Polish automobile industry in the years 1980-1989 are shown in table 4.

#### ii. Car servicing

In the past, car servicing was performed by:

- the big centralized State enterprise POLMOZBYT,
- regional co-operative enterprises,
- private workshops,
- workshops in some of the bigger car users (mainly State transport enterprises and co-ops).

Table 4: Production of cars

Car models	Years					
	1980	1985	1986	1987	1988	1989
FSO (Fiat 125)	61 629	56 233	56 842	52 412	38 681	23 109
Polonez	32 133	29 481	32 192	36 554	48 342	54 471
Fiat 126	214 432	196 989	200 640	204 505	206 444	207 917
-----						
Total of cars	358 343	285 854	291 967	296 441	296 335	288 206

Source: Statistic Yearbooks issued by the Polish Central Statistical Board.

The quality and culture of servicing were always at a low level (especially in State and co-operative workshops). Their management and workers lacked interest in their work and this was the reason why customers were often treated as intruders and why efficiency remained so low.

These poor servicing conditions offered by the State and co-operative workshops were also found in some of the private workshops. As a result, prices for services were high, compared to prices for other goods and services on the Polish market.

The other reason was insufficiently outfitted workshops where repair and maintenance devices were missing.

The present modernization of Polish economy also includes automobile services. Big State and co-operative enterprises like POLMOZBYT have been liquidated. Former POLMOZBYT workshops are being bought or taken over on lease by private persons, including former staff members. The same has happened in co-op workshops.

During the past year, numerous new workshops opened up in State organizations such as TRANSBUD (a transport network located in all regions of Poland), as a reaction to new possibilities and financial needs.

In this respect, the present situation is very complex. High prices for gasoline, spare parts, services and other expenditures connected with cars have

limited their use (there are about 30 per cent private owners). In this sense, the present relationship between demand and offer for car services may be estimated as balanced. Competition among workshops was an almost unknown phenomenon in Poland in the past. Now, the first reactions to the new situation can be noticed at the servicing level. It is right to look forward with hope to higher demand as prosperity increases in Poland. This year, around 5 million cars are on the road in the country and the increment of registered cars in 1989-90 has been 250,000 cars per year. It may be estimated that this quantity will remain the same in the next two years, after which the number of new registered cars will systematically go up.

Table 5 shows the quantities of cars in Poland in the years 1980-89.

Table 5: Number of cars being in use in Poland  
(thousands)

Types	Years					
	1980	1985	1986	1987	1988	1989
Private cars	2.33	3.61	3.90	4.17	4.45	4.70
Increment to last year	x	x	0.29	0.27	0.28	0.25
Average increment	x	x	x	x	x	0.27
Total of cars	2.38	3.67	3.98	4.23	4.53	4.77

### iii .Second-hand market

The characteristic feature of the Polish car industry is a very developed market for old cars.

The very long life of cars is caused by two main factors:

- people do not have enough money to buy new ones,
- a car licence for an old car is easily available.

A Polish car, therefore, changes hand very often during its life. Unfortunately, this is a good chance for swindlers: cars are sold to people who are unable to appreciate their technical condition; sometimes the defects are

intentionally hidden and difficult to detect; sometimes it is impossible to determine whether the car has been stolen or not. Up to now, there are no special workshops to prepare cars for resale as second-hand cars, accompanied by a technical and legal guarantee for the customer. A workshop network has yet to be organized offering this kind of service. Such stations could also carry out normal repair and maintenance services and sell new cars as well.

iv. Conclusions

1. Taking into account that the two final car producers in Poland are strongly connected with FIAT, the main (and big) field of activity for other foreign partners could be assisting producers in assembling and specializing in parts.

There exist possibilities to organize car assembling in one big Polish factory formerly belonging to the military industry and now looking for new production possibilities for civil purposes.

2. The special problem remains to produce modern diesel and carburetor engines for vans and mini-buses.
3. The Polish automobile market needs:
  - a network of workshops for repairs, maintenance and sale of cars,
  - an organisation to trade second-hand cars.
4. When the workshops are organized and well equipped with all repair and maintenance devices, this equipment could be advertised and sold to other workshops in Poland.

F. PHARMACEUTICAL INDUSTRY

The Polish pharmaceutical industry began in 1823 when the first pharmaceutical firm was established on Polish territory: "Hirschman and Kijewski" with a branch in Tarchomin (1826). Time went on and in 1885, seventeen Polish firms offered their goods at the Industrial and Agricultural Exhibition. By 1939, 352 pharmaceutical firms were in operation and their production covered 75 per cent of the country needs. Based on chemical synthesis, products included among others: salicylates, barbiturates, morphine, cocaine, dionine. It must be



emphasized that the production of most important medicines had started between the two world wars but the Second World War ruined the Polish achievements. The pharmaceutical industry had to be reconstructed from the very beginning. The period 1945-70 was marked by large constructions. Big production enterprises were started in Tarchomin, Kraków, Starogard, Gdański, Grodzisk, Mazowiecki, and Kutno. Between 1970 and 1980, Poland invested mostly in purchasing machinery and equipment, especially for finished drug dosage forms. The production based on synthesized substances dropped, however, and only one big project was started at that time in Tarchomin, which dealt with new antibiotics.

This new plant has been established in co-operation with the pharmaceutical company Squibb and Sons of the USA. Tarchomin II is producing traditional and modern antibiotics such as penicillin and the cephalosporin group. This makes home and export offers more interesting.

Sixteen main plants are now composing the pharmaceutical industry, with over 21,000 employees (their production profiles are shown in Table 1). Amongst these are producers of vials, ampoules and aerosol containers and the Pharmaceutical Industry Institute.

The pharmaceutical production reached 672 billion zI in 1989 (current domestic prices), of which 51 per cent were exported (90 per cent to CMEA countries). Imported pharmaceuticals amounted to 390 billion zI (current domestic prices), 17 per cent of which from the CMEA countries.

Fixed assets are 154.1 billion zI and investments, 52.2 billion zI. The main figures showing the production structure are presented in Table 6.

Research laboratories are conducting intensive work for the pharmaceutical industry aiming at better product quality, new technologies and pharmaceutical intermediates. This results in the launching each year of new pharmaceutical products on the market. New research and development studies are being conducted with social and economic implications.

Three main programmes are covered by these studies:

- Technologies of drugs and pharmaceutical intermediates (the Institute of Pharmaceutical Industry);
- Tumour diseases (the Oncology Institute);

- Heart diseases (the Cardiology Institute, in co-operation with the Institute of Drug Research and Control)

New proposals for pharmacotherapy are also included in the R & D programme. The most important one deals with preparations used in cardiovascular diseases, asthma and allergies, dermatology, rheumatology, gastro-enterology, psychiatry, endocrinology, virus and bacterial infections.

Besides products used in human medicine, the Polish pharmaceutical industry also produces veterinary preparations and food mixes. This production, however, represents only 10 per cent of the total output. The pharmaceutical industry is an important exporter of veterinary products, mainly to the USSR and other CMEA countries.

Till now, the activity of the Polish pharmaceutical industry was characterized by the following:

1. Low official retail prices and generous distribution of medicine both to people and animals;
2. Centralization, both in domestic and foreign trade;
3. Strong connexion with the CMEA markets, especially with the USSR;
4. State influence in investments and technical development activities.

The emerging changes in Polish economy predict a change also in the pharmaceutical industry, namely:

- limiting schedule medicines at official prices (i.e., better financial situation for producers but also reduced domestic demand);
- introducing new trade principles with the CMEA countries (i.e., expected temporary difficulties in exported pharmaceutical products but also better financial results on the longer term);
- restructuring the country's selling and foreign trade systems. At present, two firms hold the monopoly in this field: - CEFARM for domestic trade and CIECH for foreign trade. The fact that they are unable to make decisions on trade policies in the pharmaceutical industry represents an advantage for producers who will be in a position to organize new selling networks of their own and exercise authority, particularly in connexion with foreign partners and marketing co-operation.

- highly devaluating the Polish zŁoty (since January 1990, US\$ = 9,500 zŁ); this will reduce imports, encourage increased domestic production and introduce favorable conditions to produce new sorts of medicines.

One important problem is how to keep the Soviet and other Eastern Europe markets. Expanding exports towards Western countries requires improved technical level of production, in the first place to fulfil the GMP and GLP standards, and even more so to meet regulations which will probably be required in the near future on East European markets and in Poland as well. Another important problem is to bring to an end the constructions now under way and to obtain the missing machinery and equipment as soon as possible.

For this purpose, the Polish pharmaceutical industry needs financial and technical support from foreign partners. The demand of the Polish market (concerning value relation) should become stable in the next few years but bring a change in structure because the up-to-date factor DDD is not too high (1092), as compared to Western Europe and it will probably go up in the future with the foreseen aging of the Polish population.

The 1989 increase in Polish market prices is certainly not the last one. It will gradually continue to limit the list of medicines being subsidized by the State, thus approaching the conditions of a free market within the next years.

Retail prices of medicines produced in Poland are very low on Polish market (about 10 per cent of retail prices for the same medicines in Western Europe). The economical results are that Polish producers are much better off in foreign trade.

The Polish pharmaceutical industry is not able to achieve a proper level of production in the short term without co-operation with foreign partners in order to make full use of its possibilities.

Table 6: Pharmaceutical plant production profiles

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Name of plant	Main assortment of products
1. Tarchomin Pharmaceutical Works	Antibiotics obtained by biosynthesis; semi-synthetic antibiotics; insulin; benzodiazepines. Low charge drug synthesis. Dosage forms: tablets, coated tablets, capsules, ampoules, vials and dermatological aerosols.
2. Starogard Pharmaceutical Works	High-charge and low-charge drug synthesis; sulphonamides and salicylates. Dosage forms: tablets, coated tablets, capsules, glass and polyethylene ampoules, eye drops in polyethylene containers, infusion fluids in polyethylene containers.
3. Kutno Pharmaceutical Works	Low-charge drug synthesis; morphine, dextran, amikacin, protein preparations. Dosage forms: tablets, coated tablets, infusions, fluids in glass and polyethylene containers, powders in sachets. Veterinary drugs and polfamixes.
4. Grodzisk Pharmaceutical Works	High-charge drug synthesis; sulphonamides, cardiovascular drugs, analgesics. Dosage forms: tablets, coated tablets, capsules. Veterinary drugs and polfamixes.
5. Jelenia Gora Pharmaceutical Works	Low-charge drug synthesis, mainly hormones, organopreparates, cocarboxylase. Dosage forms: tablets, coated tablets, glass ampoules, dermatological ointments, creams, gels, lotions. Stomatological drugs.
6. Warszawa Pharmaceutical Works	Low-charge drug synthesis: organopreparates. Drug forms: tablets, coated tablets, glass ampoules, nasal drops, eye drops, syrups.
7. Poznan Pharmaceutical Works	Absorbable sutures (Dexon-S) and non-absorbable sutures. Dosage forms: tablets, coated tablets, soft gelatin capsules metered dose aerosols, suppositories, ophthalmic and dermatological ointments, toothpastes, granulates for suspensions.
8. Pabianice Pharmaceutical Works	High-charge drug synthesis, fodder antibiotics, hormones, disinfectants. Dosage forms: tablets, coated tablets, solutions.

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(continued)

Table 6: Pharmaceutical plant production profiles (continued)

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Name of plant	Main assortment of products
9. Krakow Pharmaceutical Works	Low-charge drug synthesis: glucose, vitamins. Dosage forms: tablets, coated tablets, capsules, glass ampoules, granulates for suspensions, emulsions.
10. Rzeszow Pharmaceutical Works	Low-charge drug synthesis. Drug forms: tablets, coated tablets, syrups, solutions, granulates.
11. Lublin Pharmaceutical Works	Infusion solutions in polyethylene containers. Disposable plastic medical instruments and equipment (syringes)
12. Boleslaviec Vials and Ampoules Plant	Packing materials for pharmaceutical industry: glass (vials, ampoules cylinders), metal elements (tubes, caps, aerosol containers), elements of plastic materials, disposable syringes.
13. Lowicz Pharmaceutical Works	High-charge synthesis of calcium preparations. Dosage forms: tablets, coated tablets, syrups, granulates, ointments, gels.
14. Terpol	Dosage forms: solutions, suspensions for adults and children.
15. Farmapol	Low-charge drug synthesis. Dosage forms: tablets, ointments, coated tablets.
16. Institute of Pharmaceutical Industry	Research studies on new drugs: cardiac, oncological, hormonal, antibacterial, antiulcer, antiallergic. Low-charge drug synthesis.

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#### IV. RECOMMENDATIONS

##### A. Introduction

UNIDO has worked out a programme to help restructuring industries in east European countries and set up the project "Identification of opportunity to strengthen manufacturing systems of selected industries through automation of the production process".

Two project teams were sent to Poland and Hungary to investigate the electric/electronics, pharmaceutical and automobile industries during October/November 1990 and January 1991. The visit was short and limited to respective enterprises but the authorities concerned in both countries had given their support and arranged meetings in advance, so that the project team could have useful talks with their top managers and engineers.

The main objective given to the project team was to assess selected manufacturing plants to improve their production efficiency and product quality, and to make proposals on how to introduce the most appropriate automated production process to suit these particular manufacturing industries.

In the process of reforming Poland's economic policies, building up an active market system and modernizing its industries, there will be needs for financial resources, investment capital, technology transfer, human resources development, business management and marketing development. Direct foreign assistance will also be essential in this process.

In turn, Poland will take all necessary measures to develop good investment climate for domestic as well as foreign investors.

Under the present economic situation, however, the manufacturing industries in the country encounter many problems which should be solved before applying automated production processes. Therefore, the report emphasizes management, marketing and general engineering/technology.

## B. Electrical and electronics industries

The project team visited 13 places, six in Poland and seven in Hungary, during a period of two weeks from 21 October to 4 November 1990. The visit was short and limited to the respective enterprises.

### Enterprises investigated

The enterprises investigated, this time, are somewhat related to electrical and electronics industries and include a wide variety of industries or organizations such as computer manufacturers, electrical power equipment manufacturers, automatic control device manufacturers, institute of IT, software houses, etc. They are the following:

UNITRA SERWIS	Service and sales company of electronics home appliances
Software houses (six companies)	Small- and medium-scale private Companies
MERA BLONIE	Manufacturers of various types of computer printers
WAMEL	Manufacturers of various types of small motors for control units
EMA ELESTER	Manufacturers of switchgears, contactors, and control cubicles
ELWRO	Computer manufacturing company
IOPM	Information processing centre.

### Progress of privatization in State-owned enterprises

#### Introduction of market principle and foreign trade liberalization

Poland is undergoing rapid political and economical reforms. When the project team made its visit, the situation was still unstable but the Government has since strived to overcome economic difficulties which are unavoidable in a period of transition and new policies have been gradually formulated and step-by-step carried out.

In order to help this situation, many study missions and delegations from western countries have visited Poland in 1990. For example, the Japanese survey mission on the economic and investment environment in Poland has been successful in May 1990 and issued its report.

There are two most important key factors for economic reforms: one is the introduction of a market principle; the other is foreign trade liberalization. These two factors are incidentally mutually related.

In Poland, it is said that the revolution has been initiated by the people at the grass roots but the existing government has implemented a drastic austerity policy based on cut subsidies, drastic revision of the existing pricing systems, high interest rates and a substantial devaluation of the exchange rate. Immediately after implementation of this policy, the rate of inflation which had been 80 per cent in January 1990 declined sharply to 5 per cent in March and the difference between the market rate and the official rate disappeared. That is the so-called "shock treatment" induced by the concept of the Finance Minister Balcerowicz. However, these results have been achieved by imposing hard sacrifice and austere measures on the people, such as increased unemployment and reduced real wages. Whether economic reforms will be successful in the future or not depends on the people's endurance and their trust in the government.

#### Privatization of State-owned enterprises

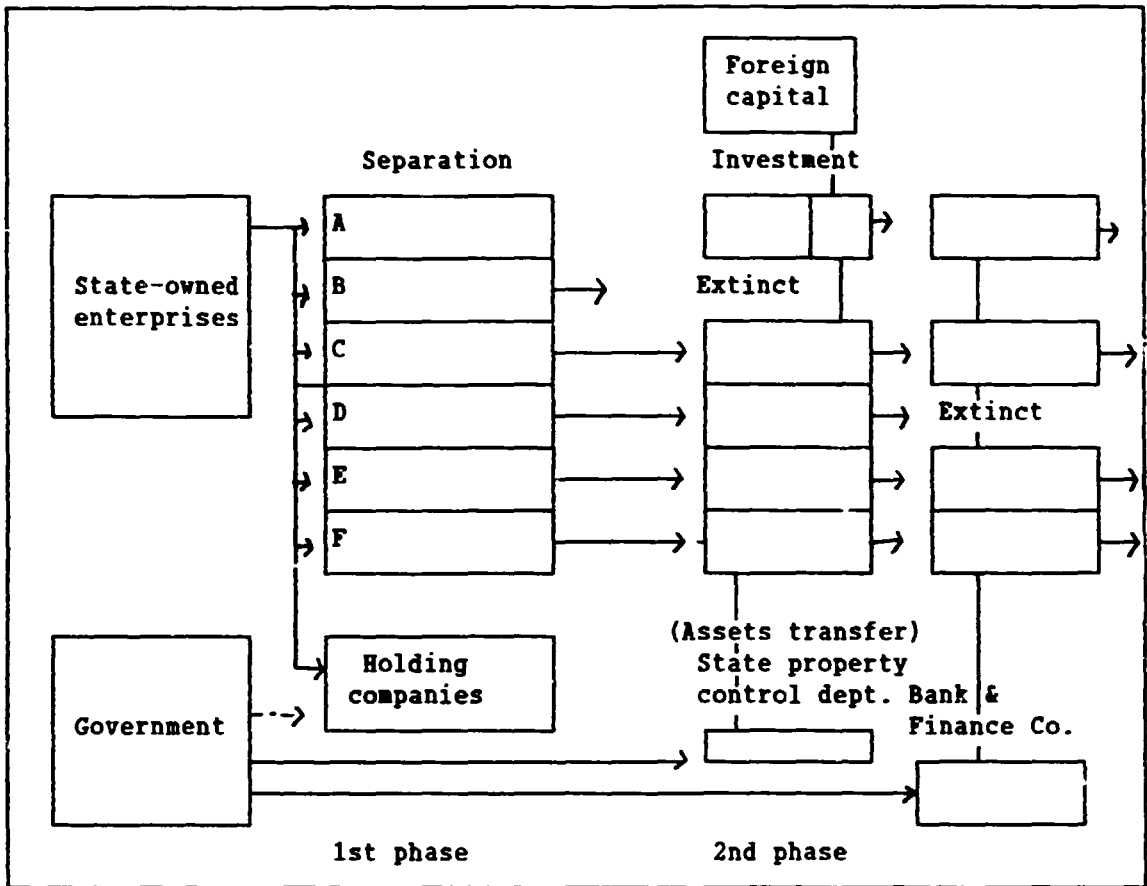
The introduction of a market principle and foreign trade liberalization is first being implemented by privatizing State-owned enterprises. All problems connected with this implementation.

Most companies visited were State-owned; they have enjoyed monopolization and subsidies for a long time under the central-planning economy.

The privatization process is closely similar in Poland and Hungary and, in most cases, is developed according to the following model:



Figure 1: Model of privatization



We have been given the impression that there are many companies still groping in the dark in the first phase.

Earnest desire to co-operate and assist by enterprises of western countries

On the way to privatization, many State-owned or private enterprises, once separated, somewhat place their hope in the co-operation they may receive from enterprises of advanced Western countries, especially multinationals. There are several degrees of co-operation: for example, simple sales assistance from Western markets, sub-contracted work to make use of Polish labour forces, technical assistance such as providing license or products design, production engineering, OEM, and joint ventures at various levels, from partial to 100 per cent share-holding.

Although there seems to be slight differences in the management's way of thinking concerning the company and employees, in comparison with that of

western enterprises, most top managers have expressed calm judgement on how to and in what way their organization should be reformed.

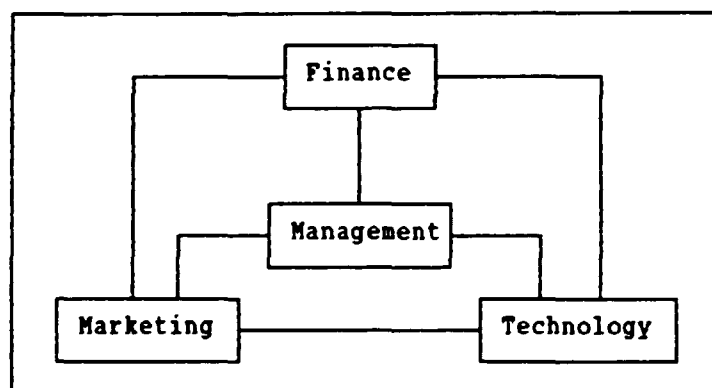
The substance of co-operation can be largely classified in four categories:

- Marketing co-operation on the Western market;
- Technology co-operation, i.e. licenses, development, product design, production engineering, supply of components and parts;
- Finance co-operation, especially investment financing;
- Management technology co-operation; introduction to western-style management.

The most desirable form of co-operation is the joint-venture with capital investment through which Polish people have to solve all existing problems with a stroke.

The developing countries in South-East Asia have achieved a quite good progress in industrial development by using similar policies. Generally speaking, the organic combination of all four above elements, marketing, technology, finance, and management, is essential to rapid industrial development. These four elements related mutually form a tetragonal pyramid model, the pivotal element of which is management. Figure 2 shows this relationship.

Figure 2: Tetra of industrial development



Inviting investment of foreign capital, especially from multinational or transnational companies, can rapidly introduce these four elements and smoothly fix them at the same time. Singapore is the country where this policy was applied with a 100 per cent success. Other ASEAN countries such as Malaysia, Thailand, Indonesia have also introduced part of the same idea in their policy.

It can be said that the same approach should be applied to Polish industries, i.e., the industrial systems should be incorporated into the world economy through international trade and investment. The only points to be borne in mind in doing so are that, introducing multinational capital will cause trouble with local companies and, consequently, this dual economic situation is liable to become acute, and that the constitution of the national economy is bound to be influenced and react to the fluctuations of the global economy.

#### Existing advantages of Polish companies

Most of the companies investigated emphasized several advantages that they would be able to offer to western partners at the time of co-operation:

- Marketing capability and experience in Eastern countries (CMEA market),
- Skillful labour forces at low cost,
- High-level engineering powers with experience,
- Production capability (production facilities and know-how).

These advantages have become clearer and more understandable to us as we went along in our visits and talks with management and engineers. Details are given in the following chapter.

#### Marketing capability and experience in the Eastern countries (CMEA market)

Most companies investigated have a fairly high rate of exports in their turnover, as shown in Chart 1.

Chart 1: Export rate to turnover

Company	Rate of export to turnover (%)		Rate of domestic to turnover (%)
MERA BLONIE	80 (70)	>>	20
WAMEL	30	<	70
EMA ELESTER	75 (75)	>>	25
ELWRO	58 (98)	>	42

Source: 1989 data (%) to export portion, for CMEA.

On the basis of these actual past results obtained in the past, the Polish managers have emphasized firstly their marketing capability in the Eastern countries as an advantage which they could offer to western partners. The Eastern market, where some 400 million people are living, is somewhat attractive to Western enterprises. But it should be noticed that the contents of the marketing capability referred to is quite different from that of the western market.

Different types of market in the socialist countries

There seems to have been three (3) different types of market in the past:

- the domestic market which was controlled intentionally by the government through various subsidies and deductions;
- the CMEA market, in the form of mutual transactions between governments,
- the western market.

These respective markets have quite different characteristics in their sales systems, price systems, delivery conditions, distribution systems, settlement of accounts, etc. and most enterprises studied have not performed marketing activities on all three markets in the past. Indeed, except WAMEL, most of them have performed their business mainly on the CMEA market.

The CMEA market systems were basically government-to-government transactions among eastern countries but, as a matter of course, the large part of these transactions was the radiate connexion between USSR and other eastern countries. It is also said that a fairly large portion of these transactions were low-cost energy (oil and natural gas) of USSR against industrial products of other eastern countries, but trading among Eastern countries was not so high. The pattern of this system structure is not likely to change quickly in the near future.

This pattern may be quite similar to the one in South East Asia where the developing countries have made quite good progress through business transactions mostly connected radially with the USA and Japan, but the contents of the systems was quite different.

Specific character of the CMEA market

Generally speaking, it can be said that there are three specific disadvantages in the transactions of the COMECON market; they are related to products, sales systems and settlement of accounts.

- (i) First of all, most products cannot satisfy the western markets regarding Q (quality), C (cost) and D (delivery) of products. This problem is caused basically by the so-called "product-out concept" of the State enterprises (the reverse concept being "market-in concept"), and the trading systems through state trading corporation weaken or rather counteract the sensitivity of the feedback response concerning the market needs. In order to develop products, an accurate and uninterrupted feedback of the needs of the market is essential, otherwise the speed of development will lag and, consequently, products will always become out of date.
- (ii) Investing in the distribution systems is not performed properly by the enterprises' independent will. As the CMEA market was made up by State distribution systems, management might have not paid enough attention to the distribution systems. Marketing is always a very costly item on the western market.
- (iii) One of the peculiar points in the CMEA trading systems was their account settlement by transferring accounts into Rubles which were not exchangeable, even on the domestic market of eastern countries. Another point was the pricing systems where the average prices of the past 5-year on the world market were being kept as a rule in prevailing practice. These transaction rules do not meet with the general conditions of the western market.

It has been revealed that some of the visited companies had realized an unusually high profit recently, seemingly induced under the above conditions (ii) and (iii).

Marketing capability in the CMEA systems

With the above characteristics, the marketing capability, which was emphasized as an advantage to offer to partners, can only be useful for business transactions within the CMEA systems; it does not have the same meaning on the western market. On the other hand, to obtain rapid economic reformations by introducing market principle and trade liberalization, the CMEA trading systems should be changed. It can be said that promptly demolishing the CMEA systems will hasten privatization of the State enterprises.

Even after termination of the CMEA trading systems, new privatized enterprises will be able to make the most out of the human relations they have long maintained among eastern countries and which which they alone can pursue.

Skillful labour forces at low cost

The second advantage that was emphasized is skillful labour forces at low cost. Chart 2 shows the approximate average wages in the visited companies.

Chart 2: Average wages in Poland

Company	Annual turnover 1989 or 1990 (mUS\$)	Number of employees	Per head turnover (US\$)	Monthly average wages or standard
UNITRA SERWIS	50.0	3,500	14,307	100
MERA BLONIE	40.0	2,500	16,000	100
WAMEL	2.3	345	6,692	100
EMA ELESTER	18.5	2,130	8,692	100
ELWRO (1989)	30.0	4,135	7,230	96
-----				
Japanese SME (electric & electronics industries- average)			128,000	2,169 US\$

A. Per capita turnover. Although under the inflation and fluctuation of foreign exchange rates, estimates are not easy to establish, the scale of the enterprises investigated in Chart 2 are as follows:

Paid-up capital	about mUS\$ 8.0-38.0, except WAMEL
Annual turnover	about mUS\$ 15.5-46.0, except WAMEL.

The scale level is medium compared to advanced western countries and the amount of the Polish per capita turnover is surprisingly low, i.e. US\$ 7,700 to 15,400. It is about 10-20 per cent the average Japanese SME (small- and medium-scale enterprises).

B. Average wages. The average monthly wages for 1990, on the other hand, are shown in the chart as about US\$ 100 (a standard and not an average in true meaning). It becomes about 1.4 times when fringe benefits are included. These figures are approximately 5 per cent of the Japanese SME (US\$ 2,170), and the wages per hour are about 50 per cent of those of HongKong or South Korea back in 1984. Accordingly, supposing that the internal processing rate in the factory is 50 per cent of the sales, the required wages to produce a 1 US dollar output is 30 cents in Poland (unit manufacturing labour cost), which comes to the same as the 1985 level of HongKong and South Korea.

C. Skill and quality of labour. We are under the impression that the quality and working attitude of the workers are at a fairly high level, possibly because the living and cultural standards of the Polish people are historically so modest that they are essentially industrious. Most companies have maintained a sizeable number of experienced skilled workers in their factory.

In comparison with workers in South East Asia, it seems that systematic training is not up to the level, one of the possible reasons lying in the management concept about the workers' role in the factory.

As economic reformation progresses, wages will raise depending on the improved country-wide economic situation and its results on the companies' business. Company heads, therefore, cannot depend permanently on cheap labour; they have to find out the optimum combination between investment and labour cost.

As to training, there are two training systems, one "off-the-job", the other "on-the-job", but on-the-job training with objectives is more important. In the case of joint-ventures, a recommendable procedure is as follows:

- (i) Select most profitable products for the near future;
- (ii) Separate from the existing company. Establish a new joint-venture with a foreign enterprise;
- (iii) Invest in the world's most advanced systems and facilities;
- (iv) Shift a minimum number of good workers and train them;
- (v) Prepare sales systems, train salesmen;
- (vi) Establish high-level management aiming at high productivity and high wages, train middle-level managers;
- (vii) Shift surplus of workers from former company to new company in a step-by-step operation, after training them, according to the growth of the new company.

High-level engineering powers with experience

Among the enterprises investigated, ELWRO proved to have a relatively large number of engineers. The total number of employees was 4 135 in early 1990, among them:

Highly educated engineers	703 (15.8%)
Secondary education employees	1,715 (38.4%)
Technical school employees	1,253 (28.1%)

The company was established in Wroclow in 1959 and since then has maintained a quite good relationship with the Educational Institute of Wroclow city, hiring many graduates from that institution. Although computer business is its main activity, the company has a fairly large number of qualified and experienced engineers.

Apart from industrial enterprises, we have also visited several technical institutes, information processing centres, a technical university where a large number of highly qualified and long experienced engineers have been maintained. For example, IOPM (information-processing centre) has 360 qualified engineers.



Engineers with academic orientation

Generally speaking, the level of engineering knowledge of all engineers we have met seems to be fairly high, with an academic orientation. Most qualified engineers have had experience in development, product design or research, but few of them seem to have worked in production engineering. Many are knowledgeable in computer science applied to business systems but not many specialists have experience in industrial systems.

Production capabilities (production facilities, technical know-how and production management)

Regarding production capabilities, some common characteristics enumerated among the enterprises visited are listed below:

- (i) Obsolete production facilities, insufficient investment, insufficient facilities and assets per capita,
- (ii) "Holding one set of production process" principle, too high rate of internal processing,
- (iii) Lack of consideration concerning the total system balance of elementary processes,
- (iv) Obsolescence of large tool shop,
- (v) Lack of consideration concerning MH (material handling),
- (vi) Insufficient quality control,
- (vii) Poor quality of components and parts,
- (viii) Inadequate production efficiency control,
- (ix) Poor maintenance of production facilities and infrastructure,
- (x) Deficient consideration in process improvement,
- (xi) Insufficient safety control for workers,
- (xii) Superfluous staff and workers.

Among the factories investigated, MERA BLONIE of Poland is at a relatively better level.

Obsolete facilities

In the Polish firm ELWRO, more than 70 per cent of the production facilities are over 10 years old (average-machine tools 86%, press 75%, injection moulding 65%, anti-corrosion coating 100%, electronic equipment 50%).

Some of the companies have recently restarted to invest in new production processes but this is still limited to a few unit processes such as: precision tool grinder, electric discharge machine, wire-cutting machine, NC machine, machining centre, turret punch press, painting systems, etc.

On the whole, it seems that the management does not give enough consideration to ROI (return of investment) and the life cycle of the products. A remote cause may lie in the poor feed-back response on the market needs.

#### "Holding one set of production processes" principle

Most companies investigated have had a high ratio of internal processing to output; it is a good thing from the viewpoint of increasing value-added but it is impossible to keep high productivity and efficiency through all processes. In the past, such problems would not have come up under cheap labour cost.

There is also a problem of industrial structure in the state; the important thing is to bring up SMEs (small- and medium-scale industries) into the industrial areas and expect a synergic effect by mutual co-operation.

#### Poor quality of components and parts

The quality of components and parts, especially electronic components, is at a fairly low level. The concerned governmental offices and respective industrial associations should consider means to procure them from western countries, otherwise they cannot compete on the western market.

In one word, "all factories and workers are in an exhausted condition but there is much hope".

#### Proposals

As mentioned in the above chapter 1.2.3, there are four (4) important areas for developing industries, and the State policy and foreign assistance should be carried out in close co-operation through these four areas.

This time, we are making a proposal in two (2) areas, i.e. Marketing and Technology.

## Marketing

In any country, developing industry begins with marketing; managers should keep in mind that "there should be a business at the beginning". All other functions such as financing, technology and management can have objectives only if there is a business.

It is costly to do marketing but it is necessary to invest a fairly large sum of money in marketing. Considering the present financial situation in Poland and Hungary, most companies will not be able to afford to invest money in developing a new market. Therefore, at least for the time being, we would like to recommend the following threefold strategic approach to the western market and suggest some ideas for the eastern market.

### Threefold strategic approach to the western market

- (a) Offering excess labour forces to companies in the neighbouring western countries.
- (b) Approach trading companies of western countries positively.  
This is effective only when the company has strong confidence in the products. Even in that case, the company should re-organize the quality assurance department and after-service network. Quality control should be done strictly in regards to quality level of components (QCD), parts must be more than PPM (a defect part per million) level, especially for electronic products. After-service network is useful to feed back the market needs.
- (c) Have a positive approach to multinational and transnational manufacturing companies in advanced western countries.  
Positive approach means that one should go out and look (instead of waiting) for eventual partners, lately multinational companies are not necessarily large-scale companies but there are many strong medium-scale companies as well.

The type of co-operation should be joint venture or OEM production although, regretfully so, the appraisal level of products and working quality in Poland at present are considerably low. Therefore, original

products' design and production process will be done under the partners' guidance.

In such case, the largest merit is less marketing costs by using the partners' distribution systems. It is useful also to gain time for reformations.

#### Strategic approach to the eastern market

- (a) The eastern market, especially the USSR market, should be maintained with efforts. The reason is that most of the companies investigated, even now, have had a quite high rate of export in their sales to the eastern market, under the CMEA transaction systems. It is impossible to convert the fruits of such a large market to other markets within one or two years, and it is also not wise from the viewpoint of human relationships established historically.

But the companies' marketing systems should be changed to the western style, continuing their dependence on the CMEA transaction systems will only delay and check reformation.

The recommendable policy, therefore, is to establish and maintain only one western-style marketing system by which all three markets should be covered (refer to 1.3.1). Transaction rules and distribution systems should be planned and executed by their own will and financed even on the eastern market.

The number of orders received will be reduced temporarily but they can establish the real market on a long run.

- (b) Establish a joint venture with USSR enterprises which have sound management and technology will get fruitful results in the long-range term.

#### Technical assistance

Chart 3 shows the rough appraisal on the existing situations of enterprises investigated in regards with the following points:

- Present market situation
- Products and their engineering level
- Production engineering and facilities level
- Components and parts level.

Chart 3: Appraisal on market and technology

Company	Present market situation	Products and products engineering	Production engineering	Level of components and parts
UNITRA SERWIS	no good	C - D	D	D - E
MERA BLONIE	fairly good	B	C	C
WAMEL	bad	D - E	D - E	D - E
EMA ELESTER	no good	C - D	C - D	C - D
ELWRO	bad	D	C	D

Appraisal level:

Market	Very good	Engineering	A
	Fairly good		B
	Good		C
	No good		D
	Bad		E

The appraisal level A is for the most advanced products and manufacturing process in the western countries.

One of the noticeable points in the above chart is that the quality level of components and parts which are mixed imported parts from eastern countries and domestically made ones, does not meet the requirements of export products for the western market. It is not exaggerated to say that the quality of final products depends mainly on the quality of its components and parts, especially in electronics products.

Regarding products and product engineering, most companies have made the effort to develop new products themselves and at times have also bought license or product designs from western companies, but generally speaking, products made

in eastern countries are not only refined but also obsolete. We are under the impression that the causes of this peculiar situation lie in the following two points:

(i) Lack of self-propagate power in engineering.

The key factor of engineering development is in establishing dynamic propagate power in the company.

Nowadays, engineering is so rapidly progressing and changeable in the world that the products or engineering developed for a business purpose at a certain time, are good only for the time-being and get old gradually with time. Even though we could get many engineering items from all over the world, it is no use if they have become obsolete.

Developing engineering is an endless race against time.

(ii) Lack of high sensitivity on feed-back response from the market.

Export-oriented enterprises cannot succeed in their business, unless they have high sensitivity of feed-back response from the market.

Products and product engineering

The most effective policy for the time being is to proceed positively in technical collaboration with foreign enterprises or by buying technical licenses, patents from advanced companies. In this case, management and financing to develop products shall be prepared by their own capability.

For example, during the period between 1955 and 1965, many Japanese manufacturing enterprises had taken this strategic policy and despatched quite a lot of study missions and delegations to the USA and Europe to acquire new and useful technology. But the financing for investment had been prepared by their own savings and management had been carried out in their own way which became later the so-called "Japanese-style management".

In order to succeed with this policy, companies should have enough information resources.

### Production engineering

Although improving products should have top priority in the reformation, there are many other areas in the back of the factory where production engineering and pertinent investment can drastically improve and activate the existing process.

Automation or robotic engineering is one of the tools to improve manufacturing processes but it should be applied carefully once management policy, market trend, existing process, production quantity, engineering level and financial situation etc. have been carefully studied.

Therefore, with regard to production engineering, we would like to offer the following effective proposal. It means a "Production Engineering Centre" to be established by the government. The details are as follows:

#### PLAN FOR A PRODUCTION TECHNOLOGY CENTRE IN POLAND

##### 1. Name

The centre should be given a name that appeals to managers and engineers.

For example:

- Production Engineering Centre (PEC)
- Automation Application Centre (AAC)
- Scientific and Production Centre of Robotics and Automation (CRA)
- Automation Leasing and Consultancy Centre (ALC)

##### 2. Objective

The objective of PEC is to promote and help reform and activate national industries by applying advanced production technology and effective investment.

The Centre should carry the following activities:

- (a) Practical consultancy for industrial companies, especially small- and medium-scale industries;
- (b) Information on production technology. Information library, education, publication, etc.

- (c) Co-operation to effectively apply the government incentive financing scheme.

3. Industrial area of consultancy

All types of industrial companies, from process to discrete products industries, from large to small-scale industries.

4. Organization and employees

The number of employees at the beginning should be limited to the minimum required, approximately 20 people may be enough. This should be reviewed every year, according to results.

Management	2
Administration	2
Consultants	
Experienced engineers	4
Younger engineers	<u>10</u>
	14
Information centre	2
Technical advisers	2
(specialists from western countries)	
TOTAL	<u>22</u>

5. Government support

- (a) Subsidising personnel expenses (95 per cent), low-cost office rent, free transportation;
- (b) Preferable application of incentive financing programme to improve manufacturing industries;
- (c) Technical support from institutes/universities, etc.
- (d) Positive support by introducing companies to consultancy.

6. Consultancy activities

- (a) Consulting phase:
- (i) Investigation study



- (ii) Feasibility study
- (iii) Implementation study
- (iv) Result monitoring.
- (b) Free consulting for SME,
- (c) Formal consulting charges,

Charges to be paid by clients: 10 per cent of total expenses  
(Total expenses are estimated on a man-hour accounting basis. This policy is important for two reasons: one is easy marketing and the other is obligation of clients).

### C. Computers and peripherals

The open-market policy introduced by the Government has forced domestic computer manufacturers to stop production. Because of free import of second-hand computers from western countries, which started in 1990, MERA-STER, manufacturer of mini-computers compatible with PDP-11 of DIGITAL, and ELWRO, who developed and supplied main frames compatible with IBM-370, have stopped their production at the beginning of the same year.

If the Polish economic structure, in its present phase of internationalization, cannot build up its domestic electronic market, the sole introduction of foreign technology by way of governmental support to finance an inactive domestic industry can lead to a so-called negative adjustment policy, in other words, to government resources being spent in ineffective sectors, thus achieving no result.

The aim of establishing new manufacturing industries should be oriented to the domestic market in order to create highly developed consumption needs as is the case in the USA or Japan.

If the implementation of a market economy is to be successful in Poland, the Government should introduce urgent measures to attract foreign investors and obtain technology, know-how and to import modern equipment for electronic communications and information processing, etc.

By building up a merchandise circulation system in the whole of Eastern Europe, with a base in the Polish capital where it can be carried out on the

base of ample experience and knowledge in this region, Poland could strongly attract western partners for joint-venture co-operation.

As mentioned above, the key problem for Poland is to select the most important technology among others which will be introduced through joint ventures with western partners, and established and developed as domestic industry. It would be recommendable to start from manufacturing technology on low-end printers, peripheral devices, electronic components, I.C. etc. On the basis of this industry, Poland could grow the largest computer industry in the eastern and middle European region and export its products to other countries in the region.

The following aspects could be regarded as additional recommendations supplementing the ones already mentioned.

#### Regional information centre

In view of strengthening a broad public information system in the process of this development, the country would need to create maintenance and sales networks for computers and their components. This network would take over the task of communicating the users of personal and office computers directly to the regional computer centre and software house. The activities of this network would be centralised by an information centre established in each region.

#### Market for office automation equipment

When the privatisation of enterprises reaches a certain level of achievement, there will be a need to modernize office operations and get acquainted with data collection and processing techniques. Enterprises will start introducing word-processing and financing systems by importing compatible equipment and devices. This trend will step up new needs for computerization of business operations.

#### Electronics components industry

For the creation and development of a domestic market in personal computers and office automation, it would be advisable to have an already developed domestic IC as well as hardware. The presence of a domestic IC market could attract

many western manufacturers. Further, if electronics industries such as the IC establishes a firm ground in the country and cultivates its downstream industries, it would be a good incentive to develop related industrial branches such as home appliances and electronics machinery industries.

#### Introduction of financial system

The transfer to a market economy system will automatically lead to the creation and operation of financial institutions. The present financial institutions in western countries are wholly involved in daily data/information processing operations. The present trend to establish new financial institutions/banks in Poland has a good chance of attracting western computer manufacturers to the country.

Since 1990, Poland has been provided by the World Bank and other international financial institutions with long-term loans to restructure its economic system as well as to upgrade individual enterprises. These loans will be administered by the Central Bank and other commercial banks for financing industrial and business enterprises. It constitutes the best chance to introduce modern banking operations and data-processing systems to these financial institutions/banks by installing office computers and conducting on-the-job training for this equipment.

In addition, Poland will have a big opportunity to introduce and establish a computerization and data-processing system in its hotels and transportation services as well as in the computerization of technical processes for the chemical industry. Particularly the chemical and other industrial sectors such as steel, powerplants and engineering industries are badly in need of full computerization in process control and environmental pollution control which has already caused enormous damage to the national economy and public health.

#### D. Automobile industry

It is important to know that, in contrast to other industries, the automotive industry consists fundamentally of a network of firms involved in manufacturing components and parts, car assembly, sales and service, repair work, second-hand car market, financing and credit. Whenever one of these is

lacking, the automotive industry of the given country cannot be healthy or prosperous.

Because of the broad area of the automotive industry, only a repair plant, a lamp and ignition plant, and a diesel engine plant have been visited in Warsaw during the limited schedule of the mission.

TRANSBUD (ul. Czerna 8/10, 00-732 Warsaw, Poland)

Persons met: Messrs. Wiktor Sokolski (Dyrektor Biura Eksportu),  
Marek Kaniewski (Główny Inżynier)

Visiting team: Messrs. Jan Potega (Główny Specjalista, Poland), S. Mimura (UNIDO), N. Sato (Jetro), H. Tachimori (Specialist).

In the past, TRANSBUD was a Union of Transport Enterprises - 27 enterprises located in all regions of Poland. One of them was Transbud-Warsaw with 10 shops in all parts of Warsaw. In 1989 the Union was liquidated and now Transbud-Warsaw is divided in 10 independent-piece companies. Ten workshops are operating in Warsaw with enough workers, amongst them 40 mechanical engineers possessing experience in western countries. It also runs fuel stations and a broad management structure.

#### Recommendations

- Phase 1. To import passenger cars and components/parts from Western countries for both new car sales and repair work/service.
- Phase 2. To introduce new business by buying used cars back to sell them again and selling repaired second-hand cars on the open market.
- Phase 3. To establish joint-ventures with Western manufacturer(s) for parts and/or automotive production.

POLMO/ZELMOT (ul. topuszanska 22, 02-220 Warsaw, Poland)

Persons visited: Messrs. EUGENIUSZ RYBINSKI (Dyrektor), TADEUSZ KARPINSKI (Dyrektora d/s Technicznych), ANDRZEJ CHANSKI (Dyrektora d/s Handlowych), STANISŁAW PIETRZAK (Head, Quality Control Dept.)

Visiting team: as above.

POLMO/ZELMOT was established 70 years ago to produce electric bulbs for domestic consumption. It is now manufacturing head lamps, ignition coils and distributors for the automotive industry. About 25 per cent of its production

is exported both to Eastern and Western countries, among the latter, Egypt, Italy, Syria, the United Kingdom and the USA.

There are scores of key facilities in this plant such as press/stamping machines, molding machines, galvanization facilities, painting and aluminium vapor deposition, machine engineering shops, etc.

The reason for the success this company has enjoyed in exporting to Western countries is that it has been so concentrated on quality control that the defect ratio has remained at a very low level. This company is also eager to introduce new equipments and machines in order to increase its productivity and reduce its costs. As to new products, plans are under way to develop dry-type ignition and halogen lamps for the automotive industry.

#### Recommendations

1. This firm has fundamental engineering technology for the maintenance of machines and equipments. On the other hand, there is need to improve the flow of materials and products in the production lines. For the workers' health and safety, floor and light conditions should be improved.
2. Although their defect ratio is at a low level, more systematic quality control would be recommended.
3. This company has great possibilities to increase productivity and reduce costs by introducing advanced systems, processes and facilities.
4. The management people should be encouraged to engage in expanding their production towards more value-added products in the automotive industry.
5. We recommend that this company be given the chance to participate in a Japanese exhibition at the earliest occasion.

PZL/WOLA (00-961 Warsaw, Fort Wola, Poland)

Persons visited: Messrs. WIESLAW SZYMCZYK (Direktor), ANTONI SZULBORSKI (DYREKTORA d/s Technicznych),

Visiting team: Messrs. JAN POTEGA (Glowny Specialist, Poland), N. SATO (JETRO), H. TACHIMORI (Specialist).

Established in 1951, PZL/WOLA is a diesel engine manufacturer specialised in military vehicles/tanks, tractors and civil derivatives. The company also manufactures power-generating sets rated at 100, 200 and 300 KW, power packs for drilling rig drive, pumping units and marine power packs.

Some 80 per cent of their products are for export, out of which 75 per cent are sent to the USSR and the East European countries.

This company is interested in finding a partner for the joint manufacturing of modern diesel engines with a capacity up to 3.5 tons, a swept volume of 2-2.5 dm<sup>3</sup> and rated power of 70-115 HP at 3800-4200 rev/min. A new plant has been built three years ago for the manufacture of high-powered diesel engines intended for the USSR military vehicles but is now idle.

The future demand for engines is foreseen as follows:

1991	6,000 units/year
1993	12,000 " "
After 1995	25,000-50,000 units/year

The company has 250 research engineers who have managed to develop high-powered diesel engines having 6 cylinders, 600 HP with 2,000 rev./min.

#### Recommendations

1. This firm has fundamental technology in metallurgy and machining. Once it introduces some modern systems, processes and equipments, its productivity will be increased within a short time.
2. The working environment must be improved for the workers' health and safety.
3. We recommend that this company introduces new technology and products at the earliest time possible, since it possesses the suitable technical background to catch up with production.

#### E. Pharmaceutical industry

Based on the circumstances mentioned above in Chapter III, the Polish pharmaceutical firms are recommended to orient themselves according to the following lines:

##### 1. Self-help efforts

For the rapid reconstruction of the Polish economy, a wide range of assistance from Western countries is essential. But in order to obtain such assistance, self-help efforts are most important to improve economic circumstances and decrease political and economic risks. Potential Western

partners must consider that the Polish economy is both attractive and stable enough to get ahead.

Although some improvements depend on the government, and not the enterprise, some suggested steps can be attempted:

- To successfully reform the political and economic systems, especially establish a market economy and promote a privatization programme, including economic self-reliance at the enterprise level;
- To establish external debts policy;
- To restore external convertibility of the Zloty currency;
- To improve investment environment for foreign investors, especially settle investment protection agreement between Polish and Western governments;
- To improve the official rule of technology transfer, especially establish an intellectual property law;
- To enhance employees' morale.

2. Case study of co-operation in the pharmaceutical field

Several types of co-operation between Polish and western firms are possible in this field. They are shown below in Chart 4.

Cases such as "Joint R & D for substances originated in the East with assistance from the West (Case 1-1)", "Manufacture of intermediates originated in the East and exported to the West (Case 2-1)" and "Manufacture of intermediates licensed by the West and exported to the West (Case 2-2)" will be rather easy to implement and to develop Western market.

In such cases, the end stage of R & D and the production up to the finished dosage forms are performed by western firms using western process which can be more easily accepted by western regulatory system.

In contrast, cases such as "R & D for substances originated in the West on entrusted contract basis" (Case 1-2), "Import intermediates and manufactured finished dosage forms on license from the West" (Case 2-3) and "Manufacture of finished dosage forms through entire process on license from the West" (Case 2-4) would be rather difficult to implement, if the products are planned to be sold on the western market because the R & D procedures and production done in Poland are not yet approved in the West, at least in some cases.

Chart 4: Potential cases of co-operation between western and eastern firms

	C A S E	WESTERN FIRM	EASTERN FIRM (POLISH or HUNGARIAN)	WESTERN MARKET	NOTES
R & D B A S E	1-1 Joint R & D for substances originated by East with assistance from West	Joint R&D agreement ↓ Technical & Financial assistance	Active substance screened ↓ R&D ↓ New drug originated		To be followed by case (2-1).
	1-2 R & D for substances originated by West on entrusted contract basis	Active substance screened	Toxicological test on entrusted contract base		To be followed by cases (2-2), (2-3), (2-4).
P R O D U C T I O N B A S E	2-1 Manufacture of intermediates originated by East and exported to West	Import ↓ Finished dosage form	Manufacture original intermediates	→Sales	
	2-2 Manufacture of intermediates licensed by West and exported to West	License Import ↓ Finished dosage form	Manufacture intermediates licensed	→Sales	
	2-3 Import intermediates and manufacture finished dosage forms on license from West	Manufacture original intermediates License	Import ↓ Finished dosage form	→Sales	
	2-4 Manufacture finished dosage forms through entire process on license from West	License	Manufacture intermediates and Finished dosage form licensed	→Sales →Sales	
J V	3-1 Establish Joint Venture in East and manufacture finished dosage forms through entire process on license from West	Financial assistance License	(Joint Venture) Manufacture intermediates and Finished dosage form licensed	→Sales →Sales	

Notes) License shall basically cover:

- A) technical information and instruction (training) for R&D or manufacturing of individual pharmaceutical to be licensed.
- B) general instruction to improve productivity and quality including plant management technology.
- C) instruction for marketing in some cases.



An early establishment of Western-style R & D and production systems is desirable.

In order to have Case 3-1 "Establish joint venture in the East and manufacture finished forms through entire process on license from the West" materialize, the circumstances prevailing in the country at present have to be improved.

For all these reasons, the most recommended way of co-operation is to begin with Cases 1-1, 2-1 and 2-2 and then expand to Cases 1-2, 2-3, 2-4, and 3-1 as the economic climate improves.

3. Computerization

Various pharmaceutical firms have emphasized their intention to introduce or improve their computer systems to help R & D, production and management.

Considering the existing level of instrumentation, computerization, labor costs and management systems in Poland, an excessively rapid introduction of computer systems may not be appropriate and may cause unnecessary confusion.

Polish firms are hoping to use computers to improve their productivity and product quality. It should be noted, however, that technology to manage productivity and quality already exists independently from the computer, which would just help in processing. Furthermore, computer systems are not the only way to implement modernization.

Accordingly, a step-by-step approach to computerization is recommended.

4. Recommendations to potential Western partners

In view of its present difficult situation, Poland urgently needs financial and technical assistance from the West. Western companies including those in Japan should offer generous help. Annexed to this report, proposals of firms whose management has been visited are summarized. They can be referred to for a definite study of possible co-operation with them.

(a) Potential of the Polish pharmaceutical industry

As mentioned above, Poland has a well developed history in chemical and pharmaceutical production as well as in R & D but unfortunately improvements have remained at low levels in the socialist system. There is, however, significant potential especially in the theoretical field.

It can be said that the main difficulties today are in the industrial field because of inadequate social structure, lack of finance and so on.

A very high educational level is another strong point for Poland. Relatively low wages for labor and research specialists would be one of the attractive points.

It is recommended that Western firms focus on these points and try to utilize such skills and knowledge at reasonable costs.

(b) Expected areas of assistance

(i) Upgrading productivity

While discussing productivity, several definitions can be considered:

(a) Production per capita; (b) production per facility; (c) production per unit of raw material.

During the short factory visits, it has become apparent that at least (a) and (b) were relatively low and (c) could not be determined without a review of operational data. Actually, an over abundance of operators was observed in the plants - a result of, and ironically perpetuating, low wage levels. Another fact noticed was that only a small portion of the equipment was in operation while most of it was idle. The major cause of such an operation is poor maintenance level, itself attributable to insufficient capital - a weak point of the planned economy.

Although Polish plants are currently operating at low productivity levels, financial and technical assistance could remarkably improve their production.

The technique of "Total Productive Maintenance" (TPM), which has been developed to improve productivity and is becoming popular in Japan, would also meet with Poland's needs.

(ii) Upgrading product quality

During the factory visits, some product samples were displayed. It was noted that their appearance, including packaging, was relatively poor.

The product quality as well as packaging should be improved if products are to be exported to the Western market, where demand is known to be for very high quality products. Total quality, including appearance and packaging, is a very important factor to ensure successful products, especially pharmaceuticals.

Likewise, Polish pharmaceutical firms also need financial and technical assistances from the West in quality control areas. The Total Quality Control (TQC) technique developed and widely used in Japan would be very useful for this purpose.

(iii) Education and training

Because of the socialist system, Polish people have not been exposed to the latest Western technology and know-how. They should be given training in many areas such as proper operation of a market economy system, management know-how, quality control know-how and environmental control technology.

Although most Polish people understand Russian and German, very few people understand English. In order to get assistance from Western English-speaking countries including Japan, it is essential that they learn English.

Ideally, some international organization or some Western government could establish a system to educate and provide technology, know-how and language training in Poland or a Western country.

If the training center is established in Japan, the trainees could receive not only technical training itself but also acquire cultural

knowledge concerning Japan. This would greatly improve mutual understanding between the two countries.

(iv) Environmental control technology

Both water and air are now severely polluted in Poland. It is said that this situation has been generated by low levels of governmental regulations and a lack of financing to treat exhaust materials. Recently, the account settlement system between the Soviet and East European countries was shifted from using transferrable rubles to using hard currency, and as a result, oil imports from the Soviet Union have diminished. Although Poland has a rich vein of coal, it cannot be efficiently utilized because there is not sufficient technology or facilities to treat exhaust in the country.

In order to prevent future environmental harm, Western partners are expected to contribute to the improvement.

Japanese pollution-control technologies have solved severe pollution problems generated in concentrated industrial sectors of Japan in the past two decades. They should also be applied to Poland.

**ANNEX A**  
**STATISTICAL INFORMATION**

Table A.1: Production (bill. zI - fixed prices of 1984)

Industries	Y e a r s					
	1980	1985	1986	1987	1988	1989
All industries	10018	10046	10488	10841	11410	11342
Fuel and energy	1403	1445	1476	1495	1497	1485
Metallurgy	1058	935	956	946	964	914
Engineering industry	2368	2527	2715	2915	3162	3149
Chemistry	797	831	864	907	969	986
Mineral industry	408	390	407	415	443	456
Wood and paper industry	401	434	459	471	511	535
Light industry	1117	1110	1139	1171	1278	1293
Food industry	2243	2149	2228	2256	2302	2136

Remark:

With regard for the high inflation and improper relations of Polish zloty to foreign currencies all the data in zloty are presented in fixed prices of 1984 /except table 12/.

Table A.2: Employment (thousand persons)

Industries	Y e a r s					
	1980	1985	1986	1987	1988	1989
All industries	4895	4704	4741	4759	4750	4718
Fuel and energy	551	611	632	660	655	659
Metallurgy	258	226	222	217	214	209
Engineering industry	1706	1538	1541	1537	1529	1518
Chemistry	341	325	326	325	323	320
Mineral industry	296	278	274	270	271	262
Wood and paper industry	299	282	283	285	285	281
Light industry	866	800	806	802	803	797
Food industry	450	470	480	481	489	491

Table A.3: Efficiency of man-power  
(thousand zl employees - fixed prices 1984)

Industries	Y e a r s					
	1980	1985	1986	1987	1988	1989
All industries	2046	2136	2212	2278	2402	2404
Fuel and energy	2548	2363	2335	2265	2284	2253
Metallurgy	4095	4140	4306	4368	4511	4375
Engineering industry	1388	1643	1762	1896	2067	2075
Chemistry	2336	2561	2649	2795	3001	3082
Mineral industry	1376	1405	1486	1518	1640	1741
Wood and paper industry	1341	1537	1622	1654	1792	1903
Light industry	1290	1386	1413	1460	1592	1621
Food industry	4985	4568	4643	4688	4705	4354



Table A.4: Fixed assets (bill. zI fixed 1984)

Industries	Y e a r s					
	1980	1985	1986	1987	1988	1989
All industries	13135	14416	14962	15292	15673	16039
Fuel and energy		4250	4470	4688	4785	4902
Metallurgy		1778	1810	1839	1864	1885
Engineering industry		3180	3290	3412	3519	3620
Chemistry		1437	1470	1510	1530	1555
Mineral industry		845		833	851	867
Wood and paper industry		577	585	596	605	616
Light industry		860	875	893	915	943
Food industry		1225	1240	1275	1311	1392

Table A.5: Investment (bill. zl - fixed prices 1984)

Industries	Y e a r s					
	1980	1985	1986	1987	1988	1989
All industries	622	523	558	585	610	641
Fuel and energy	.	191	205	198	186	154
Metallurgy	.	34	36	35	30	42
Engineering industry	.	112	124	148	154	156
Chemistry	.	50	46	46	52	62
Mineral industry	.	23	24	24	24	26
Wood and paper industry	.	17	18	18	23	27
Light industry	.	32	31	33	41	49
Food industry	.	56	61	69	82	114

Table A.6: Export (bill. zl - fixed prices 1984)

Industries	Y e a r s					
	1980	1985	1986	1987	1988	1989
All industries	1192	1267	1330	1403	1531	1513
Fuel and energy	144	144	135	129	136	127
Metallurgy	117	132	131	131	146	145
Engineering industry	492	529	570	609	663	684
Chemistry	117	130	140	153	171	173
Mineral industry	12	14	15	16	18	17
Wood and paper industry	27	30	35	38	45	38
Light industry	151	105	.	128	137	110
Food industry	132	165	180	198	207	212

Table A.7: Import (bill. zl - fixed prices 1984)

Industries	Y e a r s					
	1980	1985	1986	1987	1988	1989
All industries	1322	1226	1280	1337	1460	1489
Fuel and energy	360	287	300	311	331	332
Metallurgy	120	106	106	105	107	100
Engineering industry	451	441	470	504	556	558
Chemistry	161	168	175	183	201	192
Mineral industry	21	19	18	18	17	17
Wood and paper industry	25	24	24	25	26	27
Light industry	60	71	.	66	85	105
Food industry	67	94	103	112	122	139

Table A.8: Shares of main countries in import and export of industrial goods in 1989

Industries	Countries and % of share		Japan
	import	export	
Fuel and energy	1. Soviet Union- 71	2. Iraq- 11	$\frac{0}{0}$ x/
	1. Soviet Union- 19	2. W.Germany- 13 3. Austria - 13	
Metallurgy	1. Soviet Union- 19	2. W.Germany- 19 3. G. Britain - 15	$\frac{1,6}{0}$
	1. W.Germany - 31	2. G.Britain - 18 3. S. Union - 6	
Engineering industry	1. W. Germany - 19	2. S. Union - 14 3. Czechoslovakia - 11	$\frac{2,1}{0,1}$
	1. S.Union - 33	Czechoslovakia - 9 3. E. Germany - 7	
Chemistry	1. W.Germany - 23	2. Switzerland - 7 3. G. Britain - 6	$\frac{1,8}{0}$
	1. S. Union - 24	2. W.Germany - 13 3. Yugoslavia - 6	
Mineral industry	1. Czechoslovakia - 18	2. E.Germany-10 3. Austria - 9	$\frac{0,1}{0}$
	1. W.Germany - 16	2. Yugoslavia - 9 3. USA - 9	
Wood and paper industry	1. S. Union - 20	2. Austria - 14 3. Yugoslavia - 10	$\frac{0}{0}$
	1. Norway - 10	2. Italy - 6	
Light industry	1. China - 18	2. Austria - 11 3. S.Union - 8	$\frac{0,7}{0,9}$
	1. W.Germany - 14	2. S. Union - 13 3. USA - 8	
Food industry	1. W.Germany - 15	2. Brazil - 14 3. Switzerland - 10	$\frac{0}{5,1}$
	1. W.Germany - 25	2. G. Britain - 11 3. USA - 10	

x/ 0 = under 0,1 %

Table A.9: Export of main groups of goods  
(in natural units)

Goods	Units	Y e a r s					
		1980	1985	1986	1987	1988	1989
Hard coal	th.t.	31048	36155	34315	30961	32177	28858
Electric energy	GWh	1416	4119	3203	2982	2571	2874
Rolled products	th.t.	1879	2080	2181	2232	2267	2301
Copper	- " -	145	182	169	162	166	157
Machine tools	pcs	7410	5927	5894	5269	6320	6631
Goods wagons	pcs	6745	2402	2420	2755	2836	2560
Cars	th.pcs	112,8	89,4	82,4	96,5	112,8	90,9
Trucks	pcs	14615	14125	12899	10533	9978	10055
Bicycles	th.pcs	528	252	270	337	301	431
Ships	th.DWT	364	208	381	208	45	172
Sulfur	th.t.	3903	3906	3823	3856	3878	3636
Coniferous timber	dam <sup>3</sup>	689	452	494	491	540	384
Footwear	mln.pairs	32	26	30	32	32	26
Aircrafts	pcs	380	430	370	385	390	320

Table A.10: Import of main groups of goods  
(in natural units)

Goods	UNITS	Y e a r s					
		1980	1985	1986	1987	1988	1989
Crude oil	th.t.	16347	13712	14139	14169	14966	14985
Natural gas	hm <sup>3</sup>	5312	5898	7135	7531	7487	7905
Electric energy	GWh	888	1877	4095	4602	6790	3861
Iron ore	th.t.	20150	16973	16644	17116	16644	13441
Aluminium	th.t.	89	86	88	89	89	96
Machine tools	th.pcs	7,2	7,4	10,0	10,9	11,8	12,6
Cars	---	14,9	25,2	34,3	31,6	38,7	33,2
Trucks	pcs	16779	5048	5890	7324	9075	11743
TV receivers	th.pcs	240	239	233	263	469	451
Potassic fertilizers	th.t.	2428	2357	2373	2496	2532	2055
Synthetic fibres	---	64	44	39	49	55	44
Cotton yarn	t.	9839	14221	9641	9189	10022	8582

Table A.11: Production of main groups of goods in natural units

Goods	Units	Y e a r s					
		1980	1985	1986	1987	1988	1989
Hard coal	mln t.	193	192	192	193	193	178
Coke	--	20,5	16,0	16,4	17,1	17,1	16,5
Sulfur /100%/	th.t.	5164	4875	4894	4966	5000	4864
Artificial manures	--	6975	7135	7833	8010	8277	8209
Gasolines	mln t.	3,3	3,8	3,9	4,4	4,3	4,4
Diesel oil	--	5,1	4,8	4,9	5,0	5,2	4,9
Electric energy	mln KWh	121876	137717	1402298	145835	144344	145472
Rolled products	th. t.	13552	11845	12340	12410	12424	11272
Copper ore	--	26568	29377	29581	29821	29996	26528
Sewing machines	th.pcs	409	419	440	450	443	422
Marine engines	pcs	301	362	230	243	181	122
Machine tools	--	20194	98687	43082	37955	46054	44342
Mini-and microcomputer systems	--	-	-	4076	4484	10318	14642
Typewriters	th. pcs	76,7	59,0	64,0	66,6	64,8	65,0
Goods wagons	--	15,2	6,8	6,9	6,7	6,5	4,6
Cars	--	358	286	292	296	296	288
Trucks	--	53,7	49,1	46,1	45,6	46,8	43,9
Bicycles	--	1250	953	967	903	1130	1132
Ships	th. DWT	442,7	408,8	207,3	226,6	234,7	137,9
Aircrafts	pcs	420	468	418	422	419	343
Electric rotary machines	MW	9864	8878	9142	9065	9022	8325
Cables and wires	th.t.	261	236	238	266	252	255
Telephone sets	th.pcs	1520	1702	1916	2009	2110	2036
TVC receivers	--	147	158	169	211	215	237



Table A.12: Participation of industry in Polish economy  
(current prices [percentages])

Participation in :	Y e a r s					
	1980	1985	1986	1987	1988	1989
National income	52,1	47,6	47,3	48,6	48,1	47,5
Export	92,0	90,0	89,8	90,4	90,4	88,9
Import	87,7	95,1	95,9	95,1	94,5	95,2
Employment <sup>x/</sup>	37,0	34,1	34,2	34,3	34,5	34,0
Investments	30,4	29,2	30,2	31,3	31,5	35,5
Consumption of electrical power	57,5	55,0	54,5	53,0	53,2	.

x/ - in relation to employment in all production  
/material/ sphere.

Table A.13: Comparison of Polish industrial output (percentages)  
 (Oct.90/Oct.89, Oct.90/Sept.90, and  
 10 months 1990/10 months 1989 [January-October])

Industry	$\frac{X.90}{X.89}$	$\frac{Y.90}{IX.90}$	$\frac{I-X.90}{I-S.89}$
All industries	81,8	110,1	73,8
therein:			
Fuel and Energy	77,6	108,4	78,5
Metallurgy	86,1	109,2	79,7
Engineering	87,7	104,1	77,6
Chemistry	80,9	110,3	74,7
Mineral	80,5	105,1	73,8
Wood and Paper	89,1	115,9	74,8
Light	68,0	109,4	62,1
Food	85,2	121,0	70,6

**ANNEX B**  
**ELECTRONICS AND ELECTRICAL MANUFACTURERS VISITED**

Annex B-1

1	Name of Co.	UNITRA SFRWIS
2	Ownership	State
3	Establishment	1978
4	Capital	NA
5	Employees	3500 (1990-10)
6	Turnover	About 500 Billion ZL.
7	Products	After service and sales of electronics' home appliances (TV, VTR, Tape recorder, Radio etc.)
8	Request from the company	1 Contract with western manufacturing Co. especially Japanese Co.. 2 Training, supply of components and parts, service and test equipment. 3 Joint venture cooperation, something like PEVEX with MC centre.
9	Recommendation	
	<p>1 Re-organize management systems, expedite Privatization, establish "Profit centre operation" (it should be based on Regional, Products or Function category)</p> <p>2 Simplify management systems, reduce number of employees, especially administration department.</p> <p>3 Formal contract with first-class western manufacturing Co., Japanese company is the best, so far electronics home appliances is concerned.</p> <p>4 Despatch study missions to western countries collecting information regarding desirable partner, and learn what is, how to implement, service in western countries.</p> <p>5 Establish "Parts and components centre". Strict inventory control is essential, otherwise you will make a big loss, possibly under the guidance of cooperated company.</p> <p>6 Prepare necessary fund for the above activities, as much as possible by your own efforts.</p> <p>7 Apart from Electronics' products, expand gradually your business to white goods with precaution.</p> <p>8 For your information, it is said, there is every reasons to expect that the home appliances market in Poland, which was about 400 mUS\$ 1990 and expected 1 bUS\$ 1991, in spite of inflation.</p>	

Annex B-2

1	Name of Co.	MERA BLONIE
2	Ownership	State
3	Establishment	1953
4	Capital	Authorized 118,189 Million ZL. Paid up 103,797 Million ZL.
5	Employees	2500 (1990-10)
6	Turnover	400 Billion ZL.
7	Products	Computer printer 100,000 sets/year Matrix printer 8 types (75%) Line printer 1 type (15%) 80% export.
8	Request from the company	<p>1 Assistance for Development of new products. For example, something like Laser printer, including supply of necessary components and parts. Improvement of production process. By application of automation technology to machining process, PCB manufacturing process, assembly line. Introduction of advanced Quality control systems.</p> <p>2 Cooperation to marketing in western countries.</p> <p>3 Joint venture.</p>
9	Recommendation	<p>1 Development of new products. Despatch an overseas delegation for studying new products like laser printer, and partner to purchase its license. Apart from printer, in the long range view, introduce new product items which can be applied precision manufacturing technology which they have historically.</p> <p>2 Overall review of production engineering. For the time being, secure the service of consultant, despatch engineers to western countries for study. Aim at high productivity by more investment and low cost labour forces, otherwise cannot compete with western manufacturers. The production quantity 100,000 sets, 400 Billion ZL, by 2135 workers is too low productivity. Use more sub-contractor for tools and parts manufacturing. Improve quality control and assurance systems of products and parts. Reduce WIP (Works In Progress) by reviewing production systems.</p> <p>3 Reduce manufacturing overhead cost (28%).</p>

Annex B-3

1	Name of Co.	WAMEL
2	Ownership	State owned
3	Establishment	NA
4	Capital	NA
5	Employees	345 (1990-1), Engineers 48, workers 297
6	Turnover	1989 6,439 mZL. 1990 24,000 mZL. (plan) 1990 6-month 11,759 mZL. Export 27% 1989, 14% 1990 (plan)
7	Products	Small electric motor and generator. Various DC motors for control units. DC servo motor for NC, Disk motor, Stepping motor, Brushless motor etc..
8	Request from the company	1 Want to buy license of AC brushless servo motor for NC machine drive. (continuous stall torque 3.5-57 Nm.) 2 Technical collaboration or Joint venture
9	Recommendation	
	<p>1 It is a good policy to buy the license of Brushless servo motor. On this occasion, carrying the scheme one step farther, continuous technical collaboration of control motor including controller with western manufacturer especially Japanese company, is recommendable. But please understand that most of the present products and production systems are obsolete and cannot be sold in western market, they should be changed under the guidance of the partner. It takes time and cost.</p> <p>Despatch a study mission to western countries.</p> <p>2 For the time being, do yourself best effort to improve production systems, if possible, under the guidance of consultant.</p> <p>3 Improve factory management and motivate worker's morale, for this purpose, start from small matters like house keeping, safety management, material handling, QC circle etc..</p> <p>4 Maintain good relationship with domestic clients.</p>	

Annex B-4

1	Name of Co.	EMA-ELESTER
2	Ownership	State
3	Establishment	1930
4	Capital	Fixed assets 97 Billion ZL.
5	Employees	2130
6	Turnover	1990 185 Billion ZL. Export 75%
7	Products	75% Low voltage--Contactor (motor starter), Switchgear, Circuit breaker and its relay, small cubicle. Licensed by BBC, Westinghouse. Special custom ordered Electronics equipment
8	Request from the company	1 Technical cooperation with western manufacturing company. Improvement of operation by introduction of new technology. 2 Expand of market and activating excess man powers with the help of good partner. 3 Studying western style marketing and management.
9	Recommendation	1 Continuous technical cooperation with western manufacturing company, especially for new designed products. The existing design is slightly obsolete. 2 Overall reviewing production management and engineering, aiming at high productivity by new investment and low labour cost. More severe quality control is required, please note that the concept level of management for quality finally decides the factory' level. 3 It seems that most of foreign trade business are carried out through ELEKTRIM (state foreign trade company), it will be continued for the time being, but, in the long range view, better to change the systems to their own sales systems. 4 Productivity is too low, (1990 185 BZL. by 2130 employees), They should make a strategic plan to make efficient use of excess labour forces on other business. For the reference: production indexes of a contactor mfg. factory in Japan are shown as under. No of production-5m sets, Turnover-110 mUS\$, (1990) No of workers-240, Design engineers-20, Initial investment-15 mUS\$ 1979 (Facilities, land, and building), later 1.2 mUS\$/every year.

Annex B-5

1	Name of Co.	ELWRO
2	Ownership	State
3	Establishment	1959
4	Capital	Net assets 418,226 mZL. Fixed assets 153,757 mZL.
5	Employees	4135 (1990-6)
6	Products and	Microcomputer 42,49 ( Billion ZL.)
7	Turnover	Teleprocessing S. 18,92 Other computer S. 14,55 Others 33,28 Total (1989) 121,40 Export 70%
8	Request from the company	<p>1 Partial or 100% Joint venture with any western enterprise.</p> <p>2 Any other form of cooperation by which ELWLO can do their best efforts for improvement of management, product, and technology.</p> <p>3 ELWLO can offer experiences and knowledge in eastern market, and production facilities with low cost labour forces.</p>
9	Recommendation	<p>1 Although It is useful to cooperate with western firms, or to shift to computer application and network service business, but still it will be very difficult to survive as it is in this organization, because it will not become the answer to saving 4135 employees' job after trade liberalization. Therefore, they should develop new peripheral business to make some equipment in business and industrial field. For this purpose, the special task force should be organized with western specialists.</p> <p>2 Overall reviewing production systems, facilities and factory management by appropriate investment and new production engineering. The existing systems are too obsolete.</p>



**ANNEX C**  
**PHARMACEUTICAL MANUFACTURERS VISITED**

Annex C-1

Pharmaceutical works "POLFA" in Tarchomin

The management of POLFA-Tarchomin has proposed participation of foreign capital and cooperation in the development of pharmaceutical formulations and marketing.

The following is a portion of the paper presented by Tarchomin.

(1) "POLFA" - Tarchomin has got approvals of the Government and local authorities for construction:

- Two separate divisions for chemical synthesis for new compounds
- Extension of existing production units and construction of new lines for newest insulins
- New divisions for pharmaceutical formulations.

The materialization of the proposed programme depends on certain conditions of financing and may be realised in co-operation with foreign partners in the form of joint stock company, joint-venture including common marketing with participation of foreign capital.

(2) Potential and ability of POLFA - Tarchomin for development of co-operation in various forms with foreign partners.

It appears that our ability as far as qualification of staff, manpower for potential investment, equipment and other facilities is satisfactory for realisation of new programme of cooperation.

In our opinion the most important field for cooperation is open in the development of pharmaceutical formulations and marketing. The transfer of technologies for new products to Polfa - Tarchomin is also desired.

The structure/main products/of production

Goods	Units	Years					
		1980	1985	1986	1987	1988	1989
Pharmaceutical Industry	a	81700	72598	79290	87245	92845	83891
Vitamins	a	.	4408	4557	4461	5097	4919
Substances	b	198	194	225	193	212	215
Antibiotics (including fodder)	a	.	7926	9101	8664	9661	10146
Substances	b	387	227	259	343	510	525
Sulphonamides	a	.	3143	4013	4153	5777	5066
Substances	b	1758	1963	2107	1724	1861	1775
Antitoxines and human vaccines	a	.	252	302	305	309	273
Fodder antibiotics	b	225	211	246	251	184	209
Tannins (vegetal)	b	2431	705	696	851	764	710
Herbs pharmaceutical goods	a		6892	6675	7141	7345	7092

a- mln zł - fixed prices 1984

b- tons

Annex C-2

Pharmaceutical works "POLFA" - Starogard

POLFA - Starogard is seeking cooperation in the form of financial aid for building new production plants.

Following is a portion of the document presented by POLFA - Starogard as "Cooperation proposals"

Cooperation proposals

Cooperation forms expected from the foreign partner:

- (1) capital cooperation
- (2) cooperation in the field of the new processes
- (3) new markets for till now in Polfa manufactured products as well as for new products.

Our proposals are as follows:

1. The foreign partner participation in building production division which would be able to produce:  
6 tpa of Doxepine and  
1 tpa of Amiloride.

There is also a possibility to produce in that place

- closapine
- aminodarone

or any other pharmaceutical substances. Preliminary assessment of the foreign partner participation is 2 mln USD.

2. Our factory has a developed land which enables to build new production plants on that place. This investment demands an extension of existing heat generating plant.
3. Cooperation in building of the new galenic department, which would enable to produce ready made drugs in conformity with GMP guidelines.

Annex C-3

Pabianickie Zakłady Farmaceutyczne "POLFA" (Fabianice)

POLFA-Fabianice expressed their actual needs and directions of cooperation with foreign partners.

Following is a summary of their ideas.

Actual needs and the directions of cooperation with foreign partners.  
The firm is interested in each kind of cooperation with foreign partners, particularly:

- modernization of machines and technical equipment
- getting new, profitable technologies in the range of pharmaceutical synthesis and finished forms of drugs
- undertaking different forms of cooperation in the range of new drugs and dyes
- improvement of the quality
- implanting new organization and technical solutions increasing the productivity and decreasing the costs
- marketing studies and getting new markets
- developing scientific information concerning pharmacy
- protection of work environment
- joint venture

Annex C-4

Grodziskie Zakłady Farmaceutyczne "POLFA"

POLFA-Grodzisk highlighted a lack of production automatization and the need to improve their existing situation.

Following is a portion of the paper presented by Grodziskie Zakłady

- (1) Lack of production automatization, whereas the devices have individual control systems.
- (2) In work out are only automatization programmes for generation of power medies (nitrogen, softened water).

**ANNEX D**  
**AUTOMOBILE MANUFACTURERS AND**  
**VEHICLE SERVICE ORGANIZATIONS**

Brief Introduction on

SPUM/Warszawa

Annex D-1

<b>ADDRESS</b>	Warszawa ul. Dzika Nr 28		
<b>TEL. TELEFAX</b>	387416		
<b>FUNDATION &amp; HISTORY</b>	Established in 1965		
<b>SALES AMOUNT</b>			
<b>MARKET</b>	private (personal) and business vehicles		
<b>MAJOR PRODUCTS</b>	car repair works and authorized technical inspection of cars, trucks and buses		
<b>PLANT(S)</b>	one in Warszawa		
<b>NUMBER OF EMPLOYEES</b>	25		
<b>REMARKS</b>	Rented by private person (Edward Korczak)		



Brief Introduction on

POLMO/ZELMOT

Annex D-2

<b>ADDRESS</b>	ul. topszanska 22, 02-220 Warszawa, Poland		
<b>TEL. TELEFAX</b>	Tel.: 46-06-49	Telex: 81-3510	Fax: 46 3479
<b>FOUNDATION &amp; HISTORY</b>	Established in 1921		
<b>SALES AMOUNT</b>	141,200 (1990)		
<b>MARKET</b>	25% for export; western Europe 75%, eastern Europe 25%		
<b>MAJOR PRODUCTS</b>	head lamps, ignition coils, ignition distributors		
<b>PLANT(S)</b>	one in Warszawa		
<b>NUMBER OF EMPLOYEES</b>	1100		
<b>REMARKS</b>	In privatization process		

Brief Introduction on

Annex D-3

**PZL/WOLA**

<b>ADDRESS</b>	00-961 Warszawa, Fort Wola, Poland		
<b>TEL. TELEFAX</b>	Tel: 36-83-59	Telex: 814-751	Fax: 37-45-13
<b>FOUNDATION &amp; HISTORY</b>	Established in 1951 for manufacturing diesel engines for military vehicles/tanks		
<b>SALES AMOUNT</b>	430,000 (1990)		
<b>MARKET</b>	80% for export (75% to USSR and east European countries)		
<b>MAJOR PRODUCTS</b>	many kinds of diesel engines	Applications - generators - for: ships, locomotives, .....-trucks, heavy building machines, trucks - machines for rock-oil industry	
<b>PLANT(S)</b>	one in Warszawa and second in Siedlce (100 kms from Warszawa)		
<b>NUMBER OF EMPLOYEES</b>	3,500		
<b>REMARKS</b>	in first stage of privatization process		

Brief Introduction on

Annex D-4

TRANSBUD

<b>ADDRESS</b>	ul. Czerska 8/10, 00-732 Warszawa, Poland		
<b>TEL. TELEFAX</b>	Tel.: 41-94 41	Telex: 81-4659	
<b>FOUNDATION &amp; HISTORY</b>	Established in 1956 as a transport enterprise for the building industry		
<b>SALES AMOUNT</b>			
<b>MARKET</b>	all regions of Poland		
<b>MAJOR PRODUCTS</b>	Car and truck repair work Transport services/ goods and passengers		
<b>PLANT(S)</b>	one in Warszawa		
<b>NUMBER OF EMPLOYEES</b>	150		
<b>REMARKS</b>	Some years ago, there were 27 enterprises united in a central organization. One of them was TRANSBUD, Warszawa, with 10 workshops. In previous years, the enterprise was divided into 10 independent companies and one of them is this company on Czerska Street.		