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Czechoslovakia. Significant productivity gains with relatively small capital investment

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OSTEUROPA-INSTITUT MÜNCHEN

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CZECHOSLOVAKIA

SIGNIFICANT PRODUCTIVITY GAINS WITH RELATIVELY SMALL
CAPITAL INVESTMENT

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This study was prepared for the World Bank

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Summary

The improvements in crucial parameters of operating performance could be achieved with relatively small investments. This will be achieved using concrete examples at the levels of individual businesses, which are intended to demonstrate to public authorities as well as to enterprises and their management that the necessary structural reorganization does not always involve large-scale, expensive measures. Above all, the illustrations reveal that reorganization must begin at the bottom, i.e., at the enterprise level.

This study is based on extensive empirical material obtained from numerous businesses, of which only a small percentage is represented here. Many Czechoslovak experts and institutions, including the State Commission for Economic Planning and Control, several federal and republic ministries, banks, research institutes, enterprises and businesses, have contributed to the development of this analysis. The outlined suggestions are founded on competent, if sometimes incomplete, knowledge of the technical and economic situation encountered by Czechoslovak businesses, by their suppliers and customers as well as by domestic and foreign competitors. The proposed operating measures could serve as a stimulation for other businesses to consider ways in which they might react more efficiently to future market challenges.

The main part of the study consists of a brief description of 41 possible operating measures aimed at improving economic and technical parameters; another 32 measures are cited in the annex. Some of these have already been implemented.

Nine of the 41 measures described in the main part require capital expenditures of up to Kčs 10 million, 20 involve expenditures of between Kčs 10 and 100 million, 9 require between Kčs 100 and 200 million, and 3 measures need capital expenditures of over Kčs 200 million.

Furthermore, the measures have been classified according to their contents, thus making it possible that the same one might be mentioned repeatedly. Almost all of the actions are aimed at labor savings and increased productivity. 38 of 41 measures require capital investment; the investment of hard currency also is necessary for 38. 25 measures involve the installation of new machinery, 28 will lead to the introduction of a new or improvements to an existing product. Six measures are aimed at changes in organization and management, while another six pursue ecological objectives; and five measures make energy savings possible.

In sectoral terms, the measures are divided as follows: mechanical engineering 13, building materials 7, food industry 6, chemistry and pharmaceuticals 5, woodworking industry 4, textiles 3, transportation 2, agriculture 1.

The study shows that the recommendations and approaches that the businesses which are introduced below employ are still deeply rooted in the

old centralized economic system and the resulting way of thinking. They do not seem to have been made by enterprises which will soon do business on their own account and responsibility.

The fact that most of the suggestions correspond to earlier proposals for the introduction of various operating measures in the state plan further illustrates this fact. Occasionally, one is reminded of the old practice of investment allocation, with the minor difference that the words "planned investment" have been replaced by the word "loan."

It is also characteristic that the recommendations are evaluated only in the context of the prevailing distorted pricing system without that any consideration is being given to future prices. Although their extent cannot be exactly foreseen, substantial price increases have to be anticipated in several important areas--especially for energy and raw material prices. The projected economic parameters of the various measures will therefore change considerably.

A further characteristic is that the recommendations are almost never developed into alternatives.

Both former practices and the "old" mentality are also clearly reflected in any considerations given to the measures' foreign exchange requirements and earnings. In accordance with traditional patterns, in most cases, only the sale of earned exchange and the administrative allocation of exchange are being taken into account. The "internal convertibility" of the Koruna, whose introduction is planned for January 1, 1991, is not part of any considerations. Occasionally, buy-back transactions are considered for the repayment of loans.

A further characteristic of the businesses' way of thinking as it is expressed in their suggestions is that they see everything from the perspective of a closed economic system. The activities of foreign competitors are not taken into account in the evaluation of the results of different actions.

Furthermore, the businesses' approach fails to consider loan conditions and the amortization of loans. In most cases, the payback period of the investments is at least calculated--as the relation of capital investment to average annual net earnings (or increase in earnings) during the period of the investment. It is generally expressed in years.

In spite of all these factors, the individual recommendations and considerations can, by no means, be seen as totally irrelevant. They do contain a number of important technical, organizational and economic statements and observations about the concrete objectives, both in regard to the situation at home and abroad. A complete assessment of the individual measures is, however, impossible without knowledge of future parameters such as prices, taxes, etc. In the final analysis, all economic decisions are made without absolute certainty.

One positive aspect of the recommendations is that they seek ways to improve the economic parameters of the areas under discussion without the need for construction investments. In other words, they mainly aim at

modernizing existing processes, either in the area of technology or mechanical equipment, or both.

The suggestions point out specific bottlenecks in technology, machinery, or existing production lines. They are intended to lead to considerable increases in productivity and economic parameters through modernization, refinement or expansion. Recommendations aimed either at the introduction of new products or at the improvement of existing ones are intended to lead to the utilization--or improved utilization--of existing facilities and buildings.

I. The economic legacy of the old system

The economic development within the framework of a centralized system has left Czechoslovakia with a problematic legacy. Although this study is not striving to find macroeconomic solutions to the fundamental problems of the Czechoslovak economy, we would, at least, like to point out some of the problems facing the entire national economy. It is both useful and necessary to attempt to solve them on the microeconomic level; and many of the operational measures described below pursue this objective.

1. Economic activity at the expense of the nation's substance and its future

For decades, Czechoslovak economic growth has fed on the substance which had been created in former times. Paradoxically, investments accounted for a sizable share of the national income, which caused an undue strain on the country's resources. The same applies to utilization of the labor force, and mainly of women.

The amortization of the old investment capital, especially in the area of light industry, was used for investments in heavy industries. In structural terms, this capital was badly invested, e.g., in sectors without a natural basis and on a technologically low level. Furthermore, the light industry's investment capital became increasingly antiquated. Economic activity at the expense of the future meant that many necessary investments, as in housing and other areas of the infrastructure, were neglected. In my estimate, Czechoslovakia's overall internal indebtedness is equivalent to three years' output of its economy.

2. Wasteful consumption of energy, materials and raw materials

Eastern Europe's economy shows a 75 percent higher energy consumption per national product unit than the Western Europe's. With regard to their country's economy, Czechoslovak experts have come to the same conclusion. One of them writes: "Czechoslovakia achieves a relatively high economic level with unreasonably high costs. Repeated calculations confirm known statements to the effect that, compared with developed capitalist countries, Czechoslovakia requires approximately twice the input of raw materials, energy, labor and capital to create a comparable national income. In 1983, the consumption of primary energy per unit of the gross domestic product amounted to 49 percent of the Czechoslovak level in Japan, 47 percent in Austria, 58 percent in the Federal Republic of Germany, and 58 percent in Belgium." This data corresponds to our own findings.

Czechoslovakia's higher energy consumption can primarily be attributed to the waste of energy at all levels of production. This waste is caused by the technical and organizational inability to rationalize energy consumption and by insufficient or misdirected motivation of all individuals involved. A too energy-intensive production structure further increases the waste of energy. Another contributing factor is the excessive consumption of energy-intensive raw materials and materials in subsequent production processes. Therefore, from an energy point of view, machines and other manufactured products are much more expensive in Czechoslovakia than in the West, while their quality and technical standards are usually lower. The performance and ratings of the manufactured products reflect this situation.

Due to the accumulation of these losses, in Czechoslovakia, the relation between the cost of energy and the final economic product is extremely unfavorable in comparison with the West.

3. Above-average environmental stress in Czechoslovakia

Compared with other European countries, Czechoslovakia also experiences above-average environmental stress. We will illustrate the situation using the example of water and air pollution.

The country is located in the transitional zone between maritime Atlantic and arid Eurasian climates. This leads to heavy rainfalls, great fluctuations in soil moisture and varying degrees of river-drainage, 60 percent to 70 percent of which occurs during the three months of spring. Furthermore, the country is situated at the continental divide of three seas, the North Sea, the Baltic, and the Black Sea. All the important rivers with headwaters in Czechoslovakia carry their waters into neighboring countries, causing water reserves to be totally dependent on the amount of rain.

Moreover, the geological structure of Czechoslovakia's national territory results in considerable irregularity in ground water reserves. The usable amount of ground water amounts to 8 percent to 10 percent of the average amount of surface water. Because of these hydrological conditions, the forests, which are seriously threatened by pollution, play an unusually important role in water management.

Czechoslovakia's water pollution has, however, not progressed nearly as far as its air pollution.

The most polluted bodies of water are those located in the industrial regions. However, 50 percent of the total pollution of surface water is supposed to have been caused by agriculture, especially by the increased use of fertilizers and pesticides.

As early as 1981, 7,000 km of the 25,000 km of waterways forming the largest rivers had been classified in the low water quality classes 3 and 4. In the Czech republic alone, there are, at the present time, 5,000 km of polluted

waterways. In addition, the situation is continuing to worsen because polluters claim more than 2,000 exceptions to the clean water law, and not one new large-scale sewage plant has been built since 1978. By the end of the century, the volume of sewage will undergo a 10-fold or 15-fold increase, making the water supply situation critical. Municipal sewage, especially in large urban areas, burdens the rivers immensely. In Prague, for example, one-third of the sewage is still fed into the rivers without any prior treatment.

Most of the sewage is purified only in one single step, so that many pollutants, especially chemicals and heavy metals, continue to reach the rivers directly.

In view of this situation, it is not surprising to hear voices claiming that water is the limiting factor for Czechoslovakia's ecological potential. In some regions, this may actually be the case.

Problems related to air pollution can be illustrated using the example of sulphur dioxide.

In Eastern Europe, sulphur dioxide emissions constitute 204 percent the Western European level per capita, 141 percent per energy unit and 248 percent per unit of gross national product. On the other hand, the immission amounts to 23 percent the Western level per capita, or 43 percent per unit of land area. These figures are, however, distorted because of the immense size of the USSR.

When considering the situation of single Western and Eastern European countries, and among those especially that of Czechoslovakia, the following facts can be determined: the five European countries with the highest sulphur dioxide emissions per 1 million inhabitants are: GDR 240,000 t = 418 percent (if the Federal Republic of Germany is set at 100 percent), Czechoslovakia 223,000 t = 388 percent, Hungary 161,000 t = 281 percent, Poland 123,000 t = 215 percent, Finland 119,000 t = 207 percent.

4. Weak innovative industrial capacity

One of the most important and most complicated tasks to be solved during the course of the economic reforms is the fundamental improvement of the Czechoslovak economy's innovations. It will be impossible to achieve such an improvement without the introduction of a functioning market economy.

In all areas of the economy, competition between existing participants and the free entry of new ones into that competition secures that the best individuals, products, pieces of machinery, and processes will be chosen. Suppliers constantly attempt to improve their market position by means of competition both in the area of quality and in that of price. Quality-competition is based on the technical improvement of already existing products as well as on the development of new ones.

Price competition also depends, at least partially, on technical progress: It is based on the utilization of qualified employees, and of better machinery and methods of production, all of which lead to lower production costs.

This does, however, not imply that all enterprises are constantly operating at the highest technical standard. This holds true internationally as well when comparing different economies.

Competition causes all participants in the economy to be strongly inclined towards innovation. This fact is particularly obvious when considering the manufacturing of finished products since the possibilities for improvements to their technical quality are almost unlimited. The quality of raw materials, on the other hand, is often predetermined by certain natural conditions. This is not to say that raw materials cannot be technically improved, only that such improvements are, in this area, not as significant as the ones that can be achieved in the production of finished products. For products requiring a high level of technical expertise, the relationship between price- and technical competition changes. For those, a small difference in quality can cause huge price differences. At the same time, the prices of products that are technically obsolete drop dramatically.

In an open economy, the internal market is a part of the world market and thus subject to international competition which increases the pressure towards technical developments.

Hence, the introduction of innovations in a market economy is caused both by the market and by the autonomous decisions of individual enterprises, not by the Government's central decisions and financing. The Government can, however, assist new branches and innovations through the award of some type of "start-up grants" which, however, need to be in accordance with the market rules.

5. Indicators of low and declining technological progress

The standard of production of technical knowledge is characterized by patent applications. Since different countries' patent systems differ, patent applications in foreign countries are a better criterion than internal ones. Table 1 shows a comparison of such applications abroad in 1986. CPE countries continue to lag dramatically behind the West in the number of applications for patents per 1 million inhabitants (see column 3). In comparison to other Eastern European countries, Czechoslovakia's position is average. Table 2 shows that, between 1970 and 1986, Czechoslovakia's position, as well as that of other Eastern European countries, has deteriorated. Hungary alone presents a positive exception.

An examination of technical progress, conducted with the aid of production functions, leads to similar results. In order to execute this analysis, the development of 35 technical-economic indexes has been combined and used to

estimate production functions. Diagram 1 shows the development of the resulting overall technological indicator. This analysis offers similar results: there is a continuous deterioration over time, just as demonstrated by the examination of applications for patents.

Prices per kilogram (or unit prices) make it possible to compare the technical standard and the competitiveness of Czechoslovak products with those of other countries. These prices also provide information regarding the development over a period of time. The consideration of both aspects of the question of the technical standard leads to the other two attached diagrams. They show that the technical norm in Czechoslovakia is far below the world level and that its position has continuously worsened.

Result: Different data and methods show that Czechoslovakia's level of technology is considerably below that of comparable countries and is continuing to deteriorate. This situation has been caused primarily by the implemented economic system of central planning.

II. The purpose of this study

The purpose of this study is to demonstrate, by using concrete examples, ways in which substantial improvements in critical parameters of operating performance could be achieved in Czechoslovakia, mainly at the level of individual enterprises, with relatively limited investments. These improvements refer to technological levels, productivity, earnings, profitability, domestic and foreign sales, and other areas. The examples are intended to demonstrate to public authorities as well as to enterprises and their management that the necessary structural reorganization does not always involve costly, large-scale measures. Above all, they show that reorganization must begin at the bottom, i.e., at the enterprise level.

This text is supposed to point out measures which achieve significant results with relatively limited capital investment. The term 'limited capital investment' has not been defined and cannot be defined to be generally applicable. The amount of capital investment can initially be viewed in comparison to the size of the national economy and especially to its capital investments. Czechoslovakia's total amount of investments in 1988, which constituted about Kčs 186 billion, can serve as a basis for this comparison. In addition, the size of capital investment can be viewed in relation to the size of the business or business sector and the capital which has been invested in it. It is, however, hardly possible to compare these amounts on an individual basis because a million in one business or sector can have a different significance than a million in another business or sector. This would not be the case in a country with a developed and strong market economy, a market-determined price structure, and a capital market. Czechoslovakia, however, has not yet advanced that far. Nevertheless, the examples for the various measures to

improve economic parameters have been arranged according to capital investment.

III. Present features of enterprise behavior

This study is based on extensive empirical material from Czechoslovakia. Many Czechoslovakian institutions, including the State Commission for Economic Planning and Control, several federal and republic ministries, banks, research institutes, enterprises and businesses, have contributed to its development. It must be emphasized that it would have been impossible to complete this study without the cooperation of individual companies. The outlined suggestions are founded on competent, if sometimes incomplete, knowledge of the technical and economic situation encountered by Czechoslovak businesses, by their suppliers and customers as well as by domestic and foreign competitors. The proposed operating measures could serve as a stimulation for other businesses to consider ways in which they might react more efficiently to future market challenges.

It is, however, important to point out that the recommendations and approaches of the businesses that are being introduced below are still deeply rooted in the old centralized economic system and the resulting way of thinking. Most of the suggestions correspond to earlier proposals for the introduction of various operating measures in the state plan, which further illustrates this fact. Occasionally, one is reminded of the old practice of investment allocation, with the minor difference that the words "planned investment" have been replaced by the word "loan."

It is also characteristic that the recommendations are only evaluated in the context of the prevailing distorted pricing system without that any consideration is being given to future prices. Although their exact extent cannot be exactly foreseen, substantial price increases have to be anticipated in several important areas--especially for energy and raw material prices. The projected economic parameters of the various measures will therefore change considerably. This does, however, not mean that the individual recommendations and considerations are irrelevant. They do contain a number of correct technical, organizational and economic statements and observations regarding the concrete subject, both regarding the situation at home and abroad. Nevertheless, a comprehensive assessment of the individual measures is impossible without knowledge of future parameters such as prices, taxes, etc. In the final analysis, however, every economic decision is made without absolute certainty.

A further characteristic is that the recommendations are almost never developed into alternatives. The former practices and mentality are also clearly reflected in the considerations regarding the measures' foreign exchange requirements and earnings. In accordance with traditional patterns, in most

cases, only the sale of earned exchange and the administrative allocation of exchange are being considered. The "internal convertibility" of the Koruna, whose introduction is planned for January 1, 1991, is not mentioned.

One positive aspect of the recommendations is that they seek ways to improve the economic parameters of the analyzed areas without necessitating construction investments. In other words, the measures are chiefly aimed at modernizing existing processes. The areas to be modernized are mainly technology, or mechanical equipment, or both. Frequently, certain bottlenecks in the areas of technology, equipment, or existing production lines are pointed out. The recommendations are then intended to achieve significant increases in productivity and other economic parameters through modernization, refinement or expansion. On the basis of these suggestions, utilization--or improved utilization--of existing constructions and buildings is to be achieved through the introduction of new or the improvement of existing products.

It is also characteristic that the businesses' approach fails to consider loan conditions and the amortization of loans. In most cases, however, the payback period of the investments is calculated as the relation of capital investment to average annual net earnings (or increase in earnings) during the period of the investment. It is generally expressed in years.

A further characteristic of the businesses' way of thinking as it is expressed in their suggestions is that they see everything from the perspective of a closed economic system. The activities of foreign competitors are not taken into account in the evaluation of the results of different actions.

IV. Characteristics of enterprise management

The introduction of modern methods of business management is particularly important. The current operational and internal performance levels vary greatly from company to company because the success enjoyed by most of the businesses is not due to strong market pressure and good internal management, but to such factors as an undemanding plan, government subsidies, and protectionist measures. In sectoral terms, only the internal management of light industries and of some mechanical engineering fields show reasonable competence.

Lately, businesses have begun to pay some attention to questions of internal management since they increasingly comprehend the latter's importance for their survival. These questions are being addressed by several institutions, among them the University of Economics (VŠE) in Prague, where a management institute is being set up. There, a system has already been worked out that should enable businesses to internally disseminate information about the market demands made upon them. This concept is successfully being implemented at several plants.

Many businesses show interest in outside consultation. In Czechoslovakia, there are already some companies offering consulting services. They are, for example, developing out of cooperative associations, also in already existing organizations, e.g., the Czech Committee for Scientific Management. Private consulting firms have also sprung up.

There is also some cooperation with the West. The above-mentioned VSE cooperates with a team of experts from the association of Dutch industrialists. Contacts with a number of Czechoslovak businessmen have been initiated for this group. At this point, the Czechoslovak businesses are negotiating to have their specialists trained in the Netherlands.

The fact that many large government enterprises are being broken down into smaller units and privatized has also stimulated interest in modern management principles.

V. The potential for consulting firms

A considerable input of know-how on the part of management consultant and consulting firms in Czechoslovakia will be necessary in order to realize, over the next few years, the improvements in productivity and quality discussed in this text as well as many other improvements in management and organizational performance. At the same time, this will create new possibilities and an interesting new market for consulting services.

Who is capable of providing such services? It is obvious that, in the planned economy, there neither need nor possibilities existed for independent management consulting services. As a result, no local consulting profession comparable to that in developed market economies exists in Czechoslovakia. Such a professional group has yet to be trained and developed.

It should not be difficult to identify a number of Czechoslovak experts who, with a few years of practical experience and intensive training in management, productivity, and consulting techniques, have the potential to become competent management and business consultants. Such individuals can be found among managers and specialists with 5 to 15 years of experience, and among young university graduates. In addition, there are teams and individual experts working at technical and economic research institutes, who were involved in sectoral and organizational research projects in the past and who are now looking for more useful ways in which to utilize their talents.

A few experts have already decided to act as private, independent consultants. Also, some teams at various government institutions have started to offer consulting services with the intention of working independently and privately in the near future. These developments should be encouraged and technically supported through training programs for consultants and through providing assistance to the professional organizations. Preparations for the

establishment of the Czechoslovak management consultant association are already underway. Technical support is being offered by the International Labour Organization (ILO) and the European Federation of Management-Consultants' Association (FEACO).

International consulting firms, including the leaders in this field, have already begun a limited amount of work in Czechoslovakia--similar to what they are doing in other Eastern European countries. Using their worldwide experience and resources, they undoubtedly bring state-of-the-art management and consulting know-how to Czechoslovakia. As usual, the international consulting firms are anxious to win, train and keep local experts. They will use this same policy in Czechoslovakia, where language and socio-cultural factors make the use of local experts doubly important. Nevertheless, foreign experience has to be brought into Czechoslovakia. Thus, the technical areas in which Czechoslovakia has been isolated from the development of the international economy and of management will be revealed. Special emphasis should be given to providing the necessary practical know-how. The skilful integration of foreign know-how with local experience and perspective is the basic prerequisite for the long-term success of the consultants' activities.

The demand for consulting services will expand enormously once individual enterprises start to concern themselves with the pressing issues of reorganization, productivity and efficiency. Attempts to sell second-class consulting services at international market prices will have to be expected. Competition among consultants must be encouraged, and managers must learn how to select consultants and how to best utilize their services. Both Czechoslovak and international consulting firms which now operate or will be operating in the Czechoslovak market must be encouraged to join forces in defining and introducing the best possible technical and ethical standards in setting up the consulting profession in Czechoslovakia.

VI. Selected examples of measures aimed at increasing the czechoslovak economy's efficiency

1. Efficient management of truck transportation through transfer of the trucks to the economic use of the drivers

(without investments)

This measure can be applied throughout the entire area of truck transportation in Czechoslovakia.

The truck remains in the ownership of the business, which contracts with the driver to transfer the vehicle to the latter's personal economic use. The driver is responsible for the condition and operational readiness of the vehicle. The permissible use should correspond to the optimum performance

according to standard depreciation. In all cost positions, the driver has free rein over expenses, including the purchase of fuel, motor oil, tires, repairs and other materials. The driver is reimbursed for these expenses based on the mileage driven. In addition to his wages, the driver profits fully from savings of these materials. Therefore, he is interested in optimum performance, lowest cost and best technical condition of the vehicle, with the extent of physical wear and tear being defined in the terms of the contract.

In the controlled Czechoslovak economy, this system had never been a possibility because it would have increased the drivers' wages above and beyond the fixed government wage.

The performance of both vehicle and driver are enhanced through transfer of the truck to the economic use of the driver, so that operating costs improve in overall terms.

In Czechoslovakia, both the technical condition and the level of performance of its fleet of trucks is poor. The official depreciation period is 8.3 years, but the actual average age of the vehicles, in Prague, for example, is 14 years, and the average age at retirement from service is 20.5 years. Better use of the vehicles would make it possible to retire some of the old vehicles sooner. Approximately 200,000 trucks are in operation in Czechoslovakia. According to estimates, this number could be reduced to 130,000.

A pilot project with 20 trucks can serve as an example. In 1989, losses amounted to Kčs 250,000. After introduction of the system, the calculations and preliminary results for 1990 indicate earnings of Kčs 750,000 so that the overall result for 20 trucks would constitute approximately Kčs 1 million per year.

2. Introduction of natural gas as fuel for motor vehicles in environmentally stressed cities

(Capital investment varies depending on degree of implementation)

In Prague, as an example, this possibility exists for city busses, and various models of trucks and taxis, especially if the daily performance does not exceed 200 km. It is estimated that, in Prague alone, 5,000 vehicles could be affected, among those ca. 200 city transit vehicles (in particular the "Ikarus" busses) and about 1700 flat-bed trucks belonging to various companies' transportation departments.

Prague's truck and public traffic emit 2,300 tons of carbon monoxide per year, which could be reduced by 40 percent. Furthermore, 4,600 tons of nitric oxide, which could be reduced by 10 percent, are being emitted. The emission of 1,500 tons of soot could be completely eliminated.

The conversion of one bus costs about Kčs 63,000. In addition, compressor feeding devices must be built. The funds needed to finance the conversion can

be obtained through the introduction of an eco-fee. According to estimates, such a fee could account for revenues of Kčs 100 million per year.

3. Introduction of the manufacturing of automatized movable shelving units for industrial warehouses

(Capital investment approximately Kčs 1 million)

Until now, only stationary shelf racks have been manufactured and maintained in Czechoslovakia. Automatized mobile shelving systems save space and labor and streamline warehouse work. These systems, which are manufactured in the West, are too costly for Czechoslovak businesses. Once their production has been introduced in Czechoslovakia, manufacturing costs--as compared to the West-- will be lowered significantly because of the favorable labor and material costs as well as of the possibility of applying Western know-how. Thus, domestic sales will become possible, and the product will be extremely competitive in the West. While the export of steel and iron materials commands a price of just Kčs 4 per kilogram, the per-kg price of these systems will amount to Kčs 25.

The company IMTRADEX Czechoslovakia, an affiliate of IMTRADEX Switzerland, will be established in Uhersky Brod in order to carry out this measure. An empty production facility, which the Czechoslovak partner contributes to the venture, is available for manufacturing purposes. The Western partner will contribute 60 percent of the entire investment of Kčs 1 million, while the local share is 40 percent. The first year's projected profits set the payback period at one year.

4. Introduction of the production of washable bandages (strips)

(Capital investment Kčs 2.7 million)

The production of washable bandages (strips) could be introduced at Chemopharma ústí n/L. The cost of this measure consists of the price for all necessary machinery including installation work and supplemental mechanization. This is a finishing machine which is installed without a need for construction investment. It will be connected to the existing "Meltex" line of production with the new "Ekomelt" adhesive on the basis of hot-melt-type adhesive. Capital investment will amount to 2.7 million foreign exchange Kčs, and the expected payback period is 2 years.

5. Modernization of incubator technology

(Capital investment Kčs 4.5 million)

The government enterprise Šlechtění a rozmnožování drůbeže Dobřenice works with incubator equipment which was supplied 20 years ago by the Danish firm UNKI. The equipment functioned correctly for 15 years, but, during the last few years, disruptions have occurred. The temperature and humidity recorders do not function, and only 3 of the 4 pre-incubators are operational. The process requires uninterrupted 24-hour supervision and that a repair technician is permanently on-call. Despite great efforts, only a low hatch rate is achieved--about 75 percent of the deposited eggs. The quality of the broody hens is clearly affected by these technological disturbances. The enterprise owns very good laying material which has proven to be superior to Canadian and Dutch laying hens in international tests.

In order to improve the enterprises' technical level and effectiveness, a new incubator system should be purchased from the Danish firm FUNKI for the amount of 4.5 million foreign exchange Kčs. The hatch rate would increase from 75 percent to 81 percent, and the improved technology would also further improve the quality of the laying material. Thus, this flock could gain ground in foreign countries. With an increase in earnings of about Kčs 1 million per year, a payback period of approximately 3 to 4 years can be expected.

6. Introduction of the production of glucoamylase

(Capital investment Kčs 4.5 to 5 million)

Glucoamylase is a microbial enzyme which causes the hydrolysis of starch and starch-containing substances. The product of hydrolysis is glucose. Glucoamylase is widely used in many areas of industry and agriculture, e.g., in the production of alcohol from raw starches, in beer brewing, in the starch industry for production of fructose syrup, sorbit, ascorbic acid, etc. In agriculture, it is used to improve fodder mixes, potato processing, processing of wastes, etc. Czechoslovakia has not yet produced glucoamylase--it is importing it in limited amounts. The country's demand is estimated at 450 tons per year. The necessary production technology has been developed in Czechoslovakia. It is on the level of the world's leading producers, including NOVO INDUSTRIE in Denmark, NAARDEN in the Netherlands, and MKC in the Federal Republic of Germany. Capital investment for the construction of a production capacity of 450 tons per year would amount to Kčs 40 million; at a price of Kčs 58.9 per kilogram, earnings would amount to Kčs 6 million, leading to a payback period of almost 10 years. It would be more advantageous to use existing fermentation capacities at Středočeská Fruta Mochov, Kolín plant, or the government enterprise Trnava, Boleráz plant. At

the Kolín plant, a capital investment of Kčs 4.5 million would be required, production would amount to 280 tons per year, earnings to Kčs 3.8 million per year, and the investment would be paid back in 1.2 years.

7. Automatic system for operative planning and control of the production of packaging machines

(Capital investment Kčs 6-10 million)

The system, based on a terminal network, is to be installed at the government enterprise Blanické strojířny in Vlařim in the production-line for packaging machines. The enterprise manufactures numerous types of machines; its total output is 4000 units. Annual production amounts to about Kčs 130 million. Fifty percent of the plant's output is exported to Eastern Europe, a significant portion thereof to the USSR. The technical level of the most important machines is good, but electronic components are not up to Western standards. Most of the enterprise's machinery is depreciated and has to be replaced. Worker qualification is good, but there are problems in recruiting young skilled workers such as lathe operators, lacquerers, etc. The system of production management corresponds to small lot and unit production. To date, sales have held steady because of the enterprise's monopoly in Eastern Europe.

The intended investment would increase the flexibility of production, thus enabling the plant to respond faster to customer demands and, at the same time, to satisfy requests for customization.

The measure will require about Kčs 6 to 10 million and will increase earnings by Kčs 3 to 5 million per year. The payback period is about 2 years.

8. Supplementation of existing equipment for the drying of fruit and equipment for processing fruit waste

(Capital investment about Kčs 9.5 million)

The agricultural cooperative Mír Světice in the district of East Prague processes about 2,200 tons of apples per year, mainly into dried fruit using a drying line manufactured by the West German firm Binder. About 200 tons of dried fruit are produced in this way. As a by-products of this process, 400 tons of waste are created. Because of its content of pectin and fibrous particles, it is a valuable raw material. Until now, it has not been possible to process this waste; instead, it was used for fodder in the stock operations of the cooperative. Supplementing the equipment with an extruder will make it possible to convert this waste into extruded products based on wheat, corn and fruit. The final product will be fat-free, aromatized products with high

nutritional value. Presently, adequate supplies of this type of product are not available, but they are needed on the domestic food market and would therefore be widely used. An extruder with the capacity of 200 kg per hour (grinding, homogenizing, extruding, apportioning, drying, aromatizing) will be installed in existing buildings.

The capital investment will amount to about 8 million foreign exchange Kčs and Kčs 1.5 million. With expected earnings of Kčs 3.3 million, the payback period is 2.9 years. In the opinion of the cooperative, the foreign exchange could be paid back from exports of the extracted products or dried fruit.

9. Introduction into production of a new packaging machine

(Capital investment Kčs 10 million)

This is a machine for the packaging of milk and other liquid or pulpy products in plastic cups. It would be necessary to obtain a license from the Italian firm BANCO. The higher technical level of both the production and the product, which can be achieved because of the licensed production, and the use of high quality pneumatic, electronic and electro-mechanical elements will make it possible to obtain higher market prices and increase earnings by Kčs 3.4 million.

This measure also has a beneficial ecological effect: the cups made from polystyrene foil have a less serious impact on the environment than do those made from PVC foils. The aseptic packaging significantly improves quality and shelf-life of the milk products.

This measure can be implemented at the Blanické Strojírny Vlašim machine factory. The technical level will be improved both during the machine's production and during its use in the packaging process.

The measure costs about 10 million foreign exchange Kčs, with an expected increase in earnings of Kčs 3 to 4 million and a payback period of about 3 years.

10. Introduction of the production of aged salami

(Capital investment Kčs 11.7 million)

There is a domestic product that has been missing from the market for 20 years--a nonperishable, aged salami. Its production is technically and technologically prepared and can start up in 10 months. The production output should reach 80 tons per year, which, in terms of retail sales, represents a production increase of Kčs 8.8 million. The required investment amounts to Kčs 3.1 million for construction and 8.6 million foreign exchange Kčs for the

import of equipment from abroad. The product would meet the world's highest standards and embody modern biotechnological trends. Because this salami is not smoked, the organism is not burdened with pollutants. However, the required aging process has not yet been developed; for the time being, it will have to be provided by the firm MÜLLER in Gießen, Federal Republic of Germany. The payback period for the investment is about 4 years.

11. Introduction of the production of thin granite plates

(Capital investment Kčs 14-20 million)

Current Czechoslovak technology allows for the production of 30 mm thick plates. These plates put unnecessary static stress on buildings and increase the costs of granite construction, transport and manipulation. For European standards, granite plates which are only 10 mm thick are manufactured. If they also had interesting shades, such plates could be exported and would command much higher prices. Granites in different shades can be imported from the USSR, China and India. Czechoslovak granites permit only production of grey plates, which are unsuitable for export.

In order to equip the new government enterprise Průmysl kamene Píšťbram, it would, according to the plans, only be necessary to purchase a technological production line compatible with current Western standards. Suitable buildings already exist at the sites in question. The Italian firms LONGIO, NOTY-TENNO or BRETON are possible suppliers. The factory, which has been producing 30 mm thick plates, can be converted without extensive construction. Three sites with different investment costs have been proposed for the implementation of this measure. The investment would require Kčs 14 million in the first case, Kčs 18 million in the second, and Kčs 20 million in the third. With expected annual earnings of Kčs 3 to 3.5 million, the payback period is approximately 4 years.

12. Modernization of the production of stoneware sewage pipes

(Capital investment Kčs 20 million)

This project involves the completion of an existing production line for sewage pipes at the Kamenina Tomášovce factory. The sewage pipes produced there have a diameter of 250 mm to 400 mm and a length of 1500 mm. It is necessary to add equipment for the casting of polyurethane cone connectors into the necks and tips of the stoneware pipe. In contrast to the previous practice, this phase will be implemented during actual production. To date, only socket pipes and pipe fittings without seals have been manufactured in Czechoslovakia. The connectors are sealed with hemp rope and cast asphalt only after they arrive at the construction site. This type of sealing is labor-

intensive and unreliable. This type of sewage system is faulty from an ecological point of view because sewage can escape and pollute soil and ground water. Because of these technical shortcomings, Czechoslovak manufacturers of sewage stoneware cannot compete with foreign, especially Western, producers.

Because of the lack of polyurethane, which is not produced in Czechoslovakia, it has, until now, not been possible to improve the technical level and introduce polyurethane seals. In addition, production lines for the production and application of polyurethane are manufactured only in Western Europe. It will now be possible to meet 80 percent of the demand for polyurethane from domestic production. The casting line, however, must be imported from Western Europe, e.g., from the firm GRIESE in Wedemark, Federal Republic of Germany.

The measure will cost about Kčs 20 million, Kčs 18 million thereof being foreign exchange Kčs (DM 1.85 million). Annual earnings will increase by Kčs 5.5 million, the payback period will be 3 years.

13. Modernization of the production of candied and sweetened fruit

(Capital investment Kčs 20 million)

This measure is to be implemented at the Mařatice plant of the firm Slovácké konzervárny Uherské Hradiště, whose present production technology is very antiquated and inefficient. Production proceeds under very difficult working and manufacturing conditions, with low labor productivity, and with equipment that has been acquired between 1955 and 1957 and is thus physically and technically worn out. The demand for processed fruit is very high, both in retail and wholesale trade, e.g., in bakeries and chocolate factories. The modernization will raise the technological level and increase the production volume from 320 to 1,200 tons per year.

The capital investment is Kčs 20 million, 15.5 million thereof being exchange Kčs. Earnings will increase 15-fold, from Kčs 0.5 million to Kčs 5.8 million. The payback period is 2.7 years.

14. Introduction of the production of cooling and freezing equipment for business and community kitchens

(Capital investment Kčs 22 million)

The supply situation for outlets and restaurants with this type of equipment has become critical. Therefore, the Renokov Nové Zámky company expects an increase of production in 1992 to a volume of Kčs 70 to 80 million.

The two enterprises operating in this area, Frigera Kolín (Beroun plant) and Renokov Nové Zámky, do not satisfy demand; and imports of these products from COMECON countries are negligible. At present, this firm's products are of only average quality. The producer expects the development of an improved restaurant line NZ 5. Its parts are supposed to be comparable to European standards but priced more favorably than Western products. A comparison to equivalent products from the Federal Republic of Germany reveals lower prices: for example, the price of the refrigerated counter by Renokov is Kčs 10,000, the equivalent FRG product is DM 5,657. The price of the refrigerated display case by Renokov is Kčs 14,100, the West German product costs DM 3,311. The price of the hot-counter by Renokov is Kčs 9,180, the equivalent product by KÜPPERSBUSCH costs DM 3,726. The price of the handling counter by Renokov is Kčs 2,640, the equivalent product by KÜPPERSBUSCH costs DM 2,115. Assuming that the firm's data regarding product quality and pricing is correct, this is a promising measure. Capital investment amounts to Kčs 22 million, 7 million of which are exchange Kčs.

15. Introduction of the licensed production of intra-ocular lenses

(Capital investment Kčs 22 million)

Over the past few years, the incidence of cataract and glaucoma has increased steadily. The ideal therapy is surgical implantation of an artificial ocular lens. In Czechoslovakia, the implantation of intra-ocular lenses is very limited because the country does not produce them itself. Thus, imported ocular lenses are used exclusively.

The ophthalmologic profession is eager to perform these surgeries on a large number of cases. As the best type of lens, the "one piece" lens produced by the Munich firm ADATOMED has been chosen. The purchase of a license will speed up development in Czechoslovakia. Furthermore, it will introduce a progressive technology which could also be used for the realization of domestic development work. Domestic demand will be met through the establishment of an operational workshop of this type in each district. Their operation at full capacity is expected to produce 30,000 lenses per year. The total investment of 22 million foreign exchange Kčs would lead to an earnings increase of approximately Kčs 3 million, which would result in a payback period of 5 years.

16. Conversion of an enterprise to the production of machines for small concrete parts

(Capital investment Kčs 26 million)

At this time, such machines are not being produced in Czechoslovakia. The firm Prefa-TEC Olomouc, which has been producing and repairing the molding equipment for the manufacture of prefabricated components, also has experience with the manufacture of small concrete parts that results from the earlier production of these machines' prototypes. These prototypes' prices amounted to only 40 percent to 60 percent of those of foreign machines with approximately the same technical parameters.

The modernization of the plant with NC machines, a computer system, a transformer station, and a boiler house will cost approximately Kčs 26 million. Annual earnings would be Kčs 10 million to 13 million, and the payback period would be less than 2 years.

17. Introduction of the production of lactic acid

(Capital investment Kčs 28 million)

Lactic acid is an important raw material in the leather, textile, chemical, food and pharmaceutical industries. World production amounts to about 40,000 tons per year with prices ranging from US\$1 to US\$2.5, depending on concentration. At present, Czechoslovakia imports ca. 300 tons per year from the West. Demand is estimated at 3,000 tons per year by 1995. Therefore, the construction of a production line with a capacity of 1,500 tons per year is recommended. The technical and economic level of the production meets world standards. The technology is up-to-date, minimizes waste, and lowers production costs. Most of the production equipment is available in Czechoslovakia; only the automatic control system must be imported from the West.

The capital investment is Kčs 28 million, the import from the West costs 3 million exchange Kčs. The estimated annual earnings amount to Kčs 6 million, and the payback period is 4.5 years.

18. Modernization of the production of upholstery and decorative fabrics

(Capital investment Kčs 31 million)

Since 1975, production at the čadca plant of the government enterprise Slovena Žilina has been running with then-current technology, supplied by the firm MEIER of the Federal Republic of Germany. Today, the machinery is worn, the equipment is incomplete--the final production line is missing. This

lack has a negative impact on the final processing of the fabrics' surface texture. The quality of the products is also affected by the low grade of the raw material. Because of the problems with both the final processing and the unprocessed material, the products can be sold only within Czechoslovakia. Exports are intended exclusively for the USSR.

The products' quality will improve once the machine-park has been supplemented with equipment (valued at about Kčs 31 million) and once the quality of the unprocessed material has been improved. Therefore, the sale of the fabrics for use in the automotive industry is expected. However, the issue of improving fabric patterns, which greatly influence the final price, remains open.

The capital investment amounts to 31 million exchange Kčs, earnings will increase by Kčs 8.3 million per year, and the payback period will be 3.7 years.

19. Concentration and disposal of waste acid--an ecological measure

(Capital investment Kčs 35 million)

The acid, primarily sulfuric acid, is released during production of sulphonamides at the government enterprise Chemopharma ústí nad Labem. The mixture of wastes also contains sulphanilic acid, hydrochloric acid and acetic acid. Previously, the waste acid was disposed of by thickening it with the aid of direct heating at the evaporating plant PLINKE. This technological process is linked to the emission of sulphur dioxide, sulphur trioxide, and hydrochloric acid. The plant is located directly in the city of Ustí, and the whole process is ecologically untenable. At present, the acid is being neutralized and fed into the sewage system. That, too, is only an intermediate solution. It is now hoped that the acquisition of an evaporating plant will result in an ecologically clean operation. The equipment will be installed in the existing production plant. The waste acids will be condensed and separated, so that they can be sold individually. The capital investment amounts to Kčs 35 million, Kčs 30 million thereof for the import of the equipment. This is an ecological measure which will not have a direct impact on the economic results of the plant. The implementation of this measure is, however, a prerequisite for the continuing production of many drugs at this plant and, in general, for its continuing existence.

Characteristically, the plant does not compare the cost of the measure to fees for pollution of the environment, which it may or will have to pay. In addition, the monopolistic position of the plant should be tested in an economic hardship test by temporarily importing its products from foreign countries.

20. Development of the production of DD 37 DN microscopes

(Capital investment Kčs 39 million)

The government enterprise Křižík Praha is one of the leading Czechoslovak companies in the field of optomechanics and optoelectronics. The best components of its production program are microscopes for medicine, education, research and industry. Demand surpasses the firm's production capacity. The entire output is exported to the West.

The production of the microscopes has a long tradition; it has been in operation since the 1920s. In the 1970s, COMECON decided to relocate the production of microscopes to Poland, so that production at the plant was gradually cut. In connection with the recent decline in COMECON economic relations, the decision was made to restart production of microscopes at original levels.

Production will be launched for the DD 37 DN microscope, which is intended for biological laboratories. The product is comparable to products of the firms ZEISS, LEITZ OLYMPUS, and SWIFT. Depending on the model, this microscope sells for between US\$470 and US\$1,800.

With the exception of the finishing process (e.g., electroplating), the technical level of the preliminary production is adequate. Lenses are assembled at 1950 levels and microscopes at 1973 levels, when production of this type began. In order to raise the level of production, a Precicomb 404 processing unit by LEITZ and a Schaublin 102 lathe are required.

According to a market study, it is estimated that approximately 6,000 of these microscopes can be sold each year. This production volume can be reached within 2 or 3 years.

In order to realize this measure, the firm requires a loan of US\$2.3 million and expects a payback period of 4 years.

21. Expansion and modernization of the production of water management equipment

(Capital investment Kčs 45 million)

The government enterprise Královopolské strojířny in Brno manufactures equipment for sewage plants treating industrial and communal sewage. In view of the increasingly stringent requirements for environmental protection, production is expected to expand considerably and to increase five-fold between 1990 and 1994, i.e., to Kčs 215 million per year. The technical condition of the machinery, which is very antiquated and worn, permits neither an increase in production nor technical improvements in the products. A number of product innovations are in preparation: sedimentation facilities, biological sewage plants, and ozonizers. The required capital investment for

the modernization amounts to about Kčs 45 million; the payback period is approximately 2.5 years. Exchange imports amount to 8.5 million foreign exchange Kčs.

22. Technical improvement and supplementation of toolmaking equipment

(Capital investment Kčs 45 million)

Because of the high level of qualification of its labor force and because of the insufficient coverage of the demand for instruments and appliances on the construction industry market, the government enterprise Aritma Praha plans to significantly expand production of its toolmaking operations, including construction.

The production of such equipment as mounting and cutting devices and devices for the processing of synthetics has a long tradition at this plant. Even with insufficient technical equipment, the employees' excellent qualifications ensure parameters comparable to those of any producer of such equipment, in the preparation of production as well as in the toolmaking itself.

Because of the use of better technical equipment in the process engineering and toolmaking departments, it will be possible to increase production and to supply external domestic and foreign customers as needed.

The measure requires the acquisition of copying equipment which will lead to a capacity increase of 7,500 hours per year in the construction of the equipment. In addition, the use of computers and the utilization of a databank of the same or similar parts for the preparation of construction documentation is expected. In this area, the capacity increase per year will be ca. 5,000 hours. In overall terms, a total of 12,500 production hours will be saved each year. The capital investment required for this measure is Kčs 45 million, 35 million thereof being exchange Kčs. Annual profits are Kčs 15.4 million, the payback period would thus be 2.9 years.

23. Modernization of the production of log cabins and single family homes

(Capital investment Kčs 56 milion)

To date, the Brodno plant of the government enterprise Kysucké drevárské závody has only manufactured log cabins which cannot be heated and are thus inhabitable only in summer. This measure deals with the introduction of the production of various types of log cabins and single family homes made from thin wooden boards which could be inhabited year-round. The technology used to date has, however, not permitted such a change in production.

The current quality level of the products is only average; the main defects lie in the areas of drying and impregnating. The machinery is antiquated and

at a low technical level. Nevertheless, the log cabins sell well on both domestic and foreign markets.

The modernization encompasses all phases of production, including the installation of the finished products. The capital investment is Kčs 56 million, 38 million thereof being exchange Kčs for the import of the technological equipment. The plant is negotiating with foreign partners who will supply the technology. The expected payback period is 2.4 years.

24. Expanding the production of woven carpets

(Capital investment Kčs 63 million)

The Rájec plant of the government enterprise Slovena žilina has an 80-year tradition in this field. It employs qualified experts and enjoys a good reputation both at home and abroad. The types of carpets produced by the plant are Koras, Korasan (awarded the Woolmark trade mark), Astoria, Herat, and synthetic carpets of the Bagdad type. They are sold at home and abroad. Primary customers are Lebanon, Saudi Arabia, the Federal Republic of Germany, Italy and Japan (a total of 20 companies). The annual export volume is 320,000 m². The raw material comes from the enterprise's own yarn production.

The measure includes the installation of a number of machines which increase production by 260,000 m². It costs 63 million exchange Kčs. With an annual earnings increase of Kčs 13.2 million, the payback period is 4.7 years.

25. Introduction of the production of asbestos-free friction parts for the automotive industry

(Share of capital investment 68 million foreign exchange Kčs)

The government enterprise Osinek in Kostelec nad Orlicí currently produces brake linings, brake casings and clutch parts containing asbestos. They must be replaced by asbestos-free parts. For 1993, a production volume of 3,700 tons has been planned. The enterprise is looking for a foreign partner to participate in the conversion. A share of US\$4 million in the investment, equal to ca. 68 million exchange Kčs, is required. The investment's payback period is expected to be 1.4 years.

26. Organization of a company-owned distribution network with Czechoslovak share of ownership in EC countries and of a company-owned assembly plant in the Federal Republic of Germany

(Capital investment Kčs 80 million)

The government enterprise Desta Děčín manufactures fork-lifts, which are traditional export products of Czechoslovak mechanical engineering. They are being exported to almost 50 countries world-wide, with COMECON countries representing more than 50 percent of the importers. Despite strong, world-wide competition from more than 100 producers of fork-lifts, the exports have increased five-fold over the 1984 volume. As a result of insufficient production capacities, only 60 percent of financially sound foreign demand, and only 40 percent of domestic demand, can be met.

According to a new concept of producing fork-lifts, which was decided upon at the beginning of this year, the production capacities of the plant are to be expanded and the production doubled by 1993. The range and the technical level of the products will continue to be improved. This development concept is based on the results of a comprehensive marketing study in all leading markets as well as in Czechoslovakia.

The Federal Republic of Germany, where long-range demand is not being met, is the largest market for Desta fork-lifts. The parameters of the expected developments in the FRG and other above-mentioned considerations necessitate the construction of a Desta assembly plant and the organization of a trading company within the Federal Republic of Germany. The formation of a Desta-owned distribution network in Great Britain, France, Italy, Spain, Denmark and the Netherlands offers many advantages, including lower sales costs, better quality of sales and service, improved marketing, a quicker reaction to customer demands, etc.

The cost of constructing the assembly plant in the Federal Republic of Germany is DM 4 million, or about 40 million exchange Kčs; the projected payback period is 3.5 years. The organization of a company-owned distribution network also costs DM 4 million or 40 million exchange Kčs. The payback period for this investment is 2.8 years. The enterprise has already contacted the World Bank, from which it expects a loan which should be adequate for this investment.

27. Introduction of the variable production of skeleton constructions

(Capital investment Kčs 80 million)

A plant owned by the government enterprise Prefa Olomouc, which is presently equipped for the production of prefabricated concrete components with extremely limited flexibility, is to be modernized and converted for the

diversified production of the components of skeleton construction. This conversion is necessary because the previous construction style with preformed components will be eliminated.

The plant is to be equipped with modern automatic controls for producing the concrete mixture, with a totally new forming technique, with manipulators with a capacity of 50-100 tons, and for the utilization of better-grade cement. It could then provide both constructive and front components for the faster construction of hotels, business centers, etc., which would, additionally, be of higher quality. This would create a basis for building and construction within Czechoslovakia with favorable transportation links, especially for foreign investors.

The realization of this measure would result in a number of technical and economic advantages, such as an increased ability to vary the form and size of the parts, better bearing capacity of the construction, increased architectural possibilities, the lowering of the present noise level of 85-120 decibels through compression of the components at the factory, the lowering of the extensive amount of supplementary work and of final finishing at the site, etc. The cost of the modernization is estimated at 80 million exchange Kčs (import from the Federal Republic of Germany), annual earnings are estimated at Kčs 15 million to 20 million, the payback period is 4 to 5 years.

28. Modernization of the production of glazed, frost-resistant and of unglazed tiles

(Capital investment Kčs 85 million)

The domestic market is lacking large-size unglazed tiles and glazed ceramic tiles. The production of ceramic materials has a long tradition in Czechoslovakia, and the basic raw material is good. The government enterprise Chlumčanské keramické závody in Chlumčany, is the largest producer of ceramic tiles in Czechoslovakia. It supplies the domestic market, and a significant percentage of the plant's output is exported to Eastern Europe. Lately, exports to hard currency countries have also increased.

In order to achieve the desired modernization, existing production equipment must be replaced with state-of-the-art production lines. Existing facilities and buildings can be used for this purpose. The modernization involves particularly the production line with muffle kilns. The plant is building a corresponding production line using the S 1 line supplied by the Italian firm SACMI Imola. In close association with this installation, it is possible to also install such a production line in a different part of the factory. The enterprise's capacity will be increased and its product range improved. It will be possible to eliminate fifty jobs while still improving working conditions. The hard currency component of the import is 65 million Kčs. The payback period for the

measure, which is calculated on the basis of a capital investment of Kčs 85 million and an increase in annual earnings of Kčs 22.8 million, is 4.61 years.

29. Completion of the production of stomatological instruments

(Capital investment Kčs 90 million)

The expansion of the production of micromotor attachments and the introduction of dental turbine production should complete the fabrication of stomatological instruments at the government enterprise Chirana Stará Turá. The present production capacity of 5,000 sets of micromotor attachments licensed by the firm KAVO of the Federal Republic of Germany does not meet market demands, which amounts to five times the present capacity. At the same time, the production of 10,000 dental turbines should be introduced.

This measure increases the production capacity to 25,000 sets of micromotor attachments and 10,000 stomatological turbines and assures the working and hygiene standards of stomatological workplaces in the Czechoslovak health care system. The resulting production level is comparable to that of leading manufacturers all over the world.

The improvement of hygienic principles in stomatology is an extremely important reason for the expansion of production, especially in view of the increasing spread of infectious diseases such as AIDS and hepatitis B. In this context, the number of instruments at stomatological outpatient facilities must be increased.

The measure will have a total cost of Kčs 90 million, Kčs 75 million thereof are needed for machines and equipment. Imports will require 70 million exchange Kčs in convertible currencies.

30. Modernization of the Keramsit production

(Capital investment Kčs 105 million)

Keramsit, also known as lightweight aggregate or expanded clay, is sold under the trade name of Kevint by a single business in Czechoslovakia, the government enterprise Pozemní stavby Karlovy Vary. Equivalent COMECON products are sold under the names of Liapor, Leca, etc. Kevint is used as a filler material in the production of lightweight concrete, in the production of components for apartment buildings, for additions to single family homes or multi-family dwellings, and for use in filtering and drainage.

The present level of machine quality and technology is low because the equipment has been in use without modernization since 1965. The continuation of the production development is warranted by the availability of sufficient supplies of qualitatively good raw material. This material will last

until approximately 2020 and is obtained at very low cost as a by-product of strip mining.

Within the framework of this measure, a new method of processing the raw material and a new technology of forming and dosage into the rotary ovens are introduced; the two existing ovens will be modernized. The sorting, storing, and shipping will be innovated, which will include milling techniques for Keramsit. Furthermore, new systems for measuring and regulating the entire technological process will be implemented. Dust removal through the use of electrical filters will be modernized. Specific fuel consumption will decrease by 50 percent. The total cost of this measure will be Kčs 105 million; with an increase in earnings of Kčs 22 million, the payback period will be about 5 years.

31. Expansion of the production of tufted carpets and wall-to-wall carpeting

(Capital investment Kčs 107 million)

The Rájec factory of the government enterprise Slovena Žilina has been producing wall-to-wall carpeting since 1972. The current condition of the equipment does not meet world standards. In Czechoslovakia, this area of production faces strong competition from other products, e.g., of Bytex Vratislavice and LKZ Revúca. It is therefore necessary to update the product range with changes in the basic material. The measure also includes the import of new equipment (e.g., two tufting machines from the firm COBBLE and a pattern machine). The capital investment is Kčs 107 million, leading to increased annual earnings of Kčs 24.7 million, and thus resulting in a payback period of 3.9 years.

32. Introduction of the thermal processing of potatoes

(Capital investment Kčs 108 million)

To date, the processing of potatoes at the Batňovice agricultural plant has been limited to storage and their packaging into bags of up to 50 kg for retail sale. The intended investment is aimed at improving the existing level of this processing. In Czechoslovakia, thermally treated potato products have only limited availability. The packages are intended for both the wholesale and retail trade.

The new technology consists of the receipt and handling of potatoes in large-size pallets, and the sorting, washing, peeling and production of individual potato products. The processed goods are then packaged and frozen.

The production capacity will be increased from 10,000 to 15,000 tons of potatoes. In order to achieve that, a capital investment Kčs 108 million, 21.2 million thereof for construction, and 29 million exchange Kčs for the import of equipment from the Netherlands or Denmark is necessary. Annual earnings will amount to Kčs 22.7 million, and the payback period will be 5 years.

33. Completion of the equipment for the existing production of cement particle boards

(Capital investment Kčs 119 million)

Cement particle boards are replacing asbestos cement sheets as well as wooden fiber boards, various sheet metals, etc., as building material. These boards are not combustible, are resistant to water, freezing, fungi, etc., and can easily be machined with ordinary tools. In order to improve the features of the cement particle boards, additional parts of the production line and equipment which improve the surface quality of the product have been developed. At the same time, the quality of the boards will be improved so that they can be used in lieu of any classical construction material. The primary issue is the surface coloring. It is accomplished with a lacquering system developed by the West German firm TAUBERT. In this lacquering line, electronic beams are used to harden the colors. Using this system, the energy consumption is lower and capacity higher, space requirements are smaller, and fewer employees are needed. No emissions from solvents develop. Another issue is the molding of the board surfaces. Special resin matrixes have been developed which will be incorporated into the existing production line at a future time. The equipment is supplied by the firm BISON of the Federal Republic of Germany. The final issue is the processing of the boards for easier hanging and mounting on or in the building. The issues here are the pre-drilling of holes, the grinding of edges and the grooving (fluting) of the boards. The government enterprise Severomoravské cihelny Hranice owns none of the necessary equipment. The completion of the production line will significantly increase production efficiency.

The necessary capital investment is about Kčs 119 million. Import costs are DM 5.8 million (about Kčs 58 million). As a result, the plant anticipates earnings of about Kčs 79 million and a payback period of 1.5 years.

34. Modernization of the production of doors

(Capital investment Kčs 120 million)

The conversion is to take place at the Jihlava factory of the government enterprise Jihomoravské dřevařské závody Brno. The plant's machinery is outdated and worn and at the level of 15 to 20 years ago. It is thus unusable

for the production of doors with a wider range of quality and price. The existing system does not allow for flexibility in response to market demands.

It is intended to modernize and intensify the present mass production of interior doors and to introduce the production of natural veneer doors in order to widen the range of doors produced, meet domestic demand, and make it possible to export 20 percent to 25 percent of the output. The existing surface treatment technology, which is carried out on 15-year-old production lines, is already outdated and is to be replaced by an ecologically acceptable system producing only one-third of the current amount of emissions.

The required capital investment for the acquisition of new machines is about Kčs 120 million, 100 million of which are exchange Kčs.

35. Introduction of the production of 3-ply plywood from raw wood

(Capital investment Kčs 125 million)

At the Ošednica plant of the government enterprise Kysucké drevárské závody Krásno nad Kysucou, a new 36 m x 120 m production hall has been built. After a change in the original utilization plans, this production hall now available for the planned production, this production calls them bio-boards) can be used as flooring and building material. The sheets of plywood product is technically advanced and can be sold at a favorable price on domestic and foreign markets. The technology is automated. At this time

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The current window production is to be replaced by the production of wood-framed windows of modern design made of pine with laminated friezes.

The estimated capital investment is Kčs 145 million, the expected payback period is 2.9 years.

37. Production of new medical bandages

(Capital investment Kčs 146 million)

To date, bandages for the health care system have been produced with physically and technically worn equipment using adhesives on a caoutchouc basis. This type of bandage production is outdated, and the product's technical level makes export impossible. The coating lines are more than 20 years old and fully depreciated. Production is possible only with increased operating costs. The coating lines, which are operating at 95 percent of capacity, represent the chief bottleneck in production. The produced bandages cannot be sterilized and do not measure up to foreign specifications. Plans call for the expansion and modernization of the existing equipment at the government enterprise Chemopharma Ústí n/L. Improved bandages are to be produced with melt-type adhesives. They are more valuable, as they can be sterilized, do not irritate the skin, and are washable.

The production will meet projected domestic demand and will result in exports sales of Kčs 16.7 million per year

The capital investment is Kčs 146 million, annual net earnings are Kčs 30 million, and export earnings are Kčs 2.4 million. The payback period is 4.6 years.

38. Modernization of the production of ceramic wall tiles

(Capital investment Kčs 170 million)

The manufacturing technology at Factory No. 1 of the government enterprise Rakovnické keramické závody is outdated. Most of the tiles produced there are 15 cm x 15 cm, a size which commands only low prices despite good quality. The price is determined in part by the size of the tiles. The manufacturing equipment is also outdated. Sixty percent of production are manufactured with equipment that was installed more than 20 years ago. Market demand is met neither at home, where there is a shortage of 1.5 to 2 million m², nor in Eastern Europe. The output is also too low to attract long-term partners from Western Europe.

The focus of the measure is to discontinue operation of the tunnel kiln and the preprocessing unit. Both sets of equipment were built in 1936 and have been in operation ever since. At the preprocessing unit, small rotary grinders,

which were loaded manually, will be replaced with six large capacity rotary grinders with an automatic loading system. The new production line will be equipped with two modern presses with 1200 t of pressure, a large capacity drying unit, and modern roller ovens. The measure is to be implemented at the Rakovník ceramic factory.

The total capital investment is Kčs 170 million including about 60 million exchange Kčs (DM 6 million) for imports; the increase in annual earnings is Kčs 30 million and the payback period 4-5 years. Nineteen workers less will be required and gas consumption will decrease by at least 35 percent.

39. Equipping a factory for the production of gas, electric and combination stoves

(Capital investment Kčs 220 million)

A newly constructed plant at the government enterprise Prefa Olomouc with an area of 5000 m² is to be equipped with the technology and equipment necessary for the manufacturing of stoves. The measure will help satisfy demand on the domestic market and will expand the existing cooperation with the foreign partner (PHILIPS), who will purchase one-third of the plant's output.

A prerequisite for the equipment of this facility is the installation of a computer system, of automated technological work stations, of a convertible assembly line, and of testing stations.

The investment amounts to about Kčs 220 million and is to be implemented in three stages. Annual earnings in the third stage are estimated at Kčs 75 million; the payback period is about 3 years.

40. Auto repair shops

(Capital investment Kčs 600 million, can be implemented in many small measures)

Like auto production in general, auto repair has a long tradition in the Czech republic. In the opinion of the central authorities, the sector consists of an adequate network of workshops, approximately 442, with well-qualified employees. The major shortcomings include an inadequate supply of spare parts, insufficient equipment, the low technical level of existing equipment (above all, there is a lack of diagnostic equipment and equipment for routine maintenance), insufficient computerization, and the way in which the work is organized.

The workshops specialize primarily in automobiles that are produced in Czechoslovakia and other Eastern European countries: Škoda, Lada, Dacia,

Olcit, Wartburg, Trabant, Fiat-polski. In the future, the following objectives must be pursued: expansion of the operation to include Western automobiles; production of spare parts and accessories for the cars, including requirements of foreign customers; expansion of routine maintenance, care and service of the cars, e.g., washing, oil change, diagnostics, etc.; transport and distribution of spare parts produced abroad; renovation and sales of used foreign cars; development of repairs of electrical parts; development of the use of computers based on foreign experience; professional training abroad for Czechoslovak workers.

Investment of about Kčs 600 million, primarily for technical equipment, will be needed to improve the quality of the repair shops. The payback period is between 4 and 6 years. This sum represents an overall basic need, which the individual businesses will supplement through self-financing and borrowing.

41. Innovations in polygraph production

(Capital investment Kčs 1690 million)

In Czechoslovakia, only the government enterprise Adamovské stojírny Adamov produces polygraphs. In technical terms, the economic level of the machines is high. Ninety percent of the production is exported--a significant percentage to the West.

However, there are bottlenecks in the technology, especially regarding machines for the production of side parts and rotary parts of the polygraphs and machines for special technological work stations, e.g., for the production of printing rollers or of cams.

In terms of design and mechanical engineering, the polygraphs are among the best in the world. What is needed is the import of electronics and control systems.

The demands of foreign customers regarding machine design, safety, and electronic equipment are regularly met within a period of 2 months. The expansion of the stable network of representatives in key countries is expected for the sale of new, innovative and larger machines.

This innovative measure is expected to include the use of freed-up capacities from the defense production, the retooling of a number of factories (e.g., Blansko, Dobruška), and the introduction of machines of the AD 706 and AD 806 series. The total cost of the measure, including noninvestment costs, will be Kčs 2062 million (1589 million self-financing, 473 million in bank loans), Kčs 761 million thereof in foreign exchange. The share of capital investment would be Kčs 1690 million. The payback period of the one-time expenditures is calculated at 3.7 years because of an increase in earnings.

VII. Annex: Summary of further measures

- Introduction of the production of Koji acid (5-hydroxy-2-hydroxymethyl-4-pyronic acid) at the Leopoldov factory of the government enterprise Slovenské škrobárne a liehovary. Capital investment: Kčs 12 million.
- Organization of the production of liquid carbon dioxide at the Leopoldov factory of the government enterprise Slovenské škrobárne a liehovary. Capital investment: Kčs 23.5 million.
- Introduction of the production of bacon, Louny factory of the government enterprise Masný průmysl Praha. Capital investment: Kčs 25 million.
- Supplementation of the existing veneering machine with a production line for bonding veneers onto the outer surfaces of construction sheets at the government enterprise Uherské papírny, Bučovice plant. Capital investment: Kčs 25 million.
- Acquisition of new meat separators for the Czechoslovakian meat-packing industry. Capital investment: Kčs 33.8 million.
- Complex utilization of yeast cells. Research institute of the government enterprise Slovenské škrobárne a liehovary Bratislava. Cost of the experimental unit: Kčs 42 million.
- Introduction of the production of new tiles, type Porcelanato. Government enterprise Keramické závody Košice, Michalovce factory. Capital investment: Kčs 140 million.
- Modernization and expansion of the production of dry injections. Roztoky research institute for antibiotics near Prague. Capital investment: Kčs 145 million.
- Construction of a new factory for processing of turkeys in Planá near Mariánské Lázně. Capital investment: Kčs 150 million.
- Modernization of the production of combed cotton yarns. Government enterprise Závody MDŽ Bratislava. Capital investment: Kčs 170 million.
- Construction of the Farmacie 2 factory of the government enterprise Galena Opava. Capital investment: Kčs 220 million.
- Modernization of the production of roofing. Government enterprise Severomoravské cihelny Hranice. Capital investment: Kčs 297 million.
- Modernization of the production of plate glass. Government enterprise Sklounion Teplice. Capital investment: Kčs 340 million.
- Construction of two refrigeration factories. Government enterprise Mrazárny Praha. Capital investment: Kčs 320 or Kčs 390 million.
- Introduction of the production of laminated food cartons with aluminum foil at the government enterprise Krkonošské papírny Hostinné. Capital investment: Kčs 300-350 million.
- Updating of the production of floor coverings. Government enterprise Chemické závody Nováky. Capital investment: Kčs 369 million.

- Introduction of the production of citric acid at the Leopoldov factory of the government enterprise Slovenské škrobárne a liehovary. Capital investment: Kčs 391 million.
- Introduction of the production of 1-1-1-trichlorethane. Government enterprise Chemické závody Nováky. Capital investment: Kčs 400 million.
- Construction of a production line for the manufacture of particle boards with particle orientation at the government enterprise Závody na překližky a dýhy Hodonín. Capital investment: Kčs 420 million.
- Introduction of the production of a new fungicide based on 1-2-4-triazol. Government enterprise Slovnaft Bratislava. Capital investment: Kčs 492 million.
- Modernization of the production of paraxylene. Government enterprise Slovnaft Bratislava. Capital investment: Kčs 533 million.
- Introduction of the production of disposable injection technology. Government enterprise Chirana Stará Turá. Capital investment: Kčs 548 million.
- Organization of an operation for the production of pre-fabricated family dwellings. Government enterprise Kovona Karviná. One-time cost of the measure Kčs 648 million.
- Introduction of the production of tissue paper at the government enterprise Jihočeské papírny Větřní. Capital investment: Kčs 700 million to 800 million.
- Organization of the production of chemicals for the rubber industry in two stages. Government enterprise Duslo Šala. Capital investment: Kčs 1806 million.
- Intensification of hydrocracking at the government enterprise Slovnaft Bratislava. Total cost: Kčs 3525 million.

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- Expansion of vacuum packaging in Czechoslovakia. The problem will be solved at the research institute of the starch industry in Bratislava.
- Organization of the complex processing of apples. In preparation at the research institute of the starch industry in Bratislava.
- Juices for infants. Introduction at the government enterprise Novofructa Nové Zámky.
- Introduction of new methods for preserving vegetables. Research institute of the starch industry in Bratislava.
- Organization of private lending (pawn) institutions.
- Support of conversion of private apartments and houses to create tourist accommodations.