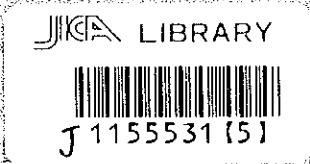


JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF ENERGY, INDUSTRY AND TRADE
REPUBLIC OF KAZAKHSTAN

MASTER PLAN STUDY
FOR
THE DEVELOPMENT OF MACHINERY INDUSTRY
IN
THE REPUBLIC OF KAZAKHSTAN

FINAL REPORT
(SUMMARY)



March, 1999

THE MATERIALS PROCESS TECHNOLOGY CENTER
YACHIYO ENGINEERING CO., LTD.

| |
|--------|
| MP I |
| JR |
| 99-105 |

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF ENERGY, INDUSTRY AND TRADE
REPUBLIC OF KAZAKHSTAN**

**MASTER PLAN STUDY
FOR
THE DEVELOPMENT OF MACHINERY INDUSTRY
IN
THE REPUBLIC OF KAZAKHSTAN**

**FINAL REPORT
(SUMMARY)**

March, 1999

**THE MATERIALS PROCESS TECHNOLOGY CENTER
YACHIYO ENGINEERING CO., LTD.**



1155531 (5)



The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

KAZAKHSTAN

- ROADS
- RAILROADS
- NATIONAL CAPITAL
- OBLAST CAPITALS
- SELECTED CITIES
- INTERNATIONAL BOUNDARIES
- OBLAST BOUNDARIES

P R E F A C E

In response to a request from the Government of the Republic of Kazakhstan, the Government of Japan decided to conduct the Master Plan Study on the Development of Machinery Industry, and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent to Kazakhstan a study team headed by Mr. Teruhiko Wakabayashi, The Materials Process Technology Center, and organized by The Materials Process Technology Center and Yachiyo Engineering Co., Ltd. from November 1997 to March 1999.

The team held discussions with the officials concerned of the Government of Kazakhstan and conducted a field study. After its return to Japan, the team conducted further studies and compiled the results in this report.

I hope this report will contribute to the further development of machinery industry in Kazakhstan and to the enhancement of friendly relations between the two countries.

I wish to express my sincere appreciation to all those who participated in this study project for their close cooperation with the team.

March 1999



Kimio Fujita

President

Japan International Cooperation Agency

Table of Contents

PREFACE

| | |
|---|-----|
| INTRODUCTION..... | 1 |
| 1. OUTLINE OF THE STUDY..... | 1 |
| 2. COMPILATION OF THE REPORT | 3 |
| 1. CONCLUSION AND RECOMMENDATIONS..... | 1-1 |
| 1.1 Future Prospects | 1-1 |
| 1.2 Macro Economic Trends and Current Conditions..... | 1-2 |
| 1.3 Current Conditions of the Machinery Industry..... | 1-3 |
| 1.4 Basic Plan for Machinery Industry Promotion..... | 1-4 |
| 1.5 Action Plan for Machinery Industry Promotion..... | 1-5 |
| 1.6 Industrial Restructuring Plan..... | 1-6 |
| 1.7 Management Improvement Plan for Model Enterprise..... | 1-7 |

Part I : Current Conditions

| | |
|---|------|
| 2. MACRO ECONOMIC TRENDS AND CURRENT CONDITIONS..... | 2-1 |
| 2.1 Macroeconomic Trends | 2-1 |
| 2.2 Structural Reform | 2-2 |
| 2.3 Long Term Prospects..... | 2-3 |
| 3. CURRENT CONDITIONS OF MACHINERY INDUSTRY | 3-1 |
| 3.1 Current Conditions of Machinery Industry | 3-1 |
| 3.1.1 Long Term Development Program..... | 3-1 |
| 3.1.2 Short Term Development Program..... | 3-1 |
| 3.2 Machinery Industry Development Program | 3-2 |
| 3.3 Current Conditions of the Machinery Industry..... | 3-3 |
| 3.4 Current Conditions of Selected Sectors..... | 3-7 |
| 3.4.1 Farm Machinery..... | 3-7 |
| 3.4.2 Agricultural Food Processing Industry | 3-9 |
| 3.4.3 Mining Machinery | 3-10 |
| 3.4.4 Rolling Stock | 3-11 |
| 3.4.5 Common Problems in Key Sectors..... | 3-14 |

Part II : Master Plan

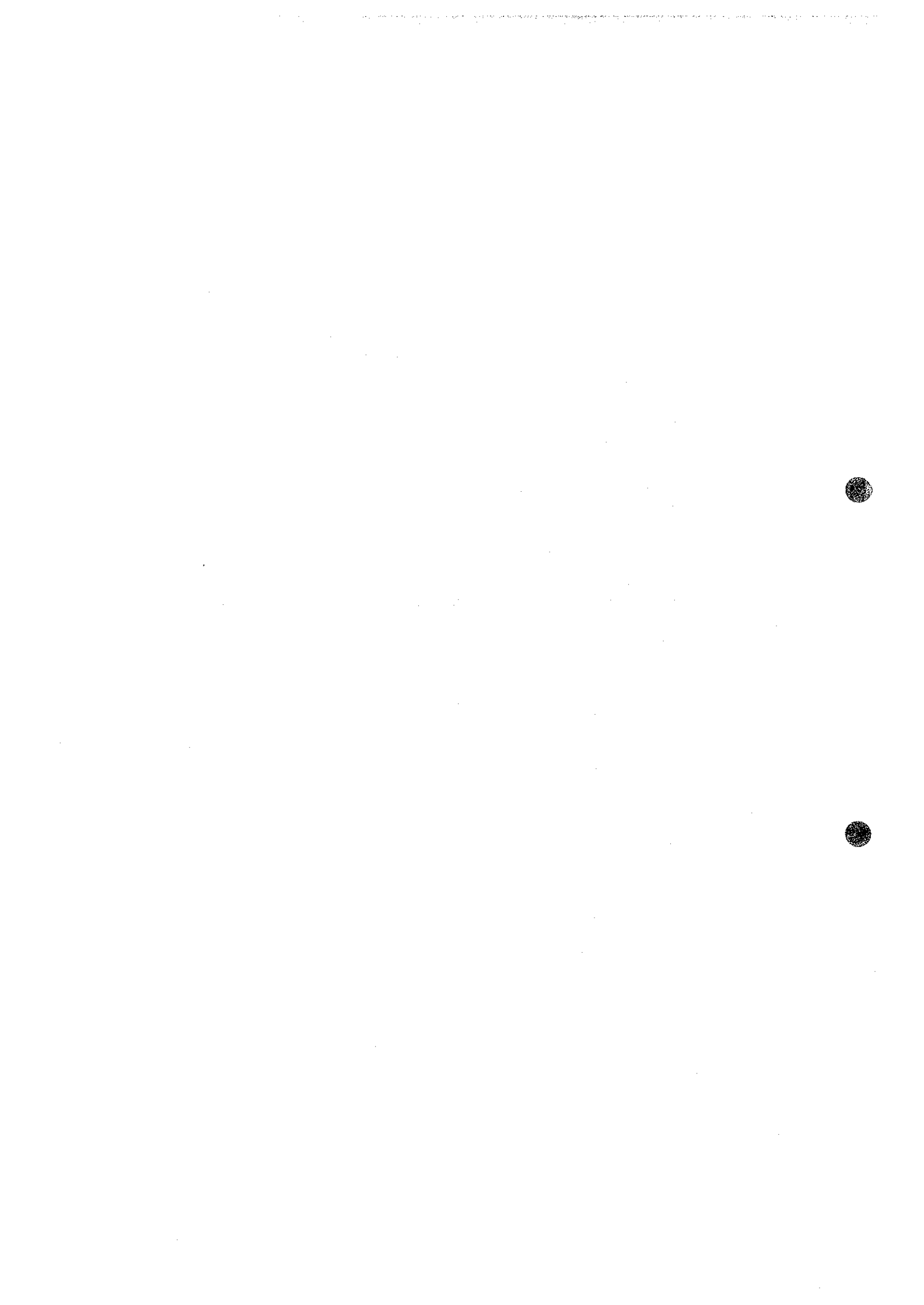
| | |
|---|-----|
| 4. BASIC PLAN FOR MACHINERY INDUSTRY PROMOTION..... | 4-1 |
| 4.1 Basic Issues for Promotion | 4-1 |
| 4.2 Appropriate Sizing of Companies | 4-1 |
| 4.2.1 Downsizing through Disposal of Surplus Equipment and Facilities | 4-1 |
| 4.2.2 Promotion of Streamlining | 4-2 |
| 4.3 Necessity of Market-oriented Production System and Market Analysis..... | 4-3 |

| | | |
|-------|---|------|
| 4.4 | Transition to Specialized Production System..... | 4-4 |
| 4.5 | Tie-ups with International Corporate Groups..... | 4-5 |
| 4.5.1 | Removal of Borders in the Machinery Industry | 4-6 |
| 4.5.2 | Strategy for Gaining Access to International Markets | 4-6 |
| 4.6 | Role of the Government in Machinery Industry Promotion..... | 4-9 |
| 4.6.1 | Improvement of Legislation and the Business Environment..... | 4-9 |
| 4.6.2 | Development of Functions for Machinery Industry Promotion | 4-10 |

Part III: Action Plan

| | | |
|-------|--|------|
| 5. | ACTION PLAN FOR THE MACHINERY INDUSTRY PROMOTION..... | 5-1 |
| 5.1 | Government Support Measures for Industry Promotion | 5-1 |
| 5.2 | Legislative and Financial Support Improvement Measures | 5-2 |
| 5.2.1 | Review of VAT Application..... | 5-2 |
| 5.2.2 | Improvement of Liquidity..... | 5-2 |
| 5.2.3 | Rationalization of Investment Procedures | 5-3 |
| 5.2.4 | Financial Support for Company Rehabilitation..... | 5-4 |
| 5.3 | Development of Functions for Machinery Industry Promotion | 5-5 |
| 5.3.1 | Development of Industrial Associations..... | 5-5 |
| 5.3.2 | Enhancement of Functions for Collection and Provision of Market and Industry Information | 5-6 |
| 5.3.3 | Enhancement of Management Technology and Marketing Education Functions | 5-7 |
| 5.3.4 | Support of Testing and Research and Enhancement of Production Technology and Skill Training | 5-8 |
| 5.3.5 | Measures for the Development of the Machinery Industrial Centre | 5-8 |
| 5.4 | Implementation Schedule | 5-14 |
| 6. | INDUSTRIAL RESTRUCTURING PLAN | 6-1 |
| 6.1 | Industrial Restructuring Basic Plan..... | 6-1 |
| 6.1.1 | Subjects from the Short to Medium Term Viewpoint (liquidation and downsizing of surplus equipment and facilities) | 6-1 |
| 6.1.2 | Subjects from the Medium to Long Term Viewpoint (key products and development methods)..... | 6-2 |
| 6.2 | Industrial Restructuring Plan for Farm Machinery..... | 6-4 |
| 6.2.1 | Key Products Development..... | 6-4 |
| 6.2.2 | Reinforcement of Retailing and Service Network..... | 6-8 |
| 6.2.3 | Implementation Plan..... | 6-8 |
| 6.3 | Industrial Restructuring Plan for Food Processing Machinery | 6-10 |
| 6.3.1 | Key Products Development | 6-11 |
| 6.3.2 | Implementation Plan..... | 6-11 |
| 6.4 | Industrial Restructuring Plan for Mining Machinery | 6-12 |
| 6.4.1 | Key Products Development | 6-12 |
| 6.4.2 | Implementation Plan..... | 6-13 |
| 6.5 | Industrial Restructuring Plan for Railway Rolling Stock..... | 6-14 |
| 6.5.1 | Railway Rolling Stock Manufacturing Plant Construction | 6-13 |
| 6.5.2 | Passenger Car Manufacturing Plant Construction Plan..... | 6-15 |

| | | |
|-------|--|------|
| 6.5.3 | Freight Car Plant Reconstruction..... | 6-18 |
| 6.5.4 | Maintenance of Railway Rolling Stock..... | 6-18 |
| 6.5.5 | Localization of Spare Parts for Railway Rolling Stock..... | 6-19 |
| 7. | MANAGEMENT IMPROVEMENT PLAN FOR MODEL ENTERPRISES..... | 7-1 |
| 7.1 | Outline of Companies and Improvement Issues by Sector..... | 7-1 |
| 7.2 | Basic Approach for Management Improvement of Model Enterprises..... | 7-4 |
| 7.2.1 | Drafting of Development Strategies | 7-4 |
| 7.2.2 | Basic Approach for Management Improvement..... | 7-5 |
| 7.2.3 | Management Improvement by Model Enterprise | 7-5 |
| 7.3 | Restructuring Procedure of Production Equipment and Facilities | 7-7 |
| 7.4 | Strengthening of Marketing and Products Development | 7-10 |
| 7.4.1 | Strengthening of Marketing Functions | 7-10 |
| 7.4.2 | Importance of Product Development..... | 7-10 |
| 7.5 | Change to Small Lot and Multi-Kinds Production..... | 7-11 |
| 7.5.1 | Transition to Small Lot Production | 7-11 |
| 7.5.2 | Transition to Multipurpose Machinery | 7-11 |
| 7.6 | Improvement of Quality Control Systems..... | 7-12 |
| 7.7 | Improvement of Management Control | 7-13 |
| 7.7.1 | Management Training..... | 7-13 |
| 7.7.2 | Financial Planning | 7-13 |
| 7.8 | Improvement of Materials Processing Section..... | 7-14 |



ACRONYMS

| | |
|-------|---|
| ADB | Asian Development Bank |
| CIS | Commonwealth of Independent States |
| EBRD | European Bank for Reconstruction and Development |
| EPZ | Export Processing Zone |
| FDI | Foreign Direct Investment |
| FSU | Former Soviet Union |
| GATS | General Agreement on Trade in Services |
| GDP | Gross Domestic Product |
| GNP | Gross National Product |
| GOK | Government of Kazakhstan |
| IMF | International Monetary Fund |
| ISO | International Organization for Standardization |
| JICA | Japan International Cooperation Agency |
| JSC | Joint Stock Company |
| KTZ | Kazakhstan Railway |
| MOEIT | Ministry of Energy, Industry and Trade |
| NBK | National Bank of Kazakhstan |
| NIS | Newly Independent States |
| ODA | Official Development Assistance |
| OECD | Overseas Economic Cooperation Fund |
| SEZ | Special Economic Zone |
| SITC | Standard International Trade Classification |
| SME | Small and Medium Enterprises |
| SOE | State-owned Enterprises |
| TACIS | Technical Assistance for Commonwealth of Independent States |
| UN | United Nations |
| USAID | United States Agency for International Development |
| VAT | Value Added Tax |
| WB | World Bank |
| WCO | World Customs Organization |
| WTO | World Trade Organization |

<Engineering Terms>

| | |
|-----|------------------------------|
| CAD | Computer Aided Design |
| CAM | Computer Aided Manufacturing |
| DE | Diesel Engine |

| | |
|------|------------------------------|
| DL | Diesel Locomotive |
| EC | Electric Railcar |
| EL | Electric Locomotive |
| FC | Freight Car |
| IE | Industrial Engineering |
| LRT | Light Railway Transportation |
| MC | Machining Center |
| MTC | Machine Technical Station |
| NC | Numerical Control |
| PC | Passenger Coach |
| PDCA | Plan Do Check Action |
| QC | Quality Control |
| R&D | Research and Development |
| SDL | Shunting Diesel Locomotive |
| TQC | Total Quality Control |
| VE | Value Engineering |

INTRODUCTION

1. OUTLINE OF THE STUDY

(1) Background

Kazakhstan gained independence in 1991 with the dissolution of the former USSR. The economic development of Kazakhstan had been traditionally implemented under the strong leadership of the former USSR. Kazakhstan is a typical resource exporting country. It exports rich resources such as petroleum and natural gas to the CIS countries while it imports machinery products from these countries. The main machinery industry of Kazakhstan includes farm machinery, mining machinery and instruments. The major part is imported from CIS countries.

The machinery industry of Kazakhstan may be characterized as having the established basic technology such as welding, casting and forging compared to the other Central Asian countries and a large scale production capacity, however it can not meet the domestic and foreign demand. As a result of the reduction of investment in heavy industries by the former USSR since the late 1980s and the collapse of the distribution system due to dissolution of the USSR, the production has inevitably decreased.

The change in enterprise structure of the machinery production industry from public corporation to the form of joint-stock corporation as the first stage of the privatization, is being challenged by problems of insufficiency or inexperience of management capability such as market research and establishment of sales and distribution systems as well as shortage of capital partly due to defective account settlement system.

Under these circumstances, the government of the Republic of Kazakhstan requested a master plan study for the development of the machinery industry to the government of Japan. Accordingly the Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of the technical cooperation of the government of Japan, was entrusted to undertake the Study in cooperation with the authorities of Kazakhstan.

JICA dispatched a preparatory study team for the study. After discussion with the related officials in Kazakhstan, the Scope of Work for the Study and the Minutes of Meeting were agreed in August 1997.

(2) Objectives of the Study

The objectives of the Study are to support Kazakhstan's transition to market-oriented economy, contribute to the development of the machinery industry, and formulate a comprehensive master-plan for the development of the machinery industry for the government on the one hand and enterprise management improvement basic plan for the entrepreneur on the other hand based on socio-economic studies, machinery industry condition study, and enterprise survey etc. The recommendations proposed in this study are expected to form a basis for formulation of policy to develop the machinery industry by the government of Kazakhstan.

The study covers the whole machinery industry with emphasis on the selected priority sub-sectors of agricultural machinery (farm machinery and food processing machinery), mining machinery, and railway (rolling stock) production for which detailed studies will be made.

(3) Study Area

The study area covers the Republic of Kazakhstan (Almaty, Astana (old Akmola), Karaganda, Pavlodar, Petropavlovsk, Ust-Kamenogorsk, Shimkent, etc.).

(4) Contents of the Study

The major contents of the study are as follows:

1. Review of socio-economic condition of Kazakhstan
2. Survey on the Current condition of the machinery industry of Kazakhstan
3. Survey on the Current condition of the important sectors
4. Formulation of basic plan for machinery industry promotion
5. Formulation of action plan for machinery industry promotion
6. Formulation of restructuring basic plan and action plan for the selected sub sectors in the machinery industry
7. Formulation of model enterprise management improvement basic plan and action plan

(5) Implementation of the Study

This study was started in October 1997 and the final report shall be finalised in March 1999. Four field surveys are implemented during this time period.

2. COMPILATION OF THE REPORT

This report comprises 7 chapters in three parts: Part 1) Analysis of the current condition of the machinery industry mentioned in Chapters 2 and 3; Part 2) Master plan for promoting the machinery industry in Chapter 4; and Part 3) Action plan for the machinery industry mentioned in Chapters 5, 6, and 7.

Chapter 1 Conclusion and Recommendations

Part I: Analysis of Current Conditions

Current social and economic circumstances and systems and policies for industrial promotion, forming the prerequisites for preparing a master plan for encouraging the machinery industry were reviewed, and problems were identified from analysis of the current conditions of the Kazakhstan machinery industry.

Chapter 2 Macro Economic Trends and Current Conditions

Chapter 3 Current Condition of the Machinery Industry

Part II: Master Plan

A long-term perspective toward which the Kazakhstan machinery industry should be directed was formulated on the basis of the results of analysis of the current condition as described above, and recommendations were made regarding development strategies from the short, medium and long-term points of view.

Chapter 4 Basic Plan for Machinery Industry Promotion

Part III: Action Plan

Government's actions as regulator and policy maker and roles of related organizations are proposed for the development of the machinery industry from the view-point of necessary functions for their supporting system.

Chapter 5 Action Plan for Machinery Industry Promotion

For the four sectors (farm machinery, food processing machinery, mining machinery and rolling stock) specified as key sectors, strategic products which may be developed were specified, together with improvement plans of the model enterprises, and a pattern of industrial restructuring was proposed as a result of studies.

Chapter 6 Industrial Restructuring Plan

Chapter 7 Management Improvement Plan for Model Enterprises

Fig.0.0.1 shows the general vision of the machinery industry and the correlation of the supporting system by the government and subjects which are to be executed by enterprises proposed in this study.

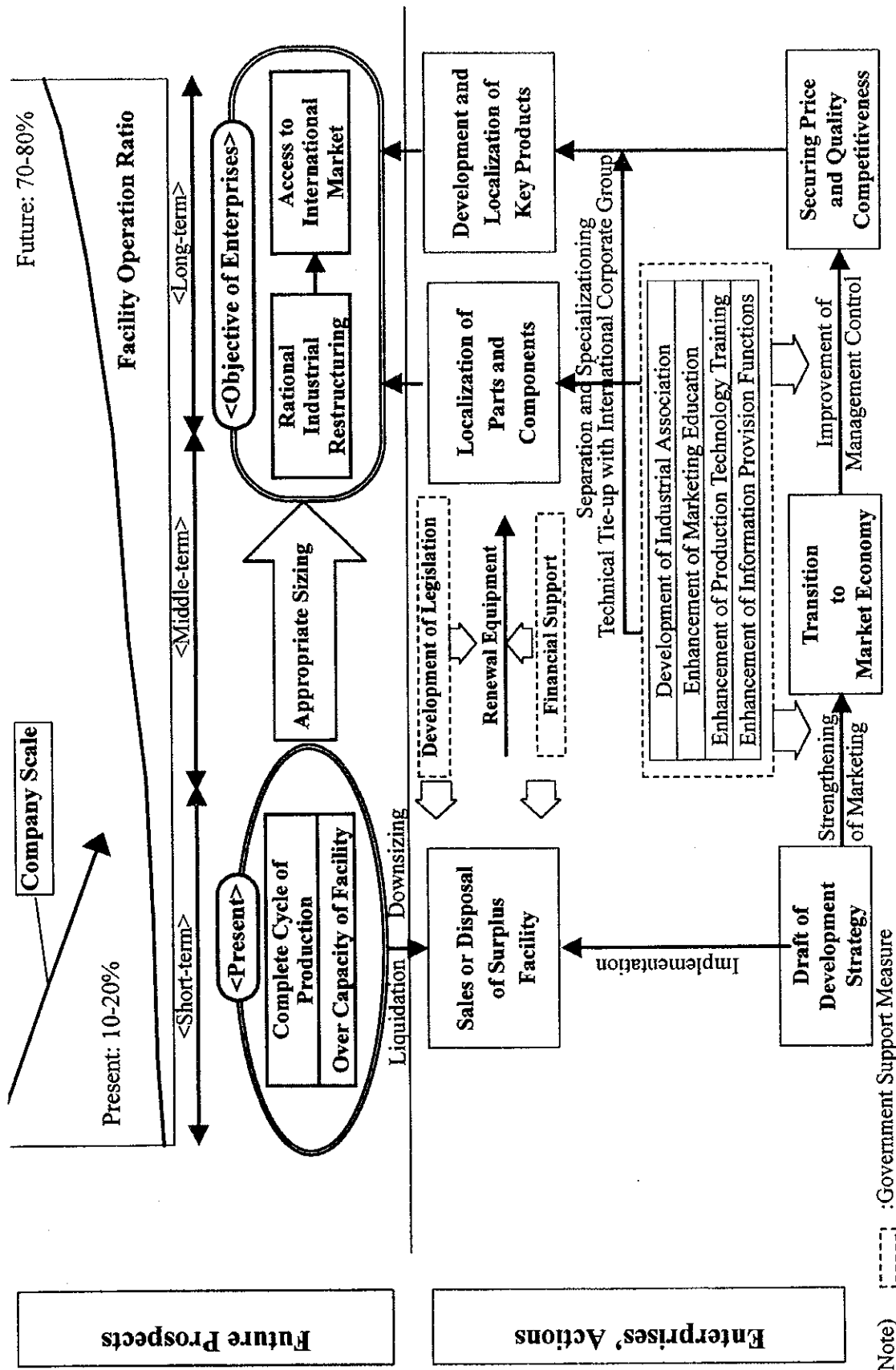


Fig. 0.0.1 General Vision of Master Plan for Machinery Industry Promotion



1. CONCLUSION AND RECOMMENDATIONS

1.1 Future Prospects

The machinery industry in Kazakhstan underwent massive plant and equipment investment during the era of Soviet economic planning, however, today in the aftermath of economic collapse, much of this equipment and facilities lies idle and are surplus to requirements. Accordingly, equipment operating rates today are extremely low (ranging between 10-20%) and there is a growing need to reexamine the overall industrial structure.

As for individual companies in Kazakhstan, they must withstand international competition from foreign companies, especially those in CIS and EU countries. As a result, not only is it necessary for companies to advance production technology in line with growing product sophistication, but they need to acquire business capability in non-manufacturing areas such as marketing, retailing and servicing. However, the production technology of companies in Kazakhstan is out of date and marketing functions are not even established. In consideration of these current conditions, measures to ensure the survival of the machinery industry in Kazakhstan were investigated.

It is essential for the machinery industry in the new market economic environment to be competitive in terms of product quality and prices, etc. in international markets.

First of all, in the short term it is necessary to liquidate and downsize the massive quantities of surplus equipment that currently exist and to make the scale of companies more appropriate.

In the medium to long term, it is necessary to move away from the complete cycle of production (a legacy of the former system) and carry out rational industrial restructuring comprising among other things the division and specialization of parts and components manufacture.

Moreover, by formulating development strategies in line with the demands of international markets and aggressively promoting technical tie-ups, etc. with international corporate groups which already enjoy a position of relative superiority in the said markets, efforts should be made to realize the production of machinery industry products that are internationally competitive in terms of quality performance and cost.

As a result of doing this, it will be possible for machinery products from Kazakhstan to gain access to international markets.

Target:

Access to international markets



Strategy 3 (long term):

Development and localization of key products through promoting tie-ups with international corporate groups



Strategy 2 (medium term):

Expansion of parts and components localization through division and specialization of labor



Strategy 1 (short term):

Optimization of company scale through liquidation and downsizing of surplus equipment and facilities

[Current Conditions]

1.2 Macro Economic Trends and Current Conditions

Kazakhstan has experienced massive economic reform since 1991 with the introduction of new liberalization measures designed to promote a shift to a market economy, however, this economic reform is today confronted with a number of difficulties. Actual GDP has fallen by half during this period, and ODA has been actively introduced in an attempt to remedy the situation. However, the machinery industry is still faced with numerous impediments to development including, 1) a high interest rate policy designed to stabilize currency, 2) entry of foreign machinery to the domestic market as a result of trade liberalization, and 3) a shortage of funds for advancing company reconstruction.

The main focus of trade policy in Kazakhstan still remains liberalization and the government is currently preparing for entry to the WTO.

The legal system regarding investment is already in place, however, problems such as a lack of transparency in the tender process exist, and hardly any foreign investment is directed towards the machinery industry.

Since there is no financial system in Kazakhstan, domestic sources of funds for companies are limited and companies must therefore rely on loans from international institutions, etc.

The policy of privatization is currently in the third stage and was scheduled for completion in December 1997, however, the targets of this policy have not been achieved. In the machinery industry, of 38 large-scale companies that were designated by the government, only three have so far been privatized.

1.3 Current Conditions of the Machinery Industry

The process of formulating a plan for promotion of the machinery industry consisted of three work areas: 1) analysis of data and materials obtained in the site surveys, 2) gauging of current conditions from interview surveys conducted in company visits, and 3) identification of problems by analyzing current conditions through questionnaire surveys.

(1) Role of the Machinery Industry in Kazakhstan

From the viewpoint of making effective use of domestic resources and technology that has been accumulated until now, national plans in Kazakhstan aim to find substitutes for products that are currently imported, achieve the sophistication of domestic industry through the introduction of new technology, and eventually encourage the export of domestic products.

(2) Current Conditions of the Machinery Industry

Large-scale production equipment and facilities were constructed during the era of planned economy under the former Soviet Union, however, because product machinery and parts supply and retail systems are now in a state of ruin, the operating rate of plant equipment at more than 90% of the 200 or so machinery manufacturers that still remain, is extremely low at less than 20%. Moreover, since many companies are faced with a shortage of working capital as a result of barter trading, legislative problems concerning the tax system and accounting criteria, a lack of market and industry information, and many other fundamental problems that hinder their businesses, there is little prospect of such companies advancing company reconstruction.

Meanwhile, technical capability in Kazakhstan is high as a result of its prominent progress within Asia in the sector of machinery manufacturing for the space and aviation industry, oil, gas and chemical industries and military industry, and it also

possesses engineers who are motivated to learn high level technologies. Therefore, it is necessary for Kazakhstan to make effective use of these business resources.

(3) Current Conditions of the Selected Sectors in the Machinery Industry

The major sector within the machinery industry is farm machinery, which it is thought accounts for between 60-70% of all machinery sales. Accordingly, many companies belong to this sector, however, domestic production is limited and imports from Russia, etc., are relied on to provide important machinery.

Food processing machinery is a sector which the government aims to foster as a means of responding to the future demand for foodstuffs, however, there are hardly any specialist makers of such machinery at the current time.

Mining development has been designated as a priority industry, and mining-related machinery is another key sector, however, all major items of mining machinery are currently imported.

Imports are also relied on to provide railway rolling stock, however, the government intends as a national policy to domestically produce rolling stock in the near future.

[Master Plan]

1.4 Basic Plan for Machinery Industry Promotion

In formulating the machinery industry promotion plan, the main issues requiring improvement were examined and the recommendations indicated below were drawn up.

The machinery industry in Kazakhstan does not adopt division of labor whereby specialist makers produce certain parts and components; but individual companies conduct the complete cycle of production ranging from the processing of raw materials to the assembly of products. While such a production setup persists, it is difficult for companies in Kazakhstan to become competitive in international markets, where the sophistication of technical capability and lowering of prices, etc. are advancing. In the future, it will be necessary to establish a more rational production setup through the division and specialization of labor, whereby the industry can achieve superiority in terms of technical capability and prices.

For this reason, as a short term objective, it is planned to liquidate and downsize existing production equipment and facilities and adopt a production setup that is more suited to the current market scale. In the medium term, it is planned to achieve the

domestic production of parts and components that are currently imported, while in the long term, it is planned to achieve the successive localization of currently imported products that are also targeted for development in the draft State Program of the Machinery Complex Development in the Republic of Kazakhstan for 1998-2000 (Note)¹.

For realization of the above objectives, with a view to reducing research and development costs and achieving fast growth, it is desirable for development to be advanced based on technical tie-ups and exchange with international corporate groups. Moreover, since the domestic market is small, a development strategy that includes foreign markets should be adopted, and the promotion of tie-ups with international corporate groups is also a wise policy from the viewpoints of utilizing the marketing ability of such groups and gaining access to international markets.

In promoting such activities, it is necessary for the government to provide support to companies in terms of implementing legislative and financial measures and developing industry promotion functions.

[Action Plan]

1.5 Action Plan for Machinery Industry Promotion

Specific promotion measures that should be adopted by the government in the areas of legislative and financial support and development of promotion functions are separately recommended according to the short, medium and long terms.

(1) Short to Medium Term Development Targets

On the company level, promote industrial restructuring (liquidation and downsizing) in line with the size of markets.

In the mean time, the government should support companies from the legislative and financial standpoints. Issues that require particularly urgent attention are the improvement of VAT application, improvement of liquidity, clarification of accounting criteria, rationalization of investment procedures, and financial support for company reconstruction.

(Note)¹ The draft State Program of the Machinery Complex Development in the Republic of Kazakhstan for 1998-2000 has been jointly compiled by the MOEIT and Science Academy.

(2) Medium to Long Term Development Targets

On the company level, construct rational production system and secure competitiveness in international markets. Meanwhile, the government should support companies through developing industry promotion functions. In particular, it is necessary to carry out the development of industrial associations, enhancement of market and industry information collection and provision functions, enhancement of management technology and marketing education functions, support of testing and research, and enhancement of training and education in production technology and skills.

1.6 Industrial Restructuring Plan

Based on, 1) the short term plan for surplus equipment and facilities liquidation and downsizing, and 2) the medium to long term plan of specialization and development through tie-ups with international corporate groups, a plan for industrial restructuring shall be recommended. In this sector-separate restructuring plan, key products shall be determined based on marketability and production potential in each priority sector, and domestic production ranging from parts and components manufacture to final assembly shall be envisaged.

In the short to medium term, as well as compiling development strategies for each individual company, active information exchange within the overall industry shall be promoted and the rational disposal of surplus equipment and facilities shall be carried out. In order to promote information exchange, the Machinery Manufacturing Center shall be given the function of collecting and providing information on used equipment and facilities. At the same time, the effective utilization of used equipment and facilities should be encouraged through fostering parts recycling merchants, etc.

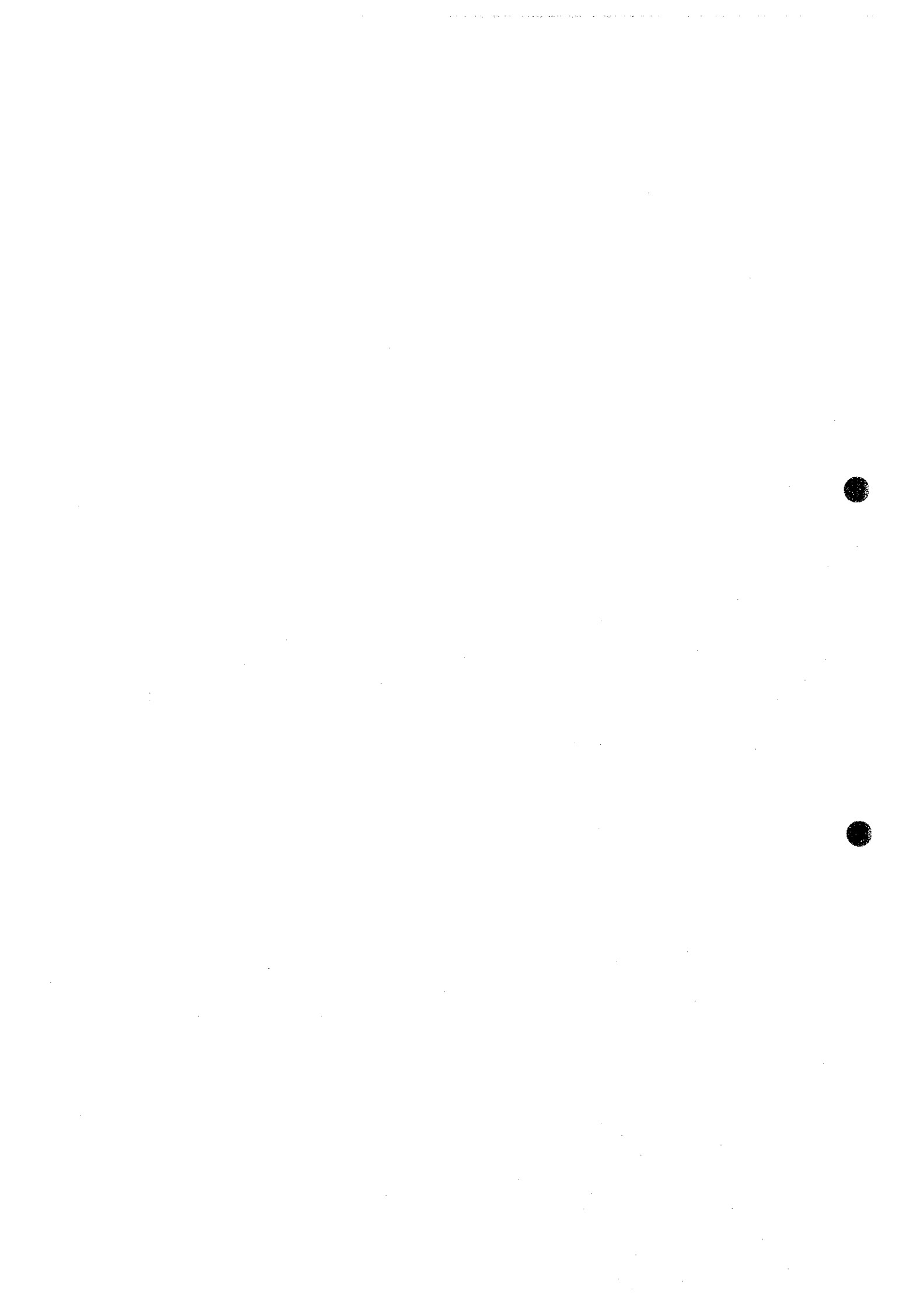
In the medium to long term, development and production shall be carried out of tractors and combine harvesters, etc. in the farm machinery sector, flour mill and bakery equipment, meat processing, and dairy product processing and refrigeration equipment in the food processing machinery sector, wheel loaders in the mining machinery sector, and passenger cars and freight cars, etc. in the railway rolling stock sector.

1.7 Management Improvement Plan for Model Enterprise

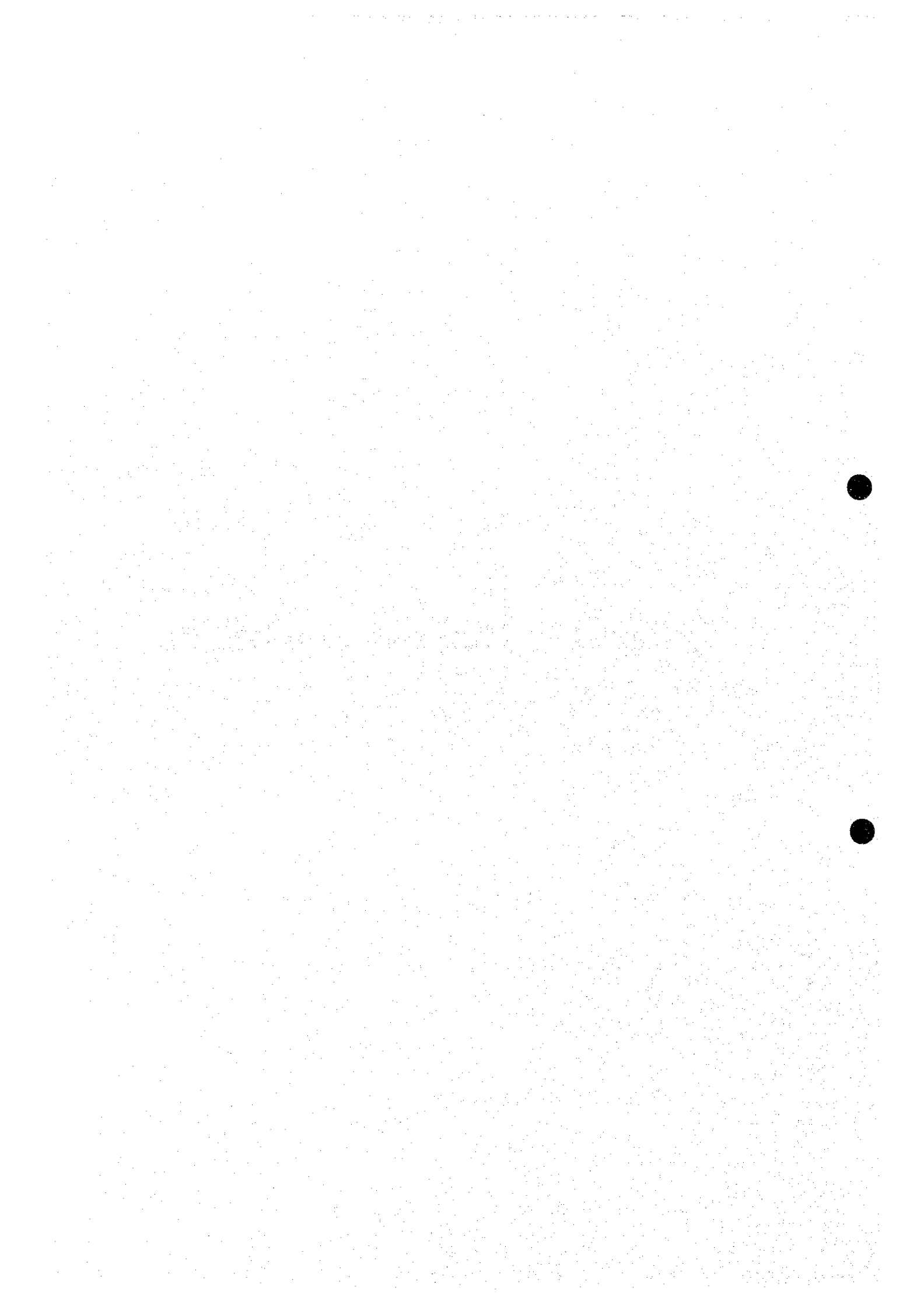
Regarding the 27 model companies that were selected upon holding discussions with the Kazakhstan side, it is recommended that development strategies be drafted, production

1.7 Management Improvement Plan for Model Enterprise

Regarding the 27 model companies that were selected upon holding discussions with the Kazakhstan side, it is recommended that development strategies be drafted, production equipment and facilities be reconstructed, greater market orientation be pursued (product development and technical improvement), manufacturing technology be advanced in new directions, quality control systems be improved, business management be enhanced, materials processing departments be improved, and so forth. Improvement measures such as the above can also be applied to other business sectors.



Part I : Current Conditions



2. MACRO ECONOMIC TRENDS AND CURRENT CONDITIONS

2.1 Macroeconomic Trends

Upon achieving independence in December 1991, the Government of Kazakhstan started on partial reform and in January 1993 compiled a comprehensive reform program aimed at achieving transition to a market economy system. In spite of these efforts, however, it was unable to check rising inflation and slumping production activity. Introduction of the country's own currency, the Tenge, in November 1993 helped to form the institutional foundation for implementing financial measures and, as a result of the Standby Agreement with the IMF in January 1994 and implementation of the revised package of structural reforms that was announced in July 1994, the downward trend in the macroeconomy was halted and the ground was set for overseas assistance centering around international financial institutions to be implemented effectively. As a result of stringent budget and financial policies that were implemented in earnest from the middle of 1994, the GDP finally started to show positive growth (0.3%) in 1996, and it has continued growing by 2.0% in 1997 and probably the same

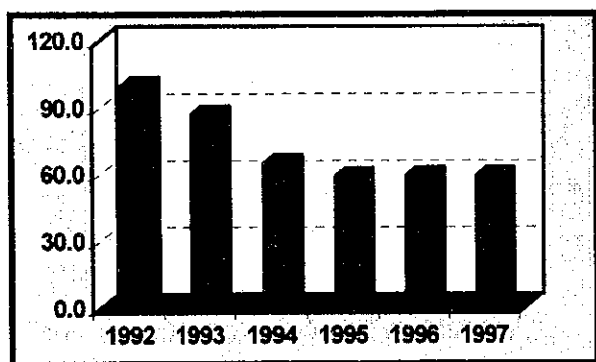


Fig. 2.1.1 Index of real GDP (1992=100), 1992-97

degree again in 1998. During this period, inflation, which stood at four digits in 1994, fell to three digits in 1995 and two digits in 1996; by 1997 it was down to between 10-20% and it is anticipated that single digit inflation will be achieved in 1998 (see Fig. 2.1.1 and Table 2.1.1).

The number of employed people according to official statistics has continued to fall ever since independence. However, the official numbers of unemployed and hidden unemployed have also been falling, as has the unemployment rate (calculated as the combined ratio of unemployed and hidden unemployed compared to the working population), which is officially put at around 7% (1997). Concerning the background to this phenomenon, there has been a net outflow of the population and also the existence of employment in the informal sector and small enterprises which is not counted in official statistics.

Table 2.1.1 Key Macroeconomic Indicators, 1994-97

| | 1994 | 1995 | 1996 | 1997 ^{c/} |
|------------------------------------|-------|-------|-------|--------------------|
| GDP (million US\$) | 12.6 | 16.3 | 20.7 | 22.9 |
| Per Capita (US\$) | 757 | 985 | 1,252 | 1,385 |
| Real GDP growth rate (%) | -25.4 | -8.9 | 0.3 | 2.0 |
| Industry Value Added (% of GDP) | na | 23.5 | 21.3 | na |
| Agriculture Value Added (% of GDP) | na | 12.3 | 12.8 | na |
| Inflation (%) ^{a/} | 1,258 | 247 | 39.7 | 17.5 |
| Average Exchange Rate Tenge/US\$ | 35.5 | 61.7 | 71.0 | 75.0 |
| Real Interest rates ^{b/} | na | 13.2 | 7.6 | 15.6 |
| State Budget Deficit (% to GDP) | 3.9 | 3.6 | 2.8 | 2.8 |
| Export (million US\$) | 3,285 | 5,197 | 5,894 | 6,411 |
| Import (million US\$) | 4,205 | 5,419 | 6,296 | 6,995 |
| Trade Balance (million US\$) | -920 | -222 | -402 | -584 |

Note: a/ Based on consumer prices.

b/ Refinancing rates adjusted for inflation. Data for 1997 based on January to May information.

c/ Estimate.

Sources: Government of Kazakhstan, Centre for Economic Reform : also derived from National Bank of Kazakhstan and National Statistical Agency.

Exports are becoming more and more dependent on natural resources-related products. Centering around oil and gas, there has been a dramatic increase in exports of coal, copper, iron, tin and other mineral resources. At the same time, however, imports of capital goods and consumer goods have been increasing in line with the growth of overseas investment in oil-related industries, and as a result the current account deficit is growing. The capital balance surplus to offset this is composed of direct investment from overseas, trade finance, credit provision from overseas, and Eurobond issues. Two-thirds of direct investment from overseas is directed towards oil-related sectors and the iron and steel industry, but investment in the energy and telecommunications sectors has also been increasing in recent times.

2.2 Structural Reform

Price liberalization policies were implemented by 1995 in all parts of the economy except for state-owned sectors and the monopolized sectors of electric power, oil and gas pipelines and telecommunications, etc. In the same year progress was also seen in trade liberalization policies with the abolition of the import/export licensing system and export quota system for almost all products.

Privatization has been promoted over three phases since 1991. In the first phase (1991-92), control of companies was transferred to business managers and employees in the

agriculture, retailing and service sectors. In the second phase, differing forms of privatization (small-scale privatization, group privatization and individual privatization) were adopted largely according to the size of company work forces, and the privatization of agricultural complexes was also advanced. It is thought that small-scale privatization is almost complete, while progress is also being seen in the area of group privatization. Individual privatization, targeting large-scale key industries, is being advanced by transferring shares and drawing up business management consignment contracts with respect to overseas capital. As a result of these efforts, it is estimated that the private sector now accounts for 50% of GNP.

Reform of the financial system is still in progress. The financial authorities are currently implementing improvement of the settlement system, enhancement of bank supervision functions and setting of criteria for judging the soundness of commercial banks, and the number of commercial banks as of March 1997 had been reduced from approximately 200 to 76 (526 branches). More and more insurance companies, auditing corporations, consulting companies and lease companies are being established and, with the opening of the Kazakhstan Stock Exchange and Central Asian Stock Exchange, the capital market is falling into place.

The progress of industrial restructuring has been set in motion and started to show the changes in each sector. The percentage of manufacturing and agriculture sectors in the total production value were 27% and 29% in 1991 and went down to 20% and 11% in 1997 respectively. This ratio of other sector, mainly composed of service industry, had changed from 19% in 1991 to 37% in 1997.

2.3 Long Term Prospects

The economy of Kazakhstan in the short term is still faced with numerous issues concerning the restructuring of companies and the establishment of a legislative framework, however, when one considers the development of Kazakhstan's abundant hydrocarbon resources and mineral reserves and the influx of funds and technology from overseas to support such development, the medium to long term prospects for the economy are bright. Having said that, there is great concern that the said development of Kazakhstan's natural resources will impede growth of the industrial sector.

At the start of 1998, President Nazarbaev announced Kazakhstan 2030 - a package indicating prospects and targets for Kazakhstan in the long term. Of seven long term priority targets given in this speech, the third one was as follows: economic growth founded on a free market economy fueled by domestic savings and high level

investment from overseas. The purport of this is to minimize economic intervention by the government and achieve a situation whereby investment is attracted from overseas and private sector growth acts as the driving force behind the economy. In order to realize this, the period up to 2010 is designated as the first phase, during which time work will start on the promotion of labor-intensive industries. The industries targeted for promotion in order of priority are agriculture, timber and timber processing, light engineering, foodstuffs, tourism, house construction, and infrastructure development. It is envisaged that the promotion of such industries will not only lay the foundation for the national economy, but also contribute to reducing unemployment and overcoming poverty as well as securing operating funds for schools and hospitals and protecting society from corruption and crime.

3. CURRENT CONDITIONS OF MACHINERY INDUSTRY

3.1 Current Conditions of Machinery Industry

3.1.1 Long Term Development Program

In "Kazakhstan-2030(Long Term Development Program)" mentioned previously, the matters relating to this study are as follows;

1. inevitable implementation of strict monetary policy
2. completion of privatization
3. improvement of legislation which will universally improve the investment climate of the country
4. more active raising of foreign investment and providing detailed information
5. construction of gas pipeline
6. development of oil and gas
7. improving railway infrastructure
8. improving the facility of Astana(Akmola) airport

Furthermore they are intending to develop labor intensive industry, specially light industry and food industry preferentially, although there is no detailed proposal on machine-building industry. In addition the government will not touch the development strategies of individual enterprises, but will support the enterprises from the legal and legislative aspects. This approach can be appreciated from the viewpoint of the less government interference.

3.1.2 Short Term Development Program

Kazakhstan government announced short-term development plan "Action Program of the Republic of Kazakhstan for 1998-2000" setting the year 2000 as a goal in April 1998.

According to this plan, the industrial policy aims at "establishment of export oriented industries in utilizing domestic resources and technologies". For this purpose, it is intended to achieve the objective by the measures of promoting standardization corresponding to international level, introducing advanced technologies, establishing information system promoting direct investment, etc. In the sphere of machine-building and metal processing industries, it aims at "continuous and integrated production by co-operation production system which is necessary for the production of traditional and

import substitute products. Under this scheme, at first the defense industry having large scale production equipment, is converted to other sectors according to the national development plan". It further aims "to expand repair service industry and to plan the export of machinery and equipment".

As for light and food industry, "they plan to concentrate the relevant technologies necessary to produce end products from the stage of processing material. In order to produce the products which satisfy consumers' needs, advertisement and marketing activities are crucial. In the case of agriculture it intends to "accelerate reforms in the agricultural sector and increase social welfare of rural population". As to the policy for science and technology it aims that "priority is to be given to the promotion of science and technology, the competitiveness of which is to be increased for the development of Kazakhstan".

3.2 Machinery Industry Development Program

The Ministry of Energy, Industry and Trade and the Ministry of Sciences-Academy of Sciences of the Republic of Kazakhstan drafted jointly and reviewed with "The State Program of the Machinery Complex Development in the Republic of Kazakhstan" in February 1998.

According to this Program, oil and gas, agriculture, mining and metallurgy, food processing, and transport are stated as the key sectors. In the machinery sector, manufacturing of farm machinery has been given the highest priority. Tractor and agro-machinery building already has yearly base manufacturing plan. As for the mining machinery, wide range of products such as drilling and loading-hoisting machinery, self-propelled auxiliary equipment are to be developed. The manufacturing of railway rolling stock aims to implement its domestic production.

Although it is understood that the contents of this program (February 1998) will be further improved, the study team's opinion, at present, is as follows;

(1) Common subjects in each field

- The program is, so to speak, a short-term plan for the period 1998-2000 and in the future, a middle term plan will be necessary. Even if it is a short-term plan, it should be made bearing in mind the long-term view.
- Production quantity is shown in the plan, but its need is not identified.
- At present in Kazakhstan, outdated design capacity and lack of product development measures including use of quality inspection equipment, etc. are

evident. A scheme to analyse the present condition and plan basic measures for development should be established.

- Almost all main components depend are imported, but it is desirable to manufacture in the state to realise cost reduction.

(2) Comments on each field

Comments on the particular problems of each field are as follows;

| Field | Comment |
|---------------------------|---|
| Farm machinery | For tractors, the program focuses on a small type, but in order to solve the present supply shortage middle and long term targets for meeting the demand for medium and large types should be included in development plan. |
| Food processing machinery | The food type and quantities of machinery are not shown clearly and further concrete development should be studied. |
| Mining machinery | The loader production by two enterprises is not cost effective because the demand is small. Thus one enterprise is recommended to produce loader. |
| Railway rolling stock | Hitherto a program was made to start (or imitate) production of passenger cars, but it was changed to start production of freight wagons. The reason for this is not clear. |

3.3 Current Conditions of the Machinery Industry

(1) Production Trends

It is estimated that the share of GDP accounted for by the industrial sector is approximately 7%, and the share accounted for by the machinery manufacturing sector is 2% or less. Viewed in terms of output index, production throughout the overall industrial sector has been declining every year since 1990, and the level in 1996 had fallen to less than half the level in 1990. Particularly with respect to the machinery industry comprising agricultural machinery (tractors, etc.) and construction machinery manufacturing, etc., the output index has fallen to between 20-30% of 1990 levels (see Table 3.3.1).

Table 3.3.1 Output Index of Selected Industries, 1990-96

(1985=100)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Total of Industrial Sector | 116.9 | 115.5 | 97.9 | 83.9 | 60.1 | 52.1 | 48.7 |
| All Machinery | 110.7 | 113.4 | 94.9 | 81.0 | 50.9 | 36.8 | 34.4 |
| - Tractors and agr.mach. | 88.2 | 85.6 | 56.8 | 42.4 | 25.0 | 15.9 | 16.5 |
| - Construction machinery | 102.0 | 91.9 | 63.3 | 46.8 | 24.1 | 12.8 | 20.9 |
| Light and food industries | 171.1 | 186.8 | 178.2 | 109.2 | 148.4 | 92.9 | 69.0 |
| Energy | 131.5 | 200.4 | 139.5 | 135.6 | 123.4 | 72.4 | 76.2 |
| Metallurgy | 125.5 | 142.4 | 159.1 | 135.9 | 146.0 | 211.4 | 198.7 |
| Mining | 129.7 | 135.3 | 137.1 | 83.6 | 85.5 | 55.0 | 39.1 |
| Chemicals | 150.8 | 156.8 | 137.4 | 101.0 | 79.1 | 72.9 | 59.1 |
| Appliances | 131.3 | 143.4 | 123.6 | 119.2 | 74.9 | 56.6 | 58.2 |
| Transport vehicles | 108.6 | 126.8 | 104.7 | 58.0 | 36.5 | 34.7 | 37.7 |

Source: Ministry of Energy, Industry and Trade.

Looking at movements from 1993 in terms of value, railway rolling stock-related machinery and chemical plant parts have displayed major increases, however, production of agricultural machinery, which accounts for the largest share (60-70%) in the machinery manufacturing sector, has declined considerably (see Table 3.3.2).

Table 3.3.2 Output of Basic Machinery Products, 1990-96

(volume and value)

| | Units | 1990 | 1993 | 1994 | 1995 | 1996 |
|---|------------|-----------|---------|---------|---------|---------|
| Instruments and Spare Parts | '000 tons | 1,092,461 | 239,902 | 147,106 | 199,956 | 179,062 |
| Metallurgical Equip, of which | | | | | | |
| Metal cutting machines | units | 2,578 | 1,193 | 42,957 | 114 | na |
| Press-forging machines | units | 1,173 | 730 | 434 | 269 | 127 |
| Rolling Stock Machines | '000 tenge | 4,353,819 | 242,125 | 259,530 | 605,136 | 688,604 |
| Chemical Equip and Spare Parts | '000 tenge | 389,056 | 15,430 | 13,654 | 36,414 | 239,681 |
| Agricultural Machines, of which | | | | | | |
| Agricultural machinery | '000 tenge | 5,567,081 | 854,420 | 435,832 | 299,021 | 257,666 |
| Livestock and feed production machinery | '000 tenge | 3,637,553 | 402,371 | 156,648 | 154,332 | 80,323 |

Source: National Statistical Agency

It is thought that this decline in agricultural machinery production has been the result of falling demand for products brought about by stagnation of production activity in the agricultural sector and shortages of funds among farmers.

Concerning the increase in the value of railway rolling stock production, this is thought to have been brought about not by greater manufacture of rolling stock itself, but by

(2) Number of Companies and Regional Concentration

According to the Ministry of Energy, Industry and Trade, there are approximately 480 machinery manufacturing companies in Kazakhstan, of which approximately 200 are currently operating. Agricultural machinery-related companies are the most common and are thought to number approximately 120. Next, there are approximately 40 mining machinery companies, 20 railway rolling stock companies and 20 food processing machinery companies, but there are many companies which produce other than machinery.

Companies are widely located in major cities throughout the broad national area of Kazakhstan, but it is possible to identify the following areas of industrial concentration:

Astana (Akmola): Agricultural machinery, railway rolling stock

Pavlodar: Agricultural machinery, mining-related machinery

Almaty: Agricultural machinery, mining-related machinery, railway rolling stock

Ust-Kamenogorsk: Agricultural machinery, mining-related machinery

Petropavlosk: Agricultural machinery, mining-related machinery

Shimkent: Agricultural machinery

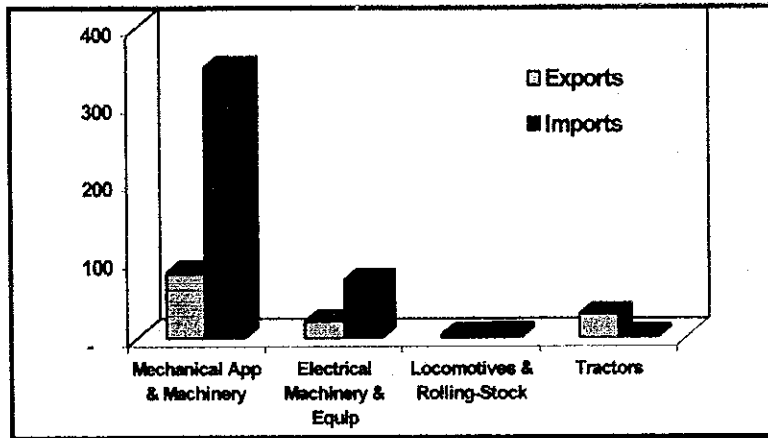
Kokushatau: Agricultural machinery

Karaganda: Agricultural machinery, mining-related machinery

(3) Import and Export Trends

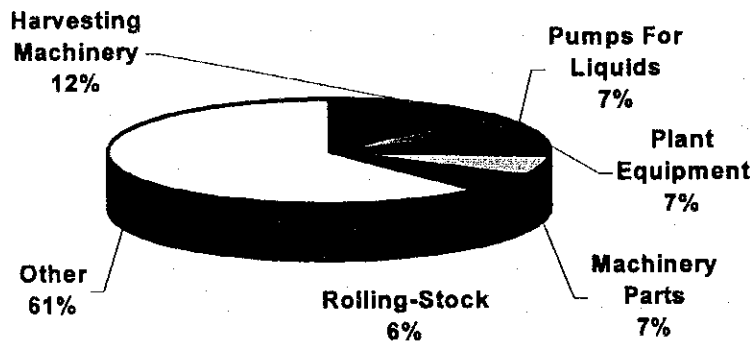
In terms of general trade trends, exports mainly consist of intermediate products and imports mainly consist of consumer goods. In the first quarter of 1997, exports and imports of machinery products accounted for US \$ 157 million and US \$ 798 million respectively, resulting in a deficit of US \$ 641 million in the machinery trade balance (see Fig. 3.3.1). Imports are basically relied on to provide machinery products, and if one looks at the products which are exported, these are limited to bearings, boilers, electrical machinery, tractors, rolling stock parts, and so on (see Fig. 3.3.3).

On the other hand, many different kinds of machinery are imported and the import share is particularly high with respect to harvesting and threshing machinery, liquid pumps, heating and cooking equipment, plant equipment, general machinery parts, and parts for locomotives and rolling stock, etc. (see Fig. 3.3.2).



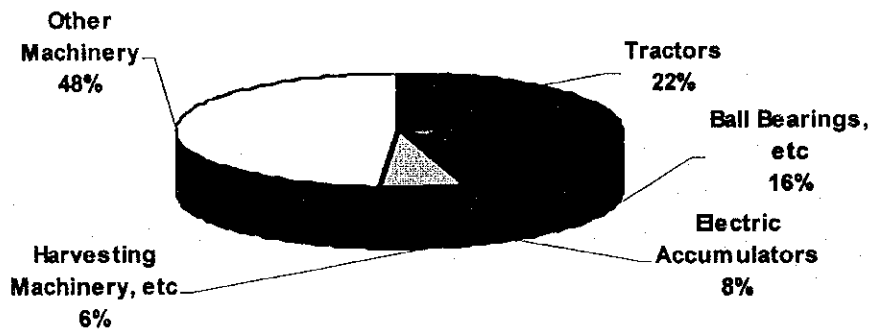
source: National Statistical Agency

Fig. 3.3.1 Trade of Machinery, 1997 (mill US\$)



source: National Statistical Agency

Fig. 3.3.2 Major Imports of Selected Machinery, 1997



source: National Statistical Agency

Fig. 3.3.3 Major Exports of Selected Machinery, 1997

3.4 Current Conditions of Selected Sectors

3.4.1 Farm Machinery

(1) Current Conditions of Agricultural Products and Cereals

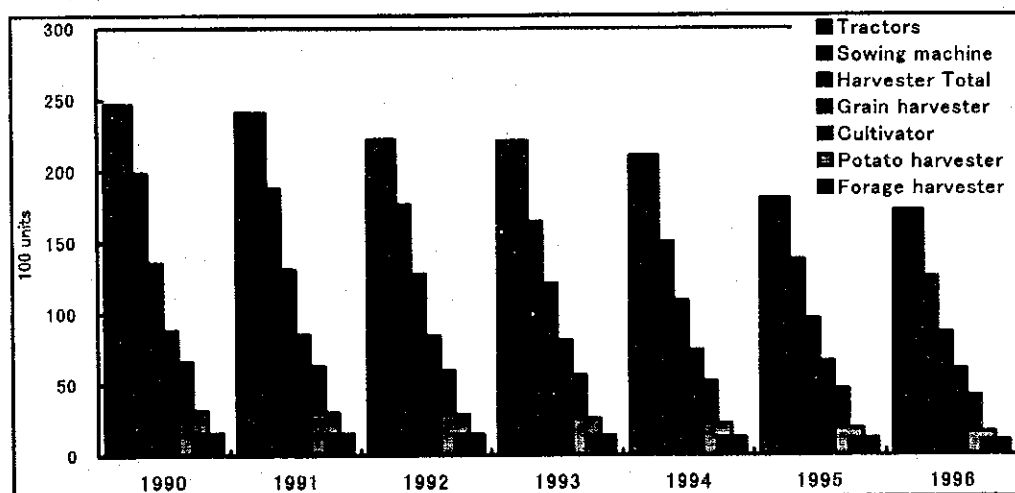
Agriculture in Kazakhstan is in deep crisis. Confronted with declining cultivated area and falling yields per unit of area, agricultural production fell by approximately half between 1990 and 1996. Taking the example of cereals production, this had fallen to approximately 40% of its 1990 level by 1996.

Since Kazakhstan previously exported between 60-70% of its agricultural production to the current Russia and other CIS countries, the decline in production has not led to any domestic shortages, however, farm machinery-related industries have been driven into a critical state.

A decline in the use of fertilizers brought about by the shortage of funds among agricultural producers is thought to be one reason for the fall in yields, however, other major factors are a shortage in the supply of appropriate cultivation machinery (large-scale machinery not produced domestically) and short service lives of machinery.

(2) Current Conditions of Agricultural Machinery

The number of farm machines owned by farmers is declining, as can be inferred from Fig. 3.4.1 and Table 3.4.1.



source: CIS committee on Statistics

Fig. 3.4.1 Ownership of Farm Machinery (1,000 units)

Direct causes for this situation are considered to be the declining service life of machinery caused by shortages of service parts, and the fall in machinery purchases

arising from lack of funds among farmers. In the era of Soviet control, new machinery was supplied irrespective of profitability in order to raise production by farmers, however, following independence, the demand for machinery has decreased because there are more farmers unable to make a profit and prices of agricultural machinery have gone up.

Table 3.4.1 Ownership of Farm Machinery (1,000 units)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Tractor | | | | | | | |
| Acquired | 23.2 | 19.0 | 17.7 | 8.4 | 0.6 | 0.5 | 0.5 |
| Scrapped | 29.1 | 24.9 | 36.7 | 9.3 | 10.7 | 30.1 | 9.9 |
| Available | 247.0 | 241.0 | 222.0 | 221.0 | 211.0 | 181.0 | 172.0 |
| Tractor | | | | | | | |
| Acquired | 7.1 | 5.7 | 7.3 | 3.3 | 0.0 | 0.1 | 0.5 |
| Scrapped | 11.5 | 8.1 | 8.9 | 6.2 | 7.1 | 7.6 | 6.4 |
| Available | 88.1 | 85.1 | 84.1 | 81.1 | 74.1 | 66.5 | 60.7 |
| Forage harvester | | | | | | | |
| Acquired | 1.7 | 1.5 | 0.7 | 0.7 | 0.5 | 0.3 | 0.1 |
| Scrapped | 1.9 | 1.9 | 1.0 | 1.8 | 1.9 | 1.6 | 1.5 |
| Available | 15.8 | 15.4 | 15.1 | 14.0 | 12.6 | 11.3 | 9.9 |
| Potato harvester | | | | | | | |
| Acquired | 4.0 | 3.8 | 0.9 | 0.9 | 0.4 | 0.2 | 0.1 |
| Scrapped | 5.4 | 5.2 | 2.5 | 4.0 | 4.0 | 3.5 | 2.9 |
| Available | 31.6 | 30.2 | 28.6 | 25.5 | 21.9 | 18.6 | 15.8 |
| Sowing machine | | | | | | | |
| Acquired | 16.8 | 11.9 | 5.8 | 2.6 | 1.7 | 0.6 | 1.5 |
| Scrapped | 26.3 | 22.6 | 17.4 | 14.7 | 16.1 | 13.0 | 13.9 |
| Available | 198.9 | 188.2 | 176.6 | 164.5 | 150.1 | 137.7 | 125.3 |
| Cultivator | | | | | | | |
| Acquired | 3.0 | 2.3 | 2.0 | 2.0 | 0.8 | 0.2 | 0.2 |
| Scrapped | 5.7 | 5.2 | 5.4 | 5.7 | 5.2 | 5.8 | 5.0 |
| Available | 66.2 | 63.3 | 59.9 | 56.3 | 51.9 | 46.3 | 41.6 |

Source : CIS Committee on Statistics

Tractors

Crawler type tractor and also Wheel type tractor are utilized in Kazakhstan. There is a doubt on the expansion of a future market in Kazakhstan. However, crawler and wheel type are predicted to coexist according to the nature of the soil and weather. The number of Wheel Type is accounted for 67% as shown in Table 3.4.2.

arising from lack of funds among farmers. In the era of Soviet control, new machinery was supplied irrespective of profitability in order to raise production by farmers, however, following independence, the demand for machinery has decreased because there are more farmers unable to make a profit and prices of agricultural machinery have gone up.

Table 3.4.1 Ownership of Farm Machinery (1,000 units)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| Tractors | | | | | | | |
| Acquired | 23.2 | 19.0 | 17.7 | 8.4 | 0.6 | 0.5 | 0.5 |
| Scrapped | 29.1 | 24.9 | 36.7 | 9.3 | 10.7 | 30.1 | 9.9 |
| Available | 247.0 | 241.0 | 222.0 | 221.0 | 211.0 | 181.0 | 172.0 |
| Grain harvester | | | | | | | |
| Acquired | 7.1 | 5.7 | 7.3 | 3.3 | 0.0 | 0.1 | 0.5 |
| Scrapped | 11.5 | 8.1 | 8.9 | 6.2 | 7.1 | 7.6 | 6.4 |
| Available | 88.1 | 85.1 | 84.1 | 81.1 | 74.1 | 66.5 | 60.7 |
| Forage harvester | | | | | | | |
| Acquired | 1.7 | 1.5 | 0.7 | 0.7 | 0.5 | 0.3 | 0.1 |
| Scrapped | 1.9 | 1.9 | 1.0 | 1.8 | 1.9 | 1.6 | 1.5 |
| Available | 15.8 | 15.4 | 15.1 | 14.0 | 12.6 | 11.3 | 9.9 |
| Potato harvester | | | | | | | |
| Acquired | 4.0 | 3.8 | 0.9 | 0.9 | 0.4 | 0.2 | 0.1 |
| Scrapped | 5.4 | 5.2 | 2.5 | 4.0 | 4.0 | 3.5 | 2.9 |
| Available | 31.6 | 30.2 | 28.6 | 25.5 | 21.9 | 18.6 | 15.8 |
| Sowing machine | | | | | | | |
| Acquired | 16.8 | 11.9 | 5.8 | 2.6 | 1.7 | 0.6 | 1.5 |
| Scrapped | 26.3 | 22.6 | 17.4 | 14.7 | 16.1 | 13.0 | 13.9 |
| Available | 198.9 | 188.2 | 176.6 | 164.5 | 150.1 | 137.7 | 125.3 |
| Cultivator | | | | | | | |
| Acquired | 3.0 | 2.3 | 2.0 | 2.0 | 0.8 | 0.2 | 0.2 |
| Scrapped | 5.7 | 5.2 | 5.4 | 5.7 | 5.2 | 5.8 | 5.0 |
| Available | 66.2 | 63.3 | 59.9 | 56.3 | 51.9 | 46.3 | 41.6 |

Source : CIS Committee on Statistics

Tractors

Crawler type tractor and also Wheel type tractor are utilized in Kazakhstan. There is a doubt on the expansion of a future market in Kazakhstan. However, crawler and wheel type are predicted to coexist according to the nature of the soil and weather. The number of Wheel Type is accounted for 67% as shown in Table 3.4.2.

Table 3.4.2 Stock of Tractors (1996year)

| Stock | | | |
|-----------------|---------------|--------|---------|
| Crawler Tractor | Wheel Tractor | | Total |
| | Total | K-700 | |
| 54,664 | 117,890 | 26,777 | 172,554 |
| 31.7% | 68.3% | 15.5% | 100% |

| Operational | | | |
|-----------------|---------------|--------|---------|
| Crawler Tractor | Wheel Tractor | | Total |
| | Total | K-700 | |
| 38,945 | 79,553 | 16,467 | 118,498 |
| 32.9% | 67.1% | 13.9% | 100.0% |

| Operational/Stock | | | |
|-------------------|-------|-------|-------|
| 71.2% | 67.5% | 61.5% | 68.7% |

Source: JSC Agromachine

Domestic production of tractor is only crawler type of DT-75 and takes about one third of the market of crawler type. Other Wheel type and crawler type tractor are imported from Russia and other CIS.

Combine harvesters

For the final process in the production of Wheat, Self propelled combine "Enisey" and some other kinds were supplied by Former Soviet Union (FSU). The satisfaction given, however, by these combines and their cost performance were generally low and the imports are now halted. In 1997, 650 units of US made combines were imported with the financial support of The Export-Import Bank of the United States.

(3) Product support network for farm machinery

The maintenance and service network of Machinery products in the FSU has collapsed and has no substitute network in Kazakhstan. Existing special maintenance networks scattered all over the country should be reorganized and a new maintenance and service network has to be restructured.

3.4.2 Agricultural Food Processing Industry

(1) Current conditions of food processing industry

In the Soviet Union era the plan of wheat production and processing was prepared by the central government. After independence, Kazakhstan government inherited all those roles together with the preparation of Yield forecasts for crops.

The loss of crops associated with storage, transportation, and processing is a considerably large amount.

Ministry of Agriculture once made a trial calculation that stated the loss of crops due to improper storage facilities reaches 30% of the total volume. To avoid the losses by storage and transportation problems, currently food processing facilities are tend to be downscaled and concentrated close to production areas.

The current conditions of the food processing industry for livestock products is similar to that of grain products. Although most livestock products greatly decreased by less than half the volume in 1990, the number of small-scale processing plants has increased.

(2) Current conditions of Food processing Machinery Industry

Food processing machinery is mainly imported from Germany, Italy, Turkey, and elsewhere. The detailed and/or processed data of Trade on these products has not been prepared in Kazakhstan.

Many food processors are farmers, who run the business as side job. Manufacturers of the food processing machinery also, usually, run their business as a side job and are closely tied to the local consumers. There are few food processing machinery makers specialized in this field and covering the market all over Kazakhstan market.

3.4.3 Mining Machinery

(1) Current condition of mineral resources

Kazakhstan has abundant mineral resources and played the part of raw materials supply base for the Soviet Union. Kazakhstan is a country rich in mineral resources, but their production which was decreasing before the collapse of the Soviet Union, has further deteriorated due to the unstable economy. The production of coal and iron ore in 1996 has fallen to 60% of the level in 1991.

Currently the operating rate of the facilities in most mines has decreased and renovations of these facilities has been hardly implemented.

(2) Current conditions of Mining Machinery Industry

Most of the mines are currently operated by foreign entities. Those entities procure high quality machinery from overseas and domestic procurements are limited to items such as selector machines, certain stationary machines and supplemental parts. Therefore the decreasing output of mining machinery is even larger than that of mineral resources.

Compared to imported Mining machinery, Kazakhstan has the advantage in its sales price, (said to be 20 to 30% cheaper) but has disadvantage in its quality. The price competitiveness is gained due to the lower procurement cost of material and oil. However, the recovery of the production level of mining machinery seems difficult unless there is considerable improvement in its quality.

Major parts and components are imported and the Export Import ratio of these goods including supplementary parts is 5 to 1.

3.4.4 Rolling Stock

(1) Rolling stock industry

Central Asian Countries are blessed with abundant underground resources such as petroleum, natural gas, coal, iron ore, rare metals, etc. In former Soviet Union days, they have been the bases to mine and supply such resources and their railways have carried out an important role for transporting such resources to processing and consuming centers. Railways and roads have big transport capacity, but almost all of goods have been transported by railway, because of long transport distance, bad road maintenance and ice road in winter. In Kazakhstan, 95~98% of freight transport has been carried by railway and railway rolling stock is carrying out an important role.

(2) KTZ rolling stock plan

1) Current conditions of rolling stock and comments

The percentage of rolling stock as at December 1996, having age of more than 2 years old, is 32% for EL, 24% for DL, 29% for PC and 48% for SDL, and that, having age of more than 16 years old, is 58% for FC. It is urgent that many EL and DL should be replaced by 2010, assuming that their life is 30 years, because their age is concentrated to 11 to 20 years old, namely 50% for EL and 71% for DL. SDL is superannuated, but it may be permissible to use overage DL for a while.

2) Rolling stock plan:

The original rolling stock holding plan of KTZ does not include the replenishments due to the present financial problem, but the abolishment and replenishment plan stated Table 3.4.3 is the case which includes replenishment.

Table 3.4.3 Condemn and Supply Plan

| | 2000 | | | | 2005 | | | 2010 | | |
|-----|---------|-----------|---------|--------|-----------|---------|--------|-----------|---------|--------|
| | Holding | Necessary | Condemn | Supply | Necessary | Condemn | Supply | Necessary | Condemn | Supply |
| EL | 592 | 499 | 60 | 0 | 520 | 94 | 22 | 653 | 94 | 227 |
| DL | 553 | 560 | 886 | 7 | 720 | 242 | 402 | 893 | 240 | 413 |
| PC | 1,835 | 3,160 | 510 | 1,325 | 3,625 | 325 | 790 | 4,090 | 325 | 790 |
| FC | 80,610 | 75,180 | 18,290 | 0 | 88,690 | 20,450 | 28,530 | 102,200 | 20,450 | 33,960 |
| SDL | 459 | 517 | 216 | 58 | 533 | 276 | 292 | 550 | 150 | 167 |

Assuming the standard number of each type of holding rolling stock as 100 in 1996, the necessary numbers of each type in 2010 are EL:100, DL:62, PC:174, FC:103, and SDL:81.

(3) Construction of new rail way rolling stock and maintenance

- 1) There is no rolling stock manufacturing company in Kazakhstan and rolling stock is procured from CIS countries and other foreign countries. As for local manufacture of PC for which constant demand is expected hereafter and which manufacture is comparatively easy, the workshop construction plan is under study. In future, the production of subway cars, streetcars and freight cars in the workshop is also considered. There are two alternatives for new PC manufacture workshop construction plan. The one is directed by Ministry of Energy, Industry and Trade, Ministry of Science, and Science Academy, constructing the workshop in Petropavlovsk where former military industry plants concentrate and is near Russia. The other is directed by Ministry of Transportation and Communications and KTZ, constructing the workshop capable to manufacture more than 100~150 PCs per year in the site of Rysty-AECRW in Almaty which is now conducting heavy repair of PC.
- 2) Kazakhstan has rich underground resources. It is thought that export of fuel such as natural gas and petroleum is very important for restructuring of Kazakhstan economy. The railway as a mass freight transport means in the inland country must carry out an important role. Then, remodelling work to tank wagon from surplus open type wagon is carried out in DZMK in Taraz which is a construction machinery builder. The construction of new FC manufacture workshop is under consideration also.
- 3) According to the demand forecast of EBRD in 1997, there is a need of 175 new PCs annually.

(4) Maintenance of rail way rolling stock

- 1) Inspection, maintenance and repair except heavy repair are carried out in the depots of KTZ. The heavy repair of PC is carried out in a local private repair company, and now, in order to increase capacity of PC heavy repair, new workshop is under construction in the site of PC Depot by the OECF loan.
- 2) In case a private company carries out heavy repair of the former Soviet Union make rolling stock, the company must have the license of Russian Ministry of Railway.
- 3) According to the result of PC heavy repair entrusted to Russia, the cost is 134 to 266% higher than that in Kazakhstan. Besides, it takes 16 to 20 round trip days for transportation, causing useless inventory increase of PCs.
- 4) The EL, DL, PC and FC depots of KTZ are very vigorous. The working floor is very clean. The equipment and parts on hand are well arranged. The maintenance manual is well done.

(5) Railway rolling stock spare parts

- 1) As for production and maintenance of spare parts for Russian make rolling stock, which passes through Russian territory, the license of the Russian Ministry of Railway is needed. As for East Germany make PC, the license is given at the time of the procurement. Actually, most rolling stock spare parts, especially important one, are procured from Russia and CIS countries and from Germany for PC.
- 2) As for other important spare parts of rolling stock, there are bearing and battery makers in Kazakhstan.
- 3) In the private heavy repair shop and KTZ depots, shortage of spare parts is observed sometimes.

(6) Current problems

The current problems described in the above items are summarized as follows.

- 1) It is anxious that many EL and DL are to be replaced in before and after 2010.
- 2) Two alternatives on new PC manufacture workshop construction plan should be settled to one.
- 3) Rolling stock heavy repair, including that of EL, DL and EC, should be carried out in Kazakhstan, from view points of repair cost reduction, necessary number reduction and future development of rolling stock.

- 4) Railway rolling stock spare parts should be locally produced as much as possible, from view points of elimination of spare parts shortage problem and saving of valuable foreign currency.

3.4.5 Common Problems in Key Sectors

From the result of company interview survey, common problems in key sectors are summarized as follows.

(1) Lack of proper production system and production technology

The existing large lot production system which provide single purpose machinery does not correspond to the recent slump of machinery production level. At this moment it seems difficult to expect a drastic shift of the large lot production system to small lot production system that has flexibility to the change of market needs.

Most of the enterprises have integrated production system, which let them to have similar production facilities by each. This derogates the cost competitiveness as whole Industry.

Product quality is lower than industrialized countries'. There should recognition and information problem regarding the importance of quality control such as external appearance quality and precise parts.

(2) Lack of marketing capability and information

Because it was not necessary to carry out marketing by himself in the environment of the planned capitalism in Soviet Union era, all large corporations lack the marketing ability. To correspond to market needs, the construction of sales network, service organizations and the improvement of merchandise development etc. are necessary.

(3) Shortage of Funds

Factory operating rates plummeted due to collapse of product supply systems, and financial conditions have remained poor ever since. Less than 50% of trading is done in cash and there are some companies which conduct 70-80% of transactions by barter trading, and this makes it difficult for companies to raise operating capital. The securing of capital sources is an issue that requires urgent attention.

(4) Lack of marketing capability

Most of top management staff of companies were senior officials in the former Soviet

Union and they lack management knowledge under the free market system. Many companies are faced with difficulty of management due to unbalance between over-capacity of equipment and reduction of production. Facility and equipment restructuring, product development, technology upgrading and management reinforcement are all essential to overcome the financial crisis.

Long-term management plan should be prepared and the top management staff should strongly strive to realize the plan.

(5) Dual System of VAT (Value Added Tax)

During the company visits, many owners pointed to the dual system of VAT taxation as a problem since this raises product prices and adversely affects competitiveness. This is also said to be one of the factors that encourages barter trading.

(6) Inadequacy of Accounting Methods

International accounting standards have been introduced, however, these are not put into practice. Depreciation is not properly considered when assessing the value of equipment and facilities, which means that book values are too high, in turn making it appear that losses are incurred when selling off or scrapping such equipment and facilities. As a result, little progress is made even in disposing of equipment and facilities that are not used in production.

Part II : Master Plan

4. BASIC PLAN FOR MACHINERY INDUSTRY PROMOTION

In this chapter, basic issues in the drafting of the machinery industry promotion plan are raised and the general direction that should be taken is recommended.

4.1 Basic Issues for Promotion

The following problems and issues can be pointed out from analyzing current conditions in the machinery industry.

1. **Surplus equipment and facilities:**
It is necessary to carry out the appropriate downsizing of companies through disposal of surplus equipment and facilities by selling and scrapping, etc.
2. **Slow response of development and production system to the market economy:**
It is necessary to build market-oriented production system through collecting and analyzing market information and compiling product development plans, etc.
3. **Inefficiency of the complete cycle of production system:**
It is necessary to improve quality and cost competitiveness through carrying out specialization of production system and production of a similar product.
4. **Lack of international competitiveness in terms of technology and sales capacity:**
It is necessary to introduce technology and secure access to markets through promoting tie-ups with international groups
5. **Inadequacy of the government support setup:**
It is necessary to improve legislation and develop support functions for the machinery industry promotion by the government

General directions for each subject are recommended in the following section.

4.2 Appropriate Sizing of Companies

4.2.1 Downsizing through Disposal of Surplus Equipment and Facilities

The restructuring of the machinery industry in Kazakhstan has already begun, however, it has been confirmed that many problems still need to be recognized for the sake of future development. It is essential that companies first become aware of the existence of the following problems:

- The scale of production is too large with respect to real demand in the economy.
- The scale of production at many companies is highly inefficient in terms of both technology and economy.

(1) Necessity of Surplus Equipment and Facilities Disposal

The company visit surveys found the operating rate of equipment at more than 90% of machinery manufacturers to be 20% or less, leading to the conclusion that most equipment and facilities are surplus to requirements. Moreover, since these equipment and facilities are old (installed 30-40 years' ago), they are not capable of producing products suited to modern markets. In other words, it is not possible for companies to produce marketable products and achieve efficient production activities with the equipment and facilities they currently possess.

Moreover, when companies hold on to surplus equipment and facilities within production plant sites, numerous problems are generated such as wasteful equipment maintenance, losses incurred through unnecessary power and heating costs, inefficient production line composition, and so on.

In order to vitalize the machinery industry, drastic reform involving the liquidation and downsizing of existing surplus equipment and facilities should be advanced, thus enabling the establishment of production system that are more geared to the market.

(2) Problems due to Inappropriate Accounting Practices

On balance sheets, the valuation of equipment and facilities is a major problem. International Accounting Criteria were officially introduced to Kazakhstan in 1997, however, guidelines necessary for the execution of these have not been set. In the International Accounting Criteria, it is general for the value of assets to be assessed after depreciation is subtracted from the investment cost, however, depreciation is not treated in the appropriate manner at the moment. Consequently, equipment and facilities are clearly overvalued and almost all equipment and facilities can only be sold off at a fraction of their book value. As a result of this method of accounting, companies are unwilling to sell off equipment and facilities because it will lead to losses. If the International Accounting Criteria had been properly applied, companies would have given their assets a lower valuation and the actual losses incurred through assets disposal would be smaller.

4.2.2 Promotion of Streamlining

In the market economy, it is inevitable that companies with low productivity are weeded out and become bankrupt, and it is this unforgiving market environment above all which promotes healthy business.

(1) Bankruptcy Criteria Necessary for Corporate Streamlining

The techniques used by numerous countries to streamline their economies are varied, but bankruptcy is an important means of liquidating companies that have become inoperable. Similarly, the existence of legislation that allows companies where reconstruction is not viable to quickly push through bankruptcy proceedings is an important element of market economy promotion. This motivates business owners to reform their thinking and encourages them to consider methods of company reconstruction before having to take legal bankruptcy proceedings.

(2) Benefits of Liquidation

Liquidation is an effective means of improving areas of the economy that suffer from stagnation. Liquidation has the following two effects when seen from the viewpoint of future economic prospects:

- Assets which currently lie idle due to company bankruptcy can be restored to productive activities.
- In some cases bankruptcy can lead to an improvement in the liquidity of creditors.

Ordinarily, the first step in bankruptcy proceedings involves the sale by tender of all or some of a company's assets to healthy business owners. An effective way of performing this is to transfer the profitable areas of a bankrupt company to other companies in the same sector. The tender process serves to identify, via the market, areas of a company that are of value and also determines the value of such assets. The determined value of assets is probably less than what the bankrupt company originally invested, but this is an important system for future streamlining.

4.3 Necessity of Market-oriented Production System and Market Analysis

(1) Roles of Companies

As the market economy becomes more firmly established, the roles of individual companies become clearer. Consumer demand not only alters the size of markets, but also leads to the production of products that are more suited to markets. Accordingly, it is necessary for market research to confirm not only market size but also changes in consumer tastes. Companies need to consider what kind of new products to develop and revise their production system so that they are responsive to market change. In order for each individual company to survive, it is necessary for each to increase competitiveness

through conducting market research and strengthening product development functions. Market research is a basic item that should be implemented by companies themselves, but judging from current conditions in Kazakhstan it is necessary for the government to support the collection and provision of information.

(2) Lack of Market Information

The economy of Kazakhstan is in a process of transition and the business environment necessary for conducting the following kind of market analysis is not in place.

- Economic structural reform is proceeding too quickly, making it very difficult to estimate the demand for certain products.
- There is an extreme shortage of basic economic statistical data (for example, annual production volumes and amount by product, domestic consumption, exports, etc.).

(3) Necessity of a Market Information Centre

Companies in Kazakhstan are lacking in information analysis capability and are not able to develop such capability overnight. In this period of transition (which will probably continue for another 10 years), it is necessary for the government to conduct analysis based on problems that are common to many machinery manufacturers. The Machinery Industry Information Center, which is recommended in Chapter 5, should make a start on conducting market analysis and providing the information it gathers to companies.

4.4 Transition to Specialised Production System

The manufacturing system of the Soviet era was typified by the complete cycle of production, which was suited to the centrally planned economy and philosophy of self-sufficiency that was adhered to at that time. However, as a result of this policy, although it was possible to exert comprehensive control over all production processes, the ability of individual companies to improve quality and minimize costs was reduced.

(1) Promotion of the Separation and Specialization

It is necessary to bring production in Kazakhstan up to international standards by dividing and specializing the system of the complete cycle of production that is still so prevalent. Companies should be converted into specialist suppliers of parts. In the market economies of advanced countries, because of the need to raise competitiveness through advancing quality improvement and cost reduction, the development of

specialized makers of specific parts was promoted. Such specialization of production is also necessary to promote tie-ups between local companies and international corporate groups. Specialized manufacturers can be established from the divisions of existing corporations.

Major corporations should concentrate efforts into the development, assembly and quality assurance of final products, while at the same time fostering small and medium subcontractors that specialize in the supply of machine processing, sheeting and casting (cast iron, cast steel, non-ferric alloys) services.

(2) Effect of Specialization

1) Technology Improvement

Specialization enables component and part manufacturers to concentrate more efforts into technical development and production technology and allows them to make quick improvements to the quality of key machine parts. Even in advanced industrial nations, improvements in the manufacture of machine parts are an important factor in improving the quality of final products.

2) Cost Reduction and Quality Improvement as a Result of Specialization

Specialization is an item worthy of consideration since it enables the achievement of appropriate economy scale and introduction of high level technology. Since orders are received from a number of companies, it becomes possible to establish small lot production system and improve equipment operating rates. Specialization also enables processing technology to be advanced, costs to be reduced, and quality to be improved.

4.5 Tie-ups with International Corporate Groups

In the State Program of the Machinery Complex Development in the Republic of Kazakhstan for 1998-2000 prepared by the Kazakhstan side, the target is the development of final products. In this report, it is stated that a strategy for localizing the production of key products and enabling the machinery industry to gain access to international markets in the medium to long term. Specific measures for the achievement of these priority objectives are described in Chapter 6.

This section describes the importance of conducting tie-ups with international corporate groups in promoting the development and localization of key products.

4.5.1 Removal of Borders in the Machinery Industry

The past 20-30 years have witnessed massive cross-border integration in many sectors of the machinery industry throughout the world. Rather than the pursuit of economies of scale in production processes, such developments have been spurred by the pursuit of technical development.

In the past 20 years, production systems have been improved even more and it has become possible to economically conduct small lot production and produce a number of models on single production lines. Competition between companies has become more intense and the competitiveness of companies now depends on their ability produce quality products at a low cost. As a result, companies have sought to promote cross-border mergers in order to obtain new design and development technology and consequently limit the costs that are incurred by the need to conduct new design and development.

The markets for products such as automobiles, harvesters and tractors are dominated by international corporate groups. One of the strengths of such groups is that they are immediately able to issue a specialist response to special situations where production to order is required in line with local conditions. Moreover, since manufacturers in advanced countries belong to cross-border corporate groups, they have an advantage in terms of economies of scale.

4.5.2 Strategy for Gaining Access to International Markets

(1) Competitiveness

The machine parts market is subject to severe price competition, however, if companies are able to improve their technical capability enough to reduce unit costs and achieve an ideal sales turnover, they should be able to secure ample competitiveness. In Kazakhstan, since costs of labor, raw materials and power are low, companies are in an environment where they should be able to become price competitive, even granting for disadvantages such as high transportation costs.

(2) Entry to International Markets

There are two ways for components and parts makers to gain entry to international markets.

- 1) Tie-ups with international corporate groups:

In this case, domestic companies conduct tie-ups with international corporate groups to which they already supply specific components and parts. Such groups are always looking for new low cost production centers in order to secure profits in industrial sector markets, where price competition is fierce.

International corporate groups also provide technical support needed to standardize quality control, and they make it possible for member companies to utilize worldwide marketing networks and brand names.

2) Independent market development:

In this case, since companies need to establish their own marketing departments and conduct quality improvement by themselves, large costs are incurred. Moreover, companies need to possess the financial capacity to acquire certification under international standards (ISO 9000, etc.) and require enough funds to comply with assessment processes required by international agencies. This method requires a lot of time and, although it may eventually guarantee higher gross profits, it does not lead to increased net profits. Accordingly, this method proves to be more expensive than joining with worldwide corporate groups that are able to minimize unit marketing costs.

To sum up, in order to promote the machinery industry in Kazakhstan, access to international markets should be pursued through promoting tie-ups with international corporate groups.

4.6 Role of the Government in Machinery Industry Promotion

It is necessary for the government to provide the necessary environment for promotion of the machinery industry in the manner described below.

4.6.1 Improvement of Legislation and the Business Environment

(1) Improvement of Barter Trading

As is the case in other CIS republics, transition to the market economy in Kazakhstan is behind schedule. The problem, as any business owner is quick to point out, is the existence of barter trading. Barter trading is conducted as a countermeasure against VAT (dual taxation), but it leads to a shortage of funds among companies. Since barter trading forces companies to act more like small-scale trading companies, they are unable to concentrate on their inherent corporate activities. The problem of dual VAT taxation should be resolved in order to encourage more cash trading.

(2) Improvement of Transparency and Trust

One legacy of the old system in Kazakhstan is a preponderance of secrecy in business dealings. Moreover, there are frequent cases where company information, etc. is not generally disclosed. Until the environment surrounding companies can be normalized, these conditions make it difficult to conduct business in the long term. In order to conduct business dealings in a market economy environment, it is necessary for a relationship of trust to be established between investors and companies, and for reliable information on company and financial affairs, etc. to be openly available.

(3) Other Subjects for Improvement

In addition to the above, the government needs to improve the VAT application system to encourage price competition between products, improve liquidity to raise the fund raising capacity of companies, and rationalize procedures for receiving international support and promoting investment by (and tie-ups with) foreign companies. Specific measures for achieving these goals are described in Chapter 5.

4.6.2 Development of Functions for Machinery Industry Promotion

(1) Development Issues

1) Strengthening of Marketing

Since the centrally planned economy eliminated marketing and competition, companies in Kazakhstan exist in a totally different environment from their foreign counterparts which have developed in market economies. Many companies have scant marketing information and do not possess basic data relating to consumer characteristics, competition and demand.

For this reason, it is necessary to strengthen the marketing and development capacity of companies in Kazakhstan.

2) Improvement of Management Technology

In the absence of any competition up until now, the management technology of companies has failed to develop and this is an area which needs to be immediately remedied if companies are to survive in competitive markets.

The following kind of problems can be pointed out in many companies.

- Management technology is extremely old fashioned and there is no understanding of the importance of financial management. Budget systems are based around cost

consciousness and there is little awareness of the need for management technology that centers on profit.

- Companies underestimate the importance of quality. Basic thinking regarding quality and quality control technology are both at a low level.

3) Improvement of Production Technology

- Equipment and facilities at almost all plants were constructed without any planning in accordance with outdated designs instructed by research institutes in Moscow. Such plants are unable to immediately adopt process designs that comply with market demands.
- Production systems and equipment are outdated and need to be replaced with modern systems and equipment.
- Production systems are still based around mass production of single items and are in need of readjustment. In order to convert these into smaller, more economic systems capable of rapidly switching between different products, it is necessary to start from the education of production engineers.

(2) Countermeasures

Since it will be difficult for companies alone to implement these countermeasures, strong support from the government is required.

In resolving the above-mentioned issues, the government should support companies through developing the following functions.

1. Objective: Encourage mutual cooperation between business owners and create opportunities for learning
Strategy: Build cooperative system between companies and between the public and private sectors through developing industrial groups
2. Objective: Transition to market-oriented company management systems
Strategy: Enhance functions for the collection and provision of market and industry information
3. Objective: Fostering of company business management capability
Strategy: Enhance management technology and marketing education functions
4. Objective: Improvement of production technology
Strategy: Support testing and research and enhance production technology and skill training and education

In developing these functions, it is necessary to designate an agency with main responsibility for each function. Moreover, the Industrial Department of the MOEIT,

which oversees the machinery industry in general, should support the implementation of functional development for promoting the machinery industry as a whole.

In specific terms, the Industrial Department of the MOEIT should have the following responsibilities. Needless to say, in order for the Industrial Department to assume such responsibilities, it will be necessary to carry out organizational expansion involving the allocation of a proper budget and securing of competent human resources, etc.

1. Support for each promotion agency in the drafting of specific implementation plans
2. Information exchange with each promotion agency, particularly the provision of information concerning legislative and policy matters
3. Attraction of investment and support of technical tie-ups with international corporations
4. Introduction of the activities of each promotion agency to companies, and encouragement of company participation in training activities

The action plan for the machinery industry promotion is indicated in Chapter 5.