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

March, 1999

THE MATERIALS PROCESS TECHNOLOGY CENTER

YACHIYO ENGINEERING CO., LTD.

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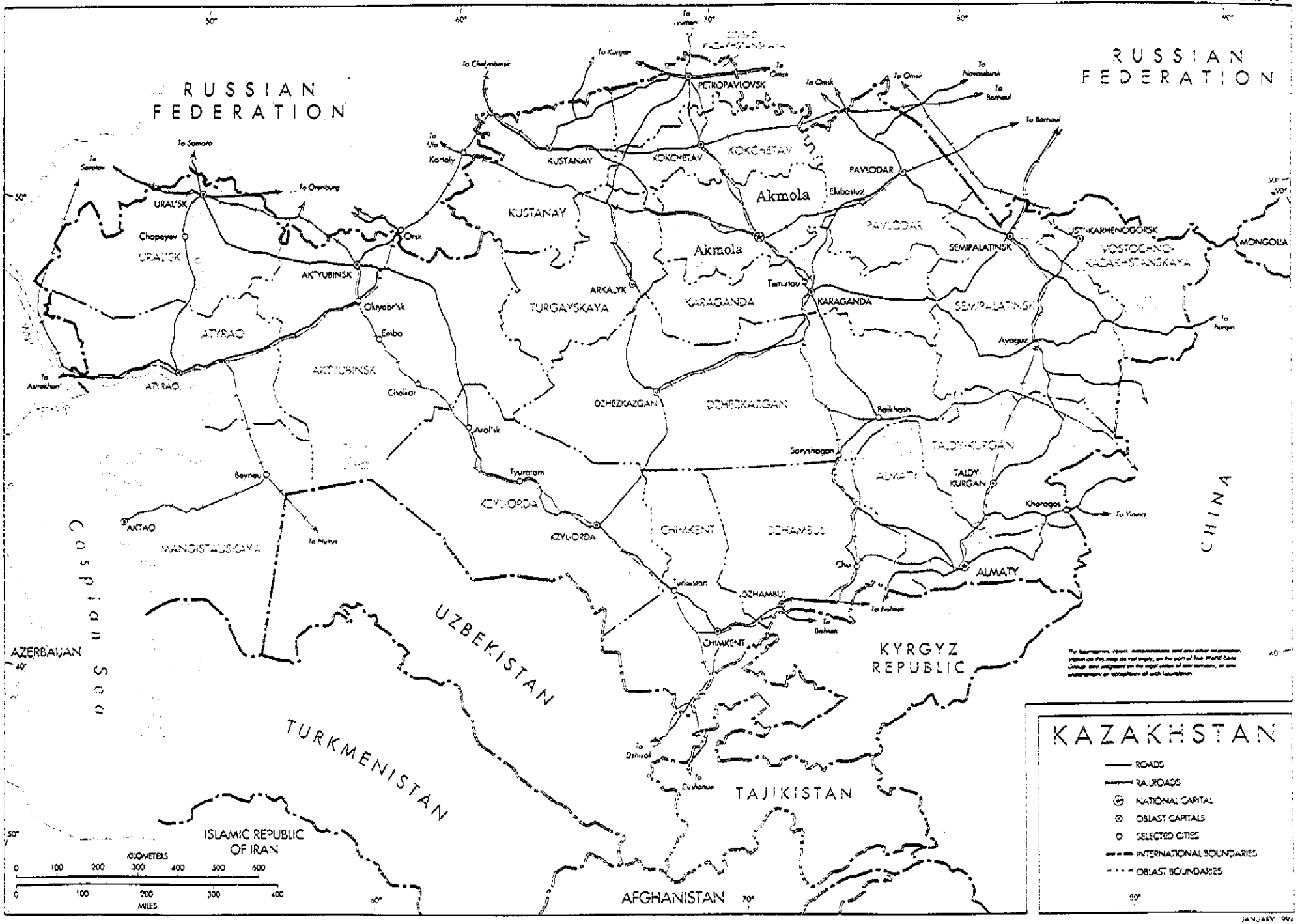
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MILES
JANUARY 1994

PREFACE

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).

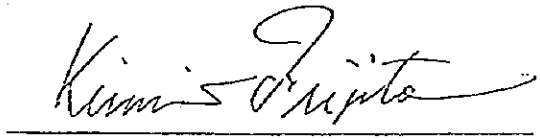
JICA sent to Kazakhstan a study team headed by Mr. Teruhiko Wakabayashi, The Materials Process Technology Center, and organized by The Materials Process Technology Center and Yachiyo Engineering Co., Ltd. from November 1997 to March 1999.

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

Part II: Master Plan

Part III: Action Plan

List of Figures

List of Tables

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
OECF	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
MTS	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 stated 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 rolles 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.

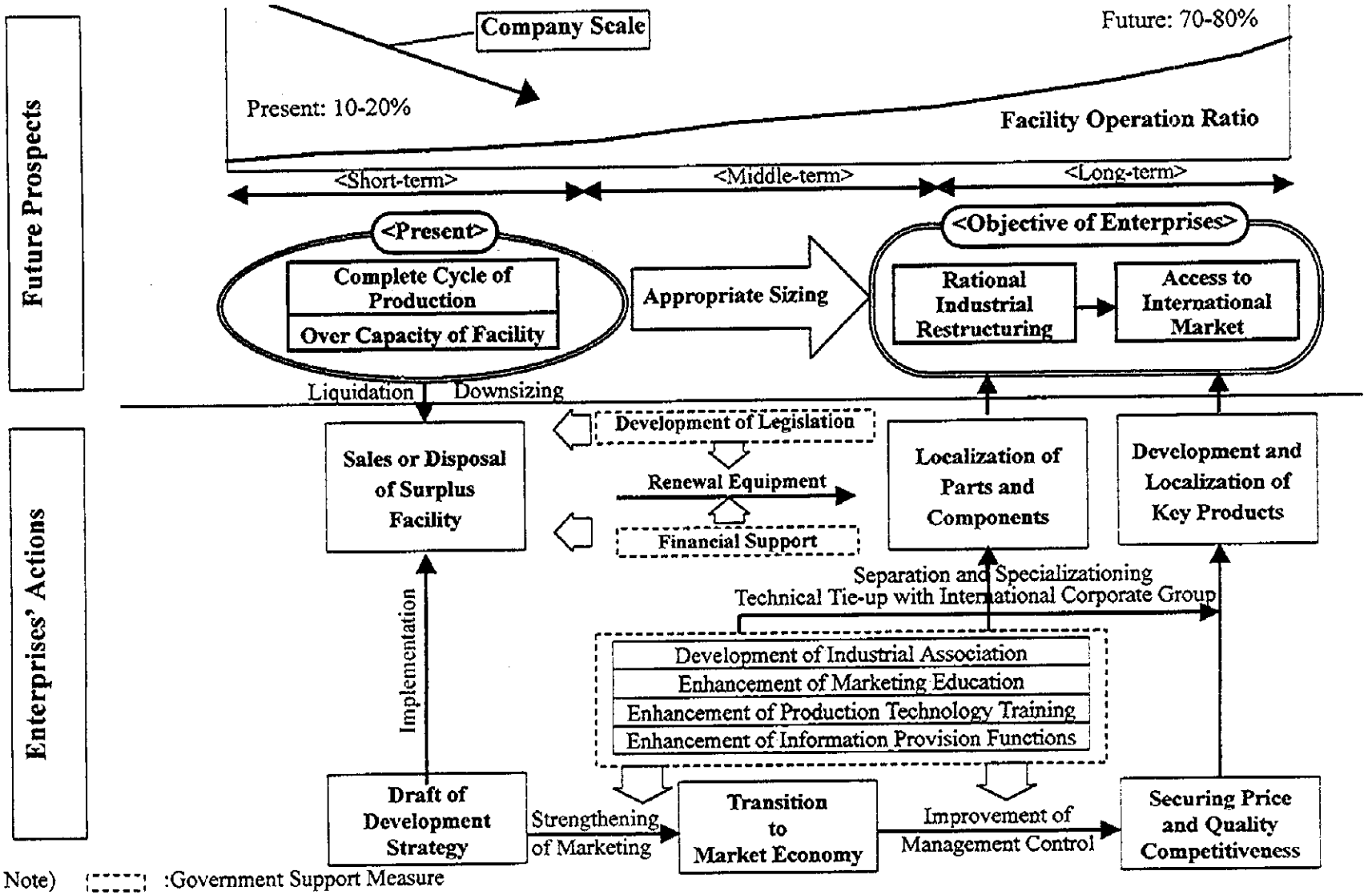


Fig. 0.0.1 General Vision of Master Plan for Machinery Industry Promotion

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.

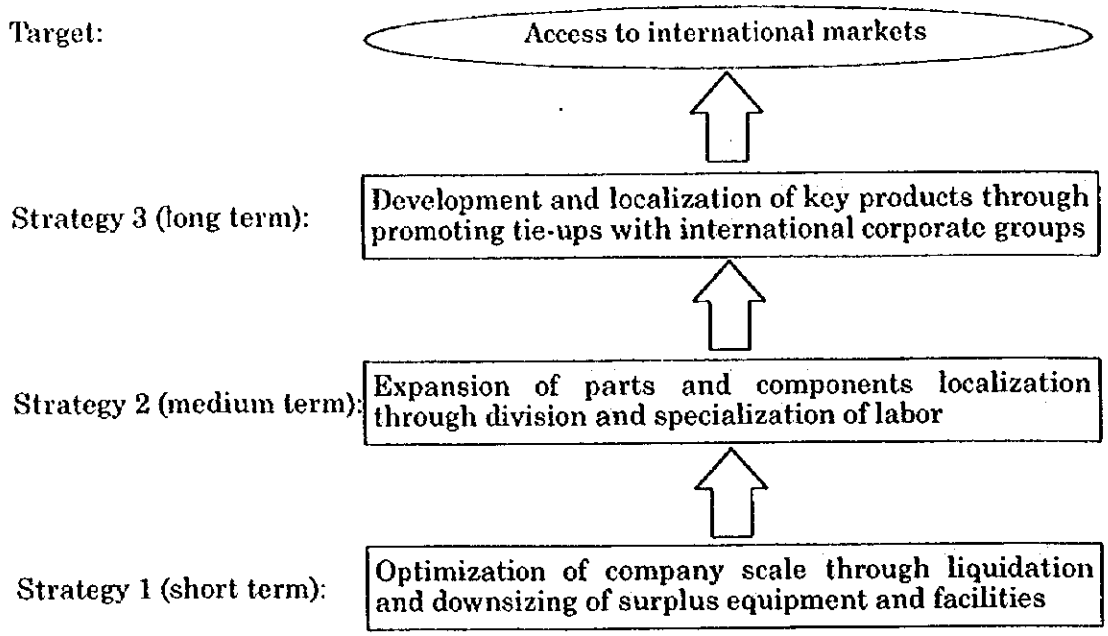
It is essential for the machinery industry in the new market economic environment to be competitive in terms of product quality and prices, etc. in international markets.

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.



[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 National Plans

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, 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 Industrial 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

The economy of Kazakhstan suffered a major blow as a result of the collapse of economic planning under the former Soviet Union. Following independence, Kazakhstan has implemented reform policies designed to promote transition to a market economy and various measures have been taken with a view to controlling inflation, reducing the budget deficit, liberalizing trade, improving the investment environment, reforming financial systems, promoting privatization and developing the legislative setup. Although these measures have been successful in some areas such as reducing inflation and stabilizing the exchange rate, numerous problems exist in terms of policy management and a new problem has emerged in that domestic industries are now in decline as a result of the liberalization of trade.

The economy has displayed signs of recovery since 1996, but the slump in the chemical, machinery and metal working, pulp and paper, and building material, etc. on the other hand, foodstuffs, iron and metallurgy, oil and gas, and light industry continued unabated in 1997. Concerning reasons for this situation, many companies in these sectors are almost bankrupt and are faced with problems such as insolvency and non-payment of wages; moreover, the products made by such companies are not domestically competitive in terms of quality and price and the companies themselves lack retailing capacity.

Gross Domestic Product: After the GDP of Kazakhstan fell by half between 1993 and 1995, it displayed a slight recovery from 1996. In 1997, production in the foodstuffs, iron and metallurgy and gas sectors increased by 20% or more, however, production in the chemicals, machinery and metal processing sectors fell by 30%. Due to change of industrial structure, share of industrial sector went down to 11% in 1977 from 29% in 1991.

Inflation: This stood at 1,258% in 1994, but had been brought down to about 10-20% by 1997.

National budget: State finances continue to show a deficit. Having said that, by 1996 the budget deficit had been reduced and accounted for 2.8% of the GDP.

Trade: As a result of trade liberalization, the abolition of tariffs on numerous products and the establishment of special economic zones, etc., trade has been increasing every year. The trade balance shows a slight deficit. Kazakhstan places high reliance on Russia as an export destination. Major exports are mineral resources such as oil, gas, coal, iron and copper, etc., while major imports are consumer goods, industrial machinery and transportation machinery.

Labor situation: In 1996 the number of employed persons was approximately 4,400,000, of which approximately 40% were employed in the industrial and agricultural sectors. There are large numbers of hidden unemployed, but the officially given unemployment rate in 1997 was roughly 7%.

Foreign investment: Approximately 80% of foreign investment goes to the iron, non-ferric metals, oil, gas and energy sectors, while another 13% goes to agriculture and construction. Foreign investors have pointed to problems such as a lack of transparency and reliability in tender and other proceedings, insufficient legislative and institutional development, and inadequate disclosure by companies regarding the investment environment in Kazakhstan. The government has designated priority investment sectors both domestically and externally; for example, in the area of machinery and parts, priority is given to light industry and foodstaffs. The processing industry attracts only 2% of all foreign investment.

Privatization: Since 1991, as a result of efforts to promote privatization through selling off companies and state-owned assets, the private sector has come to account for approximately 50% of GNP. However, privatization in the industrial sector has hardly advanced at all as a result of excessive investment by companies and other problems. Accordingly, the government now prefers to encourage privatization in the form of operating contracts rather than through competitive tender.

Financial system: As a result of government efforts to bolster the capital of banks, the number of commercial banks, which previously stood at approximately 200, had fallen to 76 (526 branches) as of August 1997. Concerning the capital market, the Kazakhstan Stock Exchange and Central Asian Stock Exchange have been opened. Although the financial setup is falling into place with the establishment of more insurance companies, auditing corporations, consulting companies and lease companies, the manufacturing sector still finds it difficult to raise funds.

Official assistance from foreign countries: Projects that are closely linked to this study are being implemented by international agencies and foreign governments.

Long term prospects: In November 1997, President Nazarbaev announced Kazakhstan 2030. This contains the long term prospects and targets for Kazakhstan and basically aims to break away from an economic structure reliant on primary products through attracting investment from foreign countries (by improving the investment environment) and promoting highly value added manufacturing industries.

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 foreign countries 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 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).

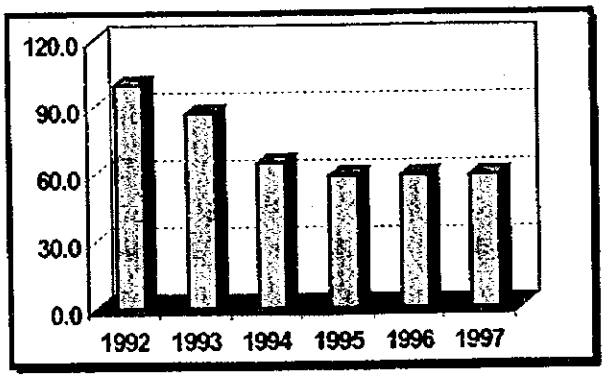


Fig. 2.1.1 Index of real GDP (1992=100), 1992-97

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 foreign 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 foreign countries, trade finance, credit provision from foreign countries, and Eurobond issues. Two-thirds of direct investment from foreign countries 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 foreign 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.

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 foreign countries 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 foreign countries. The purport of this is to minimize economic intervention by the government and achieve a situation whereby investment is attracted from foreign countries 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

Prior to independence, machinery products in Kazakhstan were produced according to instructions regarding types and quantities issued by the central government of the former Soviet Union, and such products were handed over to the central government for sale. Following 1991, due to collapse of the production and retailing system of the former Soviet Union, overall slump of the domestic economy, and the liberalization of machinery imports, the machinery industry in Kazakhstan has continued to decline. As a result, companies in the machinery industry find themselves burdened with surplus facilities, equipment and personnel, a situation which only leads to further deterioration of companies' business conditions. The government is aiming to promote the machinery industry, however, companies are confronted with a wide variety of problems such as a lack of product quality, performance and price competitiveness in international markets, insufficient corporate management capacity (including planning and retailing capabilities) and insufficient funds.

Policies: State policies to strengthen and support the machinery industry (give it added value) have been launched. The government has also compiled a short term program for machinery industry development and aims to see the development of new products.

Current conditions of the machine industry: Machinery production has been falling since 1991. The main machinery products produced in Kazakhstan are agricultural machinery (not all types), railway rolling stock (heavy repairs and parts), chemical plant parts, measuring instruments and general machine parts, etc. Imports of machinery products are five times greater than exports.

Current conditions of companies:

(Harsh business conditions) As a result of surpluses of facilities, equipment and personnel and shortages of operating funds and capital investment funds that have arisen from the decline in production, the majority of companies are on the brink of closing down operations. Companies are faced with problems of inefficiency arising from outdated integrated production systems (materials processing through to final product assembly), and insufficient corporate management capability in the areas of planning, purchasing, retailing and financial affairs, etc. as a result of their outdated organizational setups inherited from the era of Soviet control.

(Low quality, low performance, and high price products) Product performance and quality levels have hardly been improved at all from the Soviet era, and products do not possess the performance and quality needed to compete with foreign products that meet consumer needs. Moreover, due to high fixed cost rates, companies have to sell their products at high prices in order to sell their products. Also, because VAT is applied to all raw materials, parts and products, many machinery products are too expensive to compete with imports.

Agricultural machinery: Agricultural machinery accounts for 14% of Kazakhstan's GDP and is the mainstay of the machinery industry. However, Kazakhstan only produces limited types of outdated agricultural machinery and has to rely on imports to obtain other models and parts. Agricultural machinery made in Kazakhstan lacks competitiveness in terms of prices and quality.

Food processing machinery: The food processing industry has grown following independence and the demand for food processing machinery has increased in line with this development as well as the provision of assistance by the government and international agencies and entry of foreign capital into the sector. However, since flexible design and fabrication capability is required to respond to individual user needs and Kazakhstan does not possess any specialist manufacturers of food processing machinery, a large proportion of such machinery is still imported.

Mining machinery: Kazakhstan is a major resource-producing nation, however, in the mining sector, there is no development of new mines and the industry is stagnating. The mining industry is run with foreign capital and imports are relied on to provide many mining machines. Machinery made in Kazakhstan is cheaper than foreign machinery, but poor quality levels and low productivity make it necessary to rely on imports.

Railway rolling stock: More than 90% of freight transportation in this landlocked country is handled by railways and there is high demand for rolling stock. However, there are no plants for manufacturing new rolling stock in Kazakhstan, and the rolling stock plants that do exist only perform heavy repairs of passenger cars and freight cars. Moreover, imports are relied on to provide most rolling stock spare parts.

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 privatisation
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 plan will be further improved, the study team's opinion, at present, is as follows;

(1) Common subjects in each field

- The plan 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. For instance, is it simply a goal to be striven for? Or is it a target based on demand analysis?
- 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 analyze 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 realize cost reduction.

(2) Comments on each field

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

Field	Comment
Farm (cultivating) machinery	For tractors, the plan 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 plan 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 increased production of related parts and more repair work, etc.

(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 more than one type of 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:

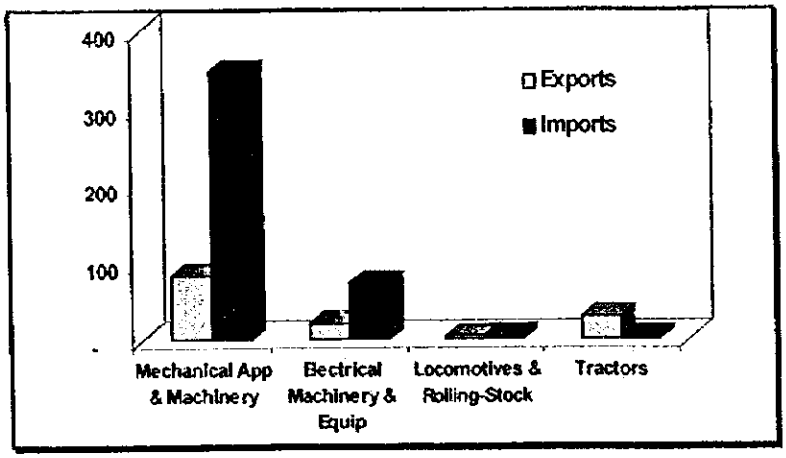
Astana (Akmola):	Agricultural machinery, railway rolling stock
Pavlodar:	Agricultural machinery, mining-related machinery
Almaty:	Agricultural machinery, mining-related machinery, railway rolling stock
Ust-Kamenogorsk:	Agricultural machinery, mining-related machinery
Petropavlosk:	Agricultural machinery, 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/ c.f.

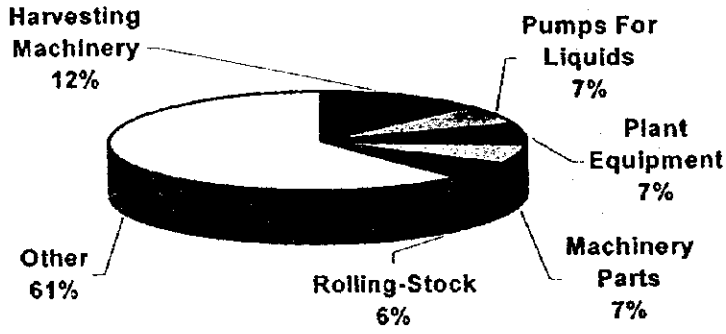
Appendix-5 Table 7.2 Export based ranking of Kazakhstan's Machinery Products).

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).



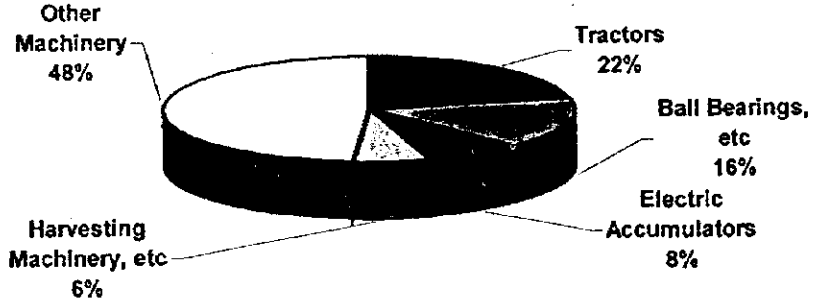
source: National Statistical Agency

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



source: National Statistical Agency

Fig. 3.3.2 Major Imports of Selected Machinery, 1997

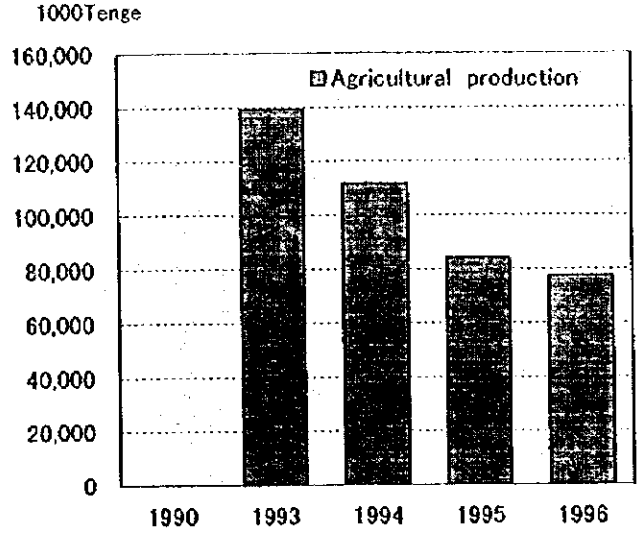


source: National Statistical Agency

Fig. 3.3.3 Major Exports of Selected Machinery, 1997

3.4 Current Conditions of Farm Machinery

3.4.1 Current Conditions of Agricultural Products and Cereals



Source : National Statistical Agency

Fig. 3.4.1 Changing Agricultural Production Amount

Table 3.4.1 Farmland Area and the Yield

			1990	1996	1996/1990
Grain	Area	1,000 ha	23,356	17,137	73.4%
	Output	1,000 t	28,491	11,474	40.3%
	Yield	t/ha	1.22	0.67	54.9%
Crops	Area	1,000 ha	11,505	8,155	70.9%
	Output	1,000 t			
	Yield	t/ha			
Potato/Vegetable /Fruit/Vine/cotton	Area	1,000 ha	521	478	91.7%
	Output	1,000 t	3,951	1,999	50.6%
	Yield	t/ha			

Source: Goscomstat

Table 3.4.2 Changing Agricultural Production in Revenue

Year	Agricultural production (M Tenge)	Grain	Cotton	Sugar Beet	Sunflower	Potatoes	Vegetables
		Yields of Crops(100 kilos per hectare)					
1990		12	27	238	8	113	154
1993	139,222	10	18	123	3	94	106
1994	111,627	8	19	77	3	94	104
1995	84,064	5	20	91	3	84	101
1996	77,443	7	17	105	2	88	96

Source : National Statistical Agency

Agriculture in Kazakhstan is now facing a serious crisis. 1996 agricultural production volume (ref. Fig. 3.4.1) as well as yield rate and farmland area (ref. Fig. 3.4.1, Table 3.4.1) has drastically decreased since 1990. Besides, a dramatic reduction of profitability in farming is another big problem. The number of farmers who could gain no profit was 12% of the total number of farmers in 1990, but the ratio has increased up to 76% in 1996, according to "On the program of forming and development of agricultural machinery construction (TACIS report)". In relation to that fact, Table 3.4.2 shows how the farmers' revenue has decreased in that period.

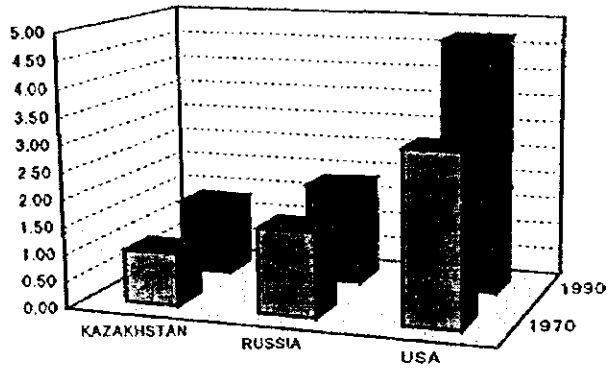


Fig. 3.4.2 Grain Yield Rates (ton per hectare)

Table 3.4.3 Wheat Yield Rate Comparison by Countries

Country	1970		1990	
	Wheat yield (T/ha)	Fert.use (Kg/ha)	Wheat yield (T/ha)	Fert.use (Kg/ha)
Kazakhstan	0.98	5	1.35	19
Russia	1.56	33	1.85	90
USA	3.14	87	4.71	106

Source: Rehabilitation Bank "Pavlodar tractor complex"

Table 3.4.4 Grain Yield Rates and Fertilizer Application

Year	All grain	Fertilizer use				
	Area 1000 ha	Yield t/ha	Mineral t/ha	Organic t/ha	Total 1000t	T/ha
1990	23,356	1.22	0.029	0.96	23,116.7	0.99
1996	14,609	0.90			1431.7	0.10

Source: Goscomstat

As shown in Fig. 3.4.2 and Table 3.4.3, grain yield rates per hectare are extremely low in Kazakhstan compared to the figures in the United States and even lower than the figures in Russia. One of the causes is lack of fertilizer, as Table 3.4.4 shows.

According to Goscomstat figures, grain production in 1996 for a total of wheat and eight other kinds of grain is 11.47 million tons, which represents 40% of the production compared to 1990 figures. The same Goscomstat figures also show that the planted farmland area was reduced by 27% and the yield per hectare by 45% in the same period.

It should be noted that the absolute amount of yield per hectare is significantly low and is influenced by two major reasons; (1) Improper maintenance of farmland and (2) handling loss due to a lack of proper intermediate storage facilities between production and final shipping points. Therefore, it is said that the yield per hectare in Kazakhstan would be normally only 20-30% of the yield in northern United States and Canadian grain area.

Since 60-70% of Kazakhstan grain produced used to be exported to Russia and other CIS countries since Soviet Union times, even such a big reduction of supply as mentioned above does not create by problems in meeting the domestic demand for grain. On the other hand, it has naturally caused a disastrous economic damage to all the farm machinery related industries.

3.4.2 Farm Machinery Market Trend

In the old Soviet Union time, all the necessary machines were supplied to all farms for the purpose of increasing agricultural production. But after independence, farmers had to purchase machines with their own capital. With the yearly agricultural production decreasing, farmers have become unable to buy machines. Consequently, the number of machine in kazakhstan have been decreasing every year, as shown in Fig. 3.4.3 and Table 3.4.5.

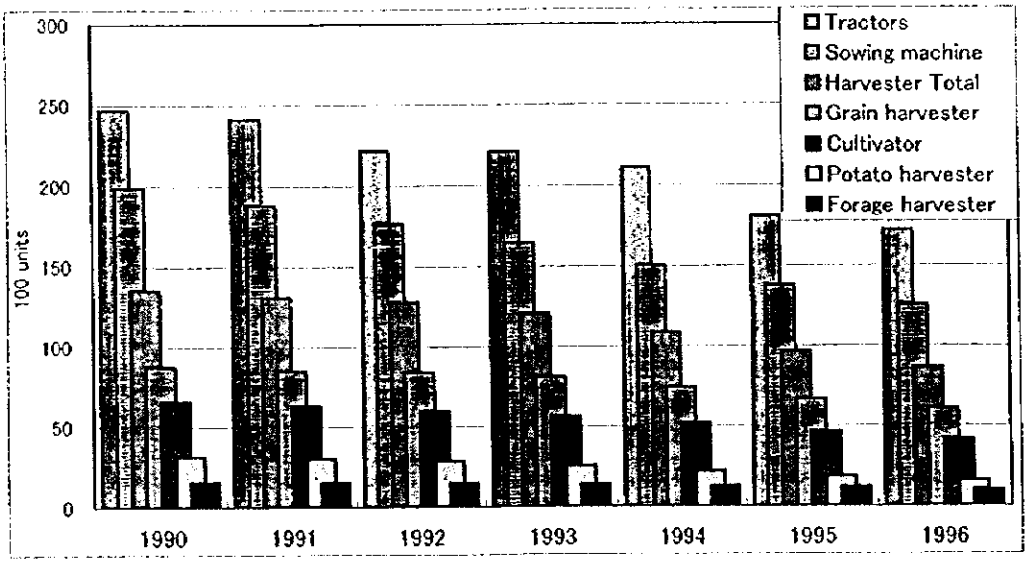
The major farm machinery used by farmers in Kazakhstan are tractors, cultivators, seeders and harvesters, as shown in Table 3.4.6. The market trend of tractors and self-propelled combine harvesters are described below, because those two are important.

Table 3.4.5 Yearly Transition of Available Farm Tractors and Implements

(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



Source: CIS Committee on Statistics

Fig. 3.4.3 Farm Machinery Holdings by Years

Table 3.4.5 Yearly Transition of Available Farm Tractors and Implements

(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
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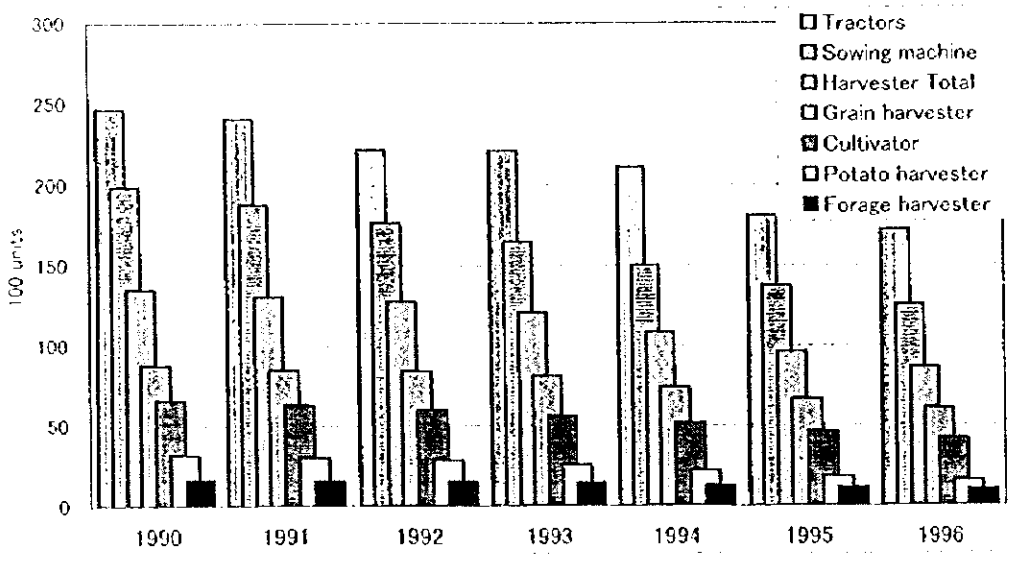
Acquired	16.8	11.9	5.8	2.6	1.7	0.6	1.5
Scrapped	26.3	22.6	17.4	14.7	16.1	13.0	13.9
Available	198.9	188.2	176.6	164.5	150.1	137.7	125.3
Cultivator							
Acquired	3.0	2.3	2.0	2.0	0.8	0.2	0.2
Scrapped	5.7	5.2	5.4	5.7	5.2	5.8	5.0
Available	66.2	63.3	59.9	56.3	51.9	46.3	41.6

Source :CIS Committee on Statistics



Source: CIS Committee on Statistics

Fig. 3.4.3 Farm Machinery Holdings by Years

Table 3.4.6 Major farm machinery used in Kazakhstan

Tractor

Type	Grade	Name of Product	Production	Import
Crawler	3T	DT-75	Domestic	
	4T	T-95	Under development	
		T-4		Russia
	8T	T-170		Russia
Wheel	3T	MTZ-80		Belarus
	4T	T-150K		Ukraina
	5T	K-700		Russia

Implement & Agriculture machine

Purpose	Kinds	Type	Production	
Harvest	Grain harvester	Self-propelled	Import	
		Tractor	Domestic · Import	
	Potato	Self-propelled	Import	
		Tractor	Domestic · Import	
	Feed	Self-propelled	Import	
		Tractor	Domestic · Import	
cultivate	Plough	Tractor	Domestic · Import	
	Rotary	Tractor	Domestic · Import	
	Hallow	Tractor	Domestic · Import	
Fertilize	Blow caster	Tractor	Domestic · Import	
	Spryer	Tractor	Domestic · Import	
Cultivate	Cultivator	Tractor	Domestic · Import	
Prevent	Spryer	Tractor	Domestic · Import	
Seed	Drill	Tractor	Domestic · Import	
	Plantar	Tractor	Domestic · Import	
	Seeder	Tractor	Domestic · Import	

(1) Farm Tractors

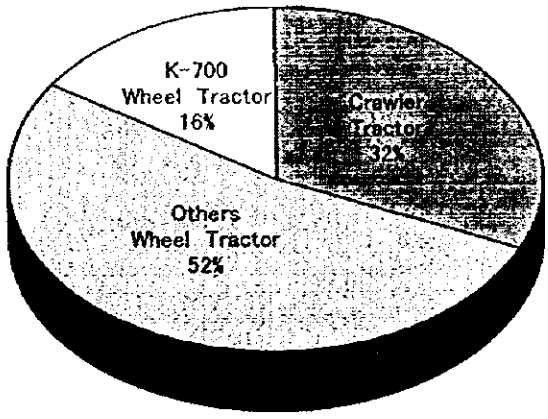


Fig. 3.4.4 Tractor Holdings by Types

Table 3.4.6 Major farm machinery used in Kazakhstan

Tractor

Type	Grade	Name of Product	Production	Import
Crawler	3T	DT-75	Domestic	
	4T	T-95	Under development	
		T-4		Russia
	8T	T-170		Russia
Wheel	3T	MTZ-80		Belarus
	4T	T-150K		Ukraina
	5T	K-700		Russia

Implement & Agriculture machine

Purpose	Kinds	Type	Production	
Harvest	Grain harvester	Self-propelled	Import	
		Tractor	Domestic · Import	
	Potato	Self-propelled	Import	
		Tractor	Domestic · Import	
	Feed	Self-propelled	Import	
		Tractor	Domestic · Import	
cultivate	Plough	Tractor	Domestic · Import	
	Rotary	Tractor	Domestic · Import	
	Hallow	Tractor	Domestic · Import	
Fertilize	Blow caster	Tractor	Domestic · Import	
	Spryer	Tractor	Domestic · Import	
Cultivate	Cultivator	Tractor	Domestic · Import	
Prevent	Spryer	Tractor	Domestic · Import	
Seed	Drill	Tractor	Domestic · Import	
	Plantar	Tractor	Domestic · Import	
	Seeder	Tractor	Domestic · Import	

(1) Farm Tractors

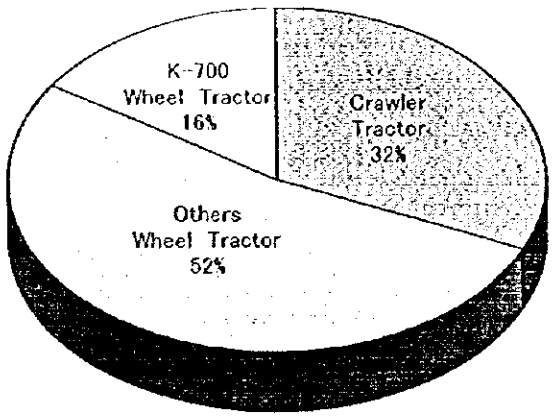


Fig. 3.4.4 Tractor Holdings by Types

Table 3.4.7 STOCK of TRACTOR TYPE (1996 year)

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

As Fig. 3.4.4 and Table 3.4.7 shows, the number of wheel tractors accounts for about two thirds of the total available tractors in Kazakhstan, and crawler tractors for a third. The main part of the tractor fleet apparently consists of wheel tractors. According to the opinion of Kazakhstan Agrarian University, large size wheel type tractors should be utilized for the large-scale mechanized farming on steppes with 400 to 500mm precipitation per annum. Large size wheel type tractors will hold a primary position in this country even in the future.

The import of K-700 series tractors manufactured in Russia has been drastically reduced, due to the lack of funds. Besides, the tractors available for use are only 60% of the total number of tractors (as of 1996). According to the Ministry of Agriculture, there is a big shortage of this tractor to achieve the year 2000 goal of grain production. Next to K-700 series tractors, the popular wheel type models are middle class tractors, such as 2wheel-drive or 4wheel-drive MTZ-80 series front wheel steering tractors and 4wheel-drive T-150K articulated tractors. They are all imported from Russia and Beylarus. The only domestically manufactured model, DT-75 crawler tractor, is useful for various complementary works in grain farming, such as spraying insecticide, manure spreading, transportation and so on. (As for DT-75 production and how is it marketed, refer to 3.4.3)

The present state of Kazakhstan-made Farm machinery Sales and Production. Other crawler tractors are T-95, now under development as a more powerful version of DT-75, and T-4 (4t class) and T-170 (8t class) solid-suspension tractors, both imported from Russia. As mentioned above, the primary tractor market in Kazakhstan is for large and middle size wheel tractors. However crawler tractors, which would perform better on

wet and soft ground, will always occupy a certain part of the market. But it seems that more of the 4t class or larger tractors are required.

(2) Combine harvesters

Self-propelled combine harvesters are in short supply and it is another critical problem in grain production. "Enisey" and other combine harvesters have been imported from Russia. But they are not imported in recent years due to shortage of funds, as well as a low degree of user satisfaction in Russian models. In 1997, 630 units of John Deere combine grain harvesters were imported (with additional 20 units of combine cotton harvesters) financed by the U.S. EXIM Bank. In the harvesting season, these imported machines were leased with operators to grain farmers by machine and service supply companies of the Ken Dala group. Ministry of Agriculture estimated in 1996 that 20,000 units of combine harvesters must be added ten year. The supply of machines is still very short.

3.4.3 Current Conditions of Sales and Production System of Farm Machinery

The current conditions of Kazakhstan-made Farm machinery Sales and Production. Farm machinery products manufactured within the country, such as harvesters, cultivators, seeders, weeders and so on, are all tractor drawn implements (Refer to Table 3.4.6). Only the T-75 crawler tractor is a mobile equipment produced in Kazakhstan How the T-75 crawler tractors are marketed and manufactured at present, will be described as follows.

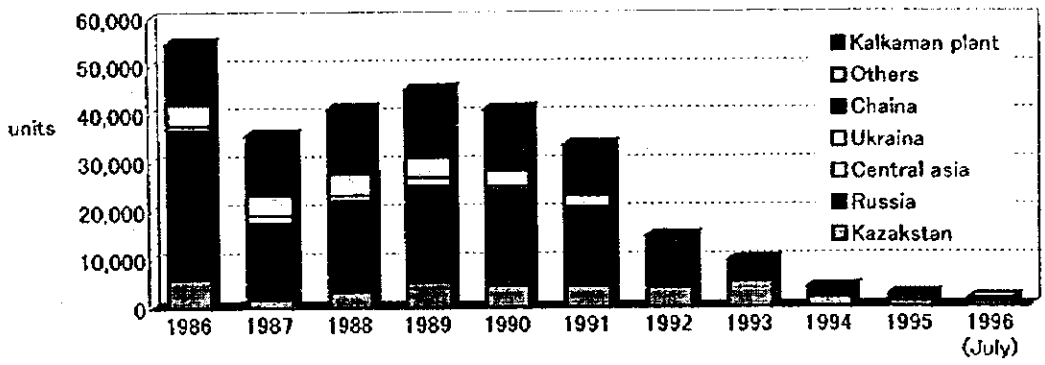


Fig. 3.4.5 Models and kinds of Farm Machinery utilized in Kazakhstan

Table 3.4.8 Models and kinds of Farm Machinery utilized in Kazakhstan

(Unit)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996 (July)
Kazakhstan	6,017	1,810	3,292	5,405	4,614	4,630	4,072	5,342	1,980	1,142	850
Russia	30,728	15,710	18,848	19,856	19,705	15,490	5,144	1,892	1,535	1,042	829
Central Asia	1,032	1,638	1,179	1,640	784	595	137	257	318	255	47
Ukraine	4,377	4,091	4,392	4,237	3,235	2,326	16	119	91	2	
China						264	2,276	1,887		3	
Others								6	88		
Kalkaman plant	12,500	12,420	13,423	14,080	12,700	10,273	3,120	252	26		
TOTAL	54,654	35,669	41,134	45,218	41,038	33,578	14,765	9,755	4,038	2,444	1,726

(1) Sales of locally made tractors

The sales of DT-75 crawler tractors, especially the in export to Russia and Ukraine have been drastically reduced (Refer to Fig. 3.4.5 and Table 3.4.7). Reduction of sales due to deterioration of the Soviet Union distribution system is a major factor. But even if the distribution network restored and the economy in CIS countries improved, the kind of demand, which existed when the government was supplying machines regardless of farmers' profitability, can never be expected again. As aforementioned, the demand for 3t class tractors is basically limited. Unless a new medium class model is successfully developed, the sales volume of these crawler tractors will continue to be low.

(2) Production of locally made tractors

DT-75 crawler tractors are manufactured at Pavlodar Tractor plant. However, such major components as engines, radiators, transmissions, hydraulic pumps, control valves and electric devices, are imported from Russia. Imported components amount to about 50% of the total cost. Because of this high share of imports, the percentage of material cost in the manufacturing cost is as high as approximately 75%, and the productivity in value added is very low.

The production facility for this tractor is composed mainly of single purpose machine tools and equipment. Although this would be suitable for the mass-production of a single model, it is not suitable for small lot production of many different kinds of models. As there is no flexibility to meet big changes in the production volume, the product prices must be raised to maintain profit margins. DT-75 tractors were offered at a sale price of US$7,000 in 1990 and were US$32,000 in 1996. (Source: Almaty Test Station) Price competitiveness of the tractor has been completely lost (Refer to Table 3.4.9). Therefore form of the production system is urgently required.

Table 3.4.9 Competitors Price

	Type	Power (kW)	Drawbar capacity(ton)	Production 1995(units)	Price excluding VAT($)
Agricultural TRACTOR					
Pavlodar	Crawler	75.9	3	1,799	18,560
Vorgograd	Crawler	75.9	3	2,808	18,594
Kharikov	Crawler	95.5	4	886	25,692
Bulldozer					
Pavlodar	Crawler	75.9	3	521	20,185
Vorgograd	Crawler	75.9	3	492	21,876
Kharikov	Crawler	95.5	4	196	27,538

Source: Rehabilitation Bank "Pavlodar tractor complex September 1996"

Table 3.4.10 Prime Cost Pavlodar tractor

year	Prime cost	Price excluding VAT	Cash at Price	Barter terms (including VAT)
1995	$20,650			
1996	$14,447	$18,560	$12,000 ~14,000	$22,272

Source: Rehabilitation Bank "Pavlodar tractor complex September 1996"

3.4.4 Development of New Product

After the decline of the divisional production system inherited from the Soviet era, some manufacturing industries in Kazakhstan are attempting their own product development. But none of them have yet succeeded in introducing new products. R & D functions of enterprises have not been developed, and the government has not arranged the supporting organization. Even performance tests of prototype machines are not easy for manufacturers to carry out. Over and above all these problems, the worst factor is that there is no system or arrangement for manufacturers to become thoroughly acquainted until users needs. Product development activities, with regard to the two key products of tractors and combine harvesters, are described as follows,

(1) Tractor development

Development project of T-95 middle size (4t class) crawler tractor has been under way at the Pavlodar Tractor plant since 1995. Eight units of test tractors (the same bodies as T-75 other than the engines) mounting 8 different kinds of engines including a Kostanai Diesel in-line 6-cylinder engine were tested, then 2 units of the 1st prototype tractors both mounting Altai (Russian) in-line 4-cylinder engines were built. The 1st prototype tractors have different transmissions and track links (only in diameter of link-pins). This development project has been interrupted.

(2) Combine harvester development

At Akmolaselmash, where various kinds of tractor drawn farm implements are domestically manufactured, product development for design improvement is passed on imported Enisey combine harvesters. Performance tests mounting their own designed reaper attachment have been completed. Production of a dozen units of field test machines with additional improvement to the implement drive system (hydrostatic drive replacing beltdrive) has been studied for some time, but has not been realized yet. Regarding the technical cooperation and localization project of John Deere combine harvesters, a technical license agreement has been proposed from the license side. As a project with the proposed contract amounting to 26 billion Tenge in total, no manufacturer in the country, including Akmolaselmash, has been able to reach agreement.

3.4.5 Farm machinery Product Support

In the Soviet Union time, all the necessary farm machinery had been supplied to all collective farms and state farms through the Regional Control Department of Farm machinery in accordance with the supply plan scheduled by the Ministry of Agriculture of the Republic. The machine maintenance and repair services were performed by repair shops of state and collective farmes and enterprises of Kazagroremmash System distributed throughout the country, which corresponds to Machine & Technical Exchange Stations and Specialized Repair Service Organizations in Russian scheme (Refer to Fig 3.4.6).

After independence, the above mentioned farm machinery supply and maintenance system has completely collapsed. Most of the farms or individual farmers are getting products through agents or directly from the machinery manufacturers, and nearly no product support is available.

However, some of the Machine & Technical Exchange Stations and Specialized Repair Service Organizations still exist and provide repair services. The Bureau of Agricultural Infrastructure At present, the Ministry of Agriculture of the republic is promoting a development program to set up so-called Machine Technological Stations (M.T.S.) since the beginning of 1998.

Number of these stations was 85 at the start, and it has increased to 393 as of July 1998,

and now 712. There is a wide variety of farm machinery maintenance stations, many of them are small repair shops belonging to individual farms, etc., and cannot function as distributors.

Among the M.T.S, there are about a dozen Ken Dala group companies, so-called "Agrotechnikas", in the northern area of the country and also some 8 or 9 similar companies, including so-called "Machine & Tractor Stations", in the south having a capability of machine repair service. These approximately 20 M.T.S. companies should be the major points of the distributor network.

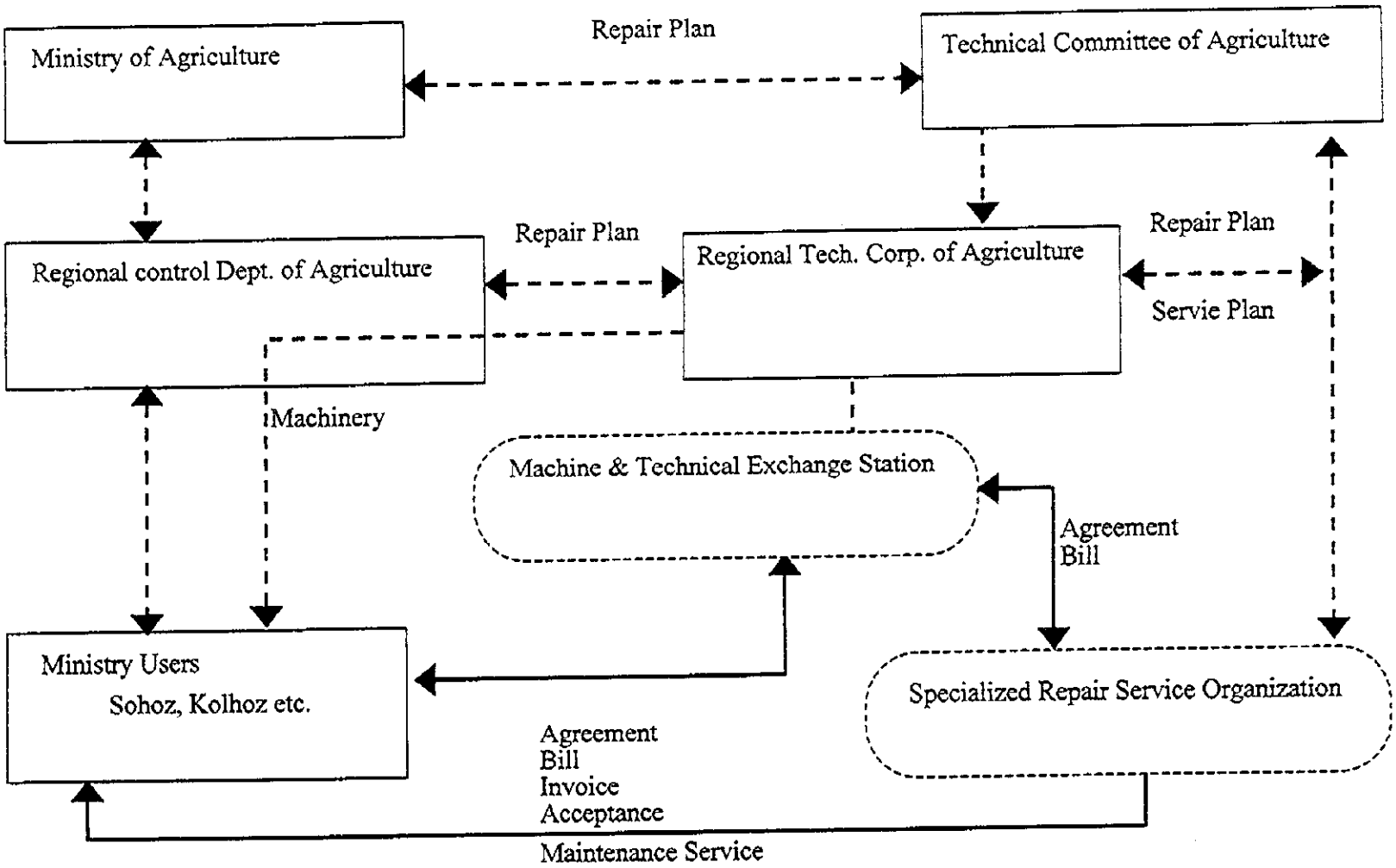


Fig. 3.4.6 Farm Machinery Supply Repair Service System Scheme

3.5 Problems Current Conditions of Food Processing Machinery

3.5.1 Current Conditions of Food Processing Industry

During the Soviet Union time in the 1950s, the farming land was expanded by aggressive land clearing, and the grain production in Kazakhstan had been maintained by approximately 2,000 state-owned farms (sorhoz) and approximately 400 collective farms(korhoz). All the grain produce harvested in Kazakhstan had been processed by the Soviet Union central government organization before independence, and after in dependence, grain production as well as processing of the produce has been planned and executed by the new government.

The big loss in storage, transportation, and processing of grain produce had to be borne by grain producers. According to the Ministry of Agriculture, the loss amounts to 30%of the total production. The situation in Russia is similar to the one in Kazakhstan. The loss amounts to 30-60% (Source: Cordonier Report), by birds, insects or bad weather due to a lack of storage facilities. Agricultural produce in Kazakhstan used to be transported to Russia for all kinds of processing and then returned in the form of processed foods. Therefore, the loss during transportation was doubled.

In recent years, there is a trend in Kazakhstan to store and dry grain at a place close to the production site. As a result, small flour millers and bakeries are found in villages.

The production of meat and dairy products is decreasing, and current levels of production are less than half of the 1990 level for most products. However, there are now small meat or dairy processors in villages, like flour millers and bakeries. According to a TACIS Report, the numbers of small processors as of 1995 were 350 meat processors and 70 dairy product processors. Some of them are producing high quality products, using imported machines. Depending on the supply of raw material, they adjust the production rate. Such small plants are producing 20-25% of the industry's total volume.

There is a trend for people in Kazakhstan to consume more and more western style food. The food processing industry is trying to meet this diet change in the market, by importing European food processing machines and equipment. This move of the industry is favorable to reduce import of processed food along with the government policy to promote agriculture in the country. To promote the food processing industry,

the government is introducing many programs for technical cooperation with international organizations and machining use of other subsidies and funds.

Tables 3.5.1 to 3.5.4 show various data on production, import and export, and investment related to food processing industries.

Table 3.5.1 Composition of Agricultural Processing Industries, 1994-96

(%)

Industry	1994	1995	1996
Food	32.4	38.0	48.1
Meat and milk	36.9	33.3	25.7
Cereals and animal feed	23.4	20.9	16.9
Others	7.3	7.7	8.8

Table 3.5.2 Production of Food Products, 1994-95

(tons)

Product	1994	1995
Bread and baked goods	1,507,711	852,751
Macaroni products	122,669	78,792
Sausage products	55,257	34,820
Cheese	18,323	11,618

Table 3.5.3 Exports and Imports of Major Food Preparations, 1995 - 97

(thousands of US$)

Preparation Food		1995	1996	1997
Preparations of Meat and Fish	Export	26,604	15,555	11,067
	Import	8,434	16,452	25,170
	Balance	18,170	(897)	(14,103)
Preparations of Cereals, Flour, Milk	Export	39,802	67,829	71,400
	Import	1,576	5,063	5,526
	Balance	38,226	62,766	65,874
Preparations of Vegetables and Fruits	Export	3,610	3,468	2,218
	Import	14,292	9,562	11,323
	Balance	(10,683)	(6,124)	(9,105)

Table 3.5.4 Inflow of Major Foreign Direct Investment 1993-97*

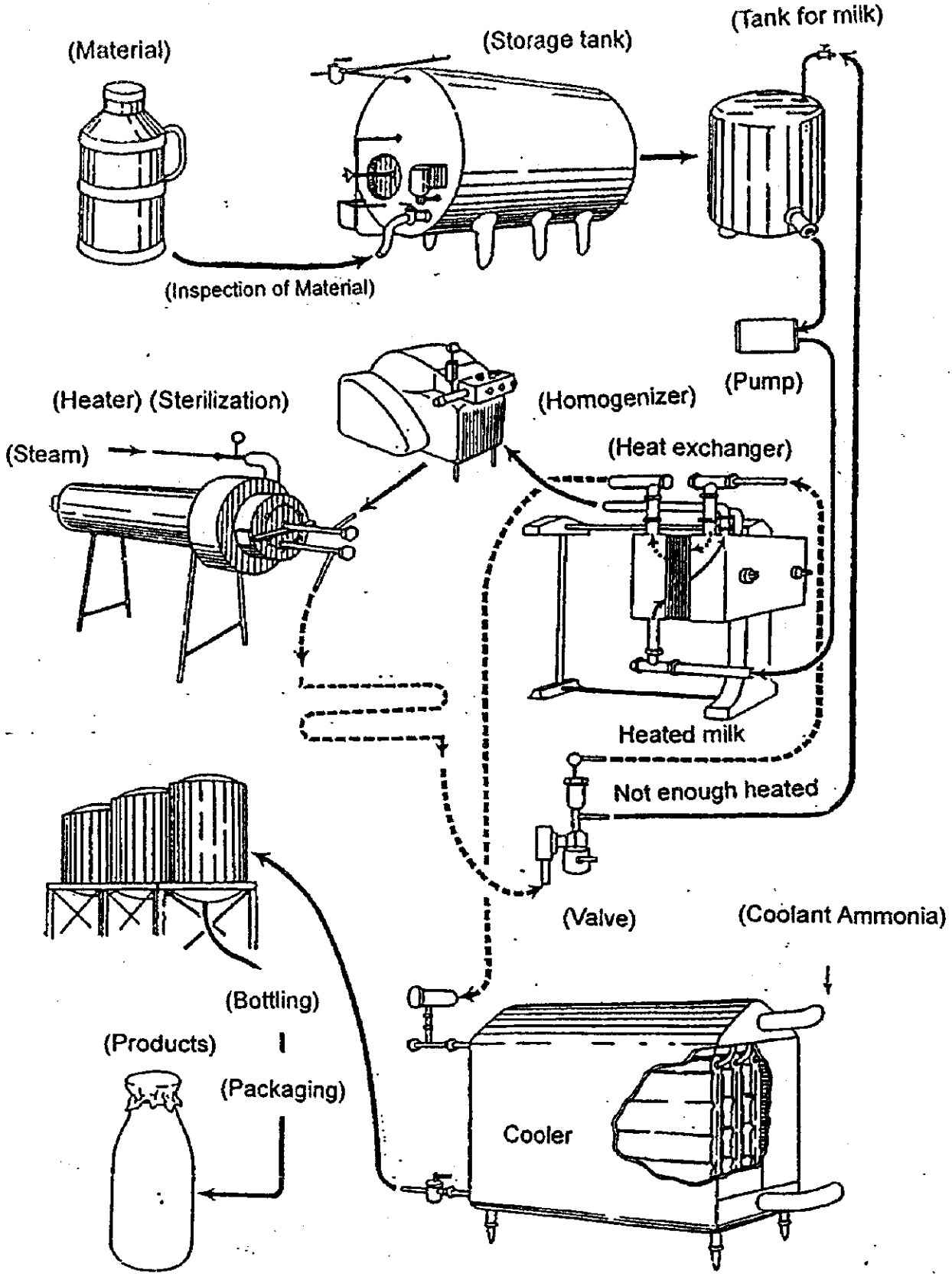
(millions of US $)

Industry	1993	1994	1995	1996	1997*
Food industry	45	42	39	41	35
Oil and gas	976	554	315	389	159
Non-ferrous metallurgy	-	18	344	707	352

* Quarters I and II.

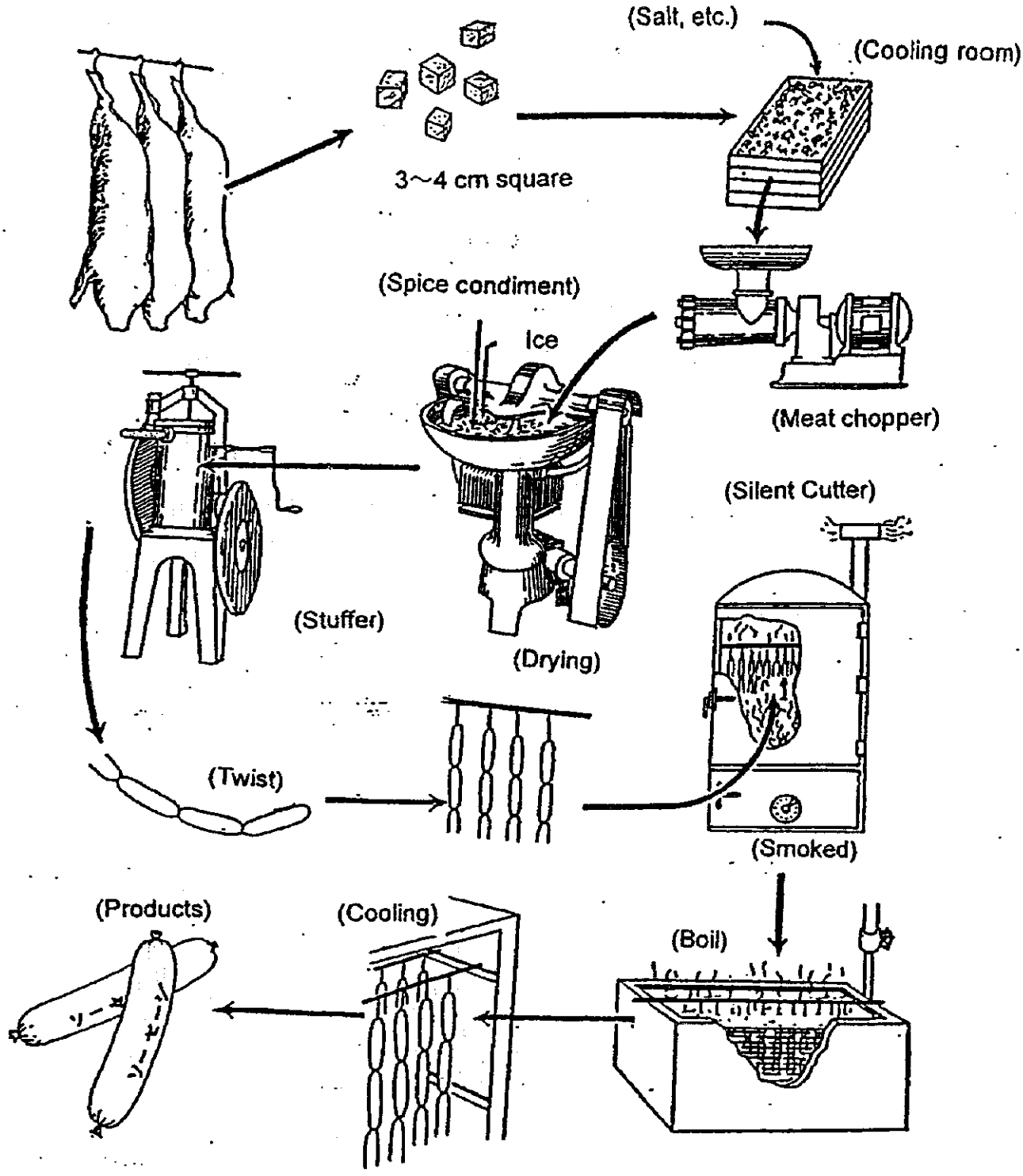
3.5.2 Production, Export and Import of Food Processing Machinery

Food processing machinery is quite often custom-made to users' requirements. Generally, it is a plant with a set of small and medium size machines and equipment. Fig. 3.5.1 and Fig. 3.5.2 are examples to show the processes and the relationship of machines.



Source: "Food Process and Storage [The Second Issue]", 1996, KoseiKan Ltd.

Fig. 3.5.1 Milk Process



Source: "Food Process and Storage [The Second Issue]", 1996, KoseiKan Ltd.

Fig. 3.5.2 Sausage Process

Food processing machinery is developed, in many cases, jointly with food processor companies under their guidance. The manufacturers must have flexible design engineering capability and a wide variety of manufacturing know-how. It is common practice that a foreign manufacturer concludes a technical agreement with a local manufacturer, who already has connections with a network of food processing companies.

Recently, the food processing industry must be more conscious about not only quality but also sanitation and safety. Development of the industry must be in line with the trend in social needs. The importance of the food processing industry in Kazakhstan is growing more and more especially for products related to grain and also meat and dairy products.

(1) Flour mill, Bakery, small size processing machinery

Now there is a trend that demand for large size machines is shifting to demand for smaller machines useful at small farms or other organizations like machine and service supply stations. For example, one of these stations in Shimkent leased farm machinery to a farmer and received 20% of the harvested wheat in a barter deal. The wheat was processed within the company and sold to employees and to outside markets in the form of flour. Another similar company in Almaty also has a bakery.

Agricultural producers also need small size food processing machinery, because they need to increase their revenue by marketing processed products. While the price of grain is only US$30-40 per ton, the wholesale price of flour is US$300-400 and US$500 retail. Some of the farmers also have bakery shops.

(2) Dairy product processing machinery

Milk processing plants are located all over the country- many of them in the northern area. Large centralized plants are few, while the machinery market has a high demand for machines for small size plants. Machines, such as separators, milk cleaners, equipment to process butter and cheese, are required. Processing capacity per year is 500-600 ton.(Source: TACIS Report)

(3) Meat processing machinery

The kind of machines the market demands is such internationally popular machines as salami sausage or smoked salami processors. However, more and more of the local meat processors are becoming unable to meet the demand of consumers. Both

processing technology and equipment is old, therefore the product quality is low and also the loss of meat during processing is high. Besides, processors in remote areas do not have sufficient refrigeration and storage facilities

(4) Vegetable, Fruit juice processing machinery

The juice producing plant in Shimkent is a fully automated and modern plant, consisting of a tomato processing line designed by an Israeli company and manufactured in Italian company, and an apple processing line manufactured in Switzerland. The operating priod of these plants is rather short, for example 2 to 3 months for tomatoes and 4 to 5 months for apples, both of them in summer. Plant equipment maintenance, product quality and cost management are important.

(5) Refrigeration, Storage facility

A comparatively large size milk processing plant in Shimkent is producing cheese and butter, collecting 7 tons of milk every day from livestock farms in the surrounding area. The company owns refrigeration and storage facilities at each center of farms in the area, in order to secure a constant supply of fresh milk for the processing plant. These refrigeration and storage facilities are most important to maintein high quality of product and minimum cost by eliminating the loss of raw material.

As long as many small milk processors exist, large number of refrigeration and storage facilities will be necessary. But in future, when the transportation of goods is facilitated and processing industries are more centralized, large size integrated facilities will replace them.

3.5.3 Problems of Food processing machinery

Food processing machines, flour mills and so on are overwhelmingly imported. Import from Germany, Italy, Turkey and other western countries is increasing. Food processing machinery in advanced nations has a high standard of quality and performance, to meet a high level of quality requirement in taste and sanitation. For instance in the case of flour mills, the mills made in Kazakhstan are inferior to western made machines in their ability to control granule grades. For Kazakhstan machinery manufacturers, the problem, that they must rely on imports of important components like electric control devices and measuring instruments, and sometimes these are not available to them.

However even though the products made locally are generally inferior, the price level is almost the same. Therefore, food processors naturally import foreign machines. Food processing machinery is duty-free. Especially, when foreign companies in the food processing industry purchase machines for their own use, no import duty or VAT is imposed as a special privilege. On the contrary, duties and VAT are imposed on the imports of all raw materials and parts for local manufacturers, and more-over VAT will again be imposed when they sell their products. Finally, the price competitiveness of the locally manufactured products is very low.

3.6 Current Conditions of Mining Machinery

3.6.1 Current Conditions of Mining Industry

Kazakhstan has abundant mineral resources and played the part of raw materials supply base for the Soviet Union. Regarding non-ferrous metals in the world production in 1991, they produced copper 4% (0.33 million tons), Lead 9% (0.258 million tons), and Zinc 4% (0.262 million tons) as well as Aluminum, Tungsten, Titanium, Magnesium, Rare earth, Gold, etc.

The production of Coal, Oil, Gas, and Iron ore was as follows.

Table 3.6.1 Production of mineral resources

(unit: 1000 t)

	1985	1991	1994	1995	1996
Coal	130816	130382	104356	83199	76597
(%)	100	99.7	79.8	63.6	58.6
Oil	21381	22036	18554	17935	21048
(%)	100	103.1	86.8	82.5	96.5
Gas (m^3)	5456	7885	4490	5916	6396
(%)	100	143	82.5	109	117
Iron ore	22977	21993	10521	15133	13174
(%)	100	95.7	45.8	65.9	57.3

Source: National Statical Agency

As stated above, Kazakhstan is a rich country in mineral resources, but their production which was decreasing before the collapse of the Soviet Union, has since further deteriorated due to the unstable economy. Equipment in the mines had not been renewed since early 1980, so the efficiency of plants has considerably decreased

because of the aged equipment and difficulty in procuring spare parts. No new mines have opened, and ore grades have dropped.

But their production has changed to up-trend at the bottom in 1994-1995, we may expect the production recovery with slow tempo.

Mine management has been depressed by cost up of fuel, energy, and transportation so forth, therefore some troubles such as salaries in arrears were happened.

Investment amounts from foreign countries are next to Russia among the CIS.
(Refer to Table 3.6.2)

Table 3.6.2 Foreign direct investment in the mining industry

(unit: US$ million)

	1994	1995	1989 -1995
Armenia	3	19	22
Azerbaijan	50	206	276
Belarus	10	7	85
Georgia	8	6	92
Kazakhstan	635	723	1,831
Kyrgyz	45	88	143
Moldova	18	63	95
Russia	1,000	1,500	3,100
Tajikistan	12	13	29
Turkmenistan	100	100	215
Ukraine	91	120	581
Uzbekistan	85	120	287
CIS TOTAL	2,057	2,965	6,756

Source: Dr. Allen, L. Clark East-West Center

The current conditions of mining industry are as follows,

(1) Coal (Open cut)

There are substantial lignite reserves which currently supply domestic markets and adjacent areas in Russia with coal for power generation. Given the low quality of this lignite and the costs of transport it is unlikely that the market will increase in size geographically and so the demand for coal will depend largely of domestic power requirements.

We expect that improvements in efficiency of existing users will largely cancel out

increases in demand created by new economic activity, so that overall demand for electricity may remain fairly constant even when the economy starts to grow.

(2) Coal (Underground)

The demand for coal mined underground (i.e. coal from the Karaganda basin) is tied to its use for metallurgy. Mining of this coal purely for energy uses is unlikely to be attractive compared to open cut operations. The cohesive coals of Karaganda are only of medium quality and will not find markets outside the region. Essentially the main markets will be limited to the Karaganda region and the Western Siberian Region, mainly for iron and steel production.

The economy in Soviet times was a particularly intense user of steel. Demand has collapsed in the CIS and Eastern Europe and some producers particularly in Poland and Russia are trying to survive by dumping low grade construction steel in East Asia. We expect that overall iron and steel production in the CIS will not grow even when the economies recover. Users will reduce the quantities of steel used in specific products by better design and by specifying higher quality steels. This together with improvements in metallurgical processes will see the demand for coking coal remain static or decline. (Ispat has already reduced its unit consumption rate for coke by over 25% at Karaganda - i.e. the amount of coke required to produce a ton of steel - though the current rate is still well above current best practice achieved in countries such as Korea which are using higher grade cokes). In summary we see little prospect for a major increase above current levels for coal mined underground.

(3) Iron Ore

As with coal freight costs, the low value per ton and average quality limits the market to regional steelworks. As already mentioned restructuring and more efficient use of steel will leave the demand for steel flat even when economic growth returns.

(4) Copper Lead and Zinc

Restructuring could see some growth in domestic demand for these metals. While the amount of metal used in specific products is likely to be reduced, new uses may well be introduced - e.g. more extensive use of galvanized steel rather than black steel, copper and brass in plumbing rather than black or galvanized steel pipe and fittings etc. In the case of lead its use as an octane booster in gasoline will hopefully be reduced for environmental reasons.

However domestic demand will remain well below production capacity, and Kazakhstan will be reliant on CIS and World markets to buy most of these products. Kazakhstan is likely to remain a price taker in these markets. New projects will only be funded by major investors if they are confident that the project will be viable throughout the price cycle. At present there appear to be very few new projects that can truly pass that test.

(5) Gold

There is significant interest in Gold exploration which could possibly generate a significant demand for mining machinery, if foreign investment from major mining enterprises given.

3.6.2 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.

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

By recent results on Import and Export are shown in Table 3.6.3 .

Table 3.6.3 Import and export in mining machinery products (1997 I ~ III)

(unit US$ 1000)

	Imports	Exports	Balance
Screen, crusher, grinding-mill, mixer	16,489	259	Δ 16,230
Grader, excavator, boring-machine	15,693	3,065	Δ 12,628
Bulldozer, scraper, shovel	10,932	5,204	Δ 5,728
Total	43,114	8,528	Δ 34,586

Source: Ministry of Energy, Industry and Trade

3.6.3 Problems of Mining Machinery

(1) Price

There are many kind of mining machine of which prices are generally cheaper than that of the other country by 20 - 30%. For example the price of wheel loader with 2 m^3 bucket is $60000 (excluding tax), in spite of main parts or component are almost imported the similar specification of Japanese machine is $75,000 - 80,000 (¥9.5 - 10 million). The reasons of low prices are laborcharge, electric power rate (4 Tenge/KWH), coke ($16/ton), and water (8 Tenge/m^3) are relatively cheap. Another reason for low price on mining machines give the casting and forging materials. Manganese Steel which is used on the machine is by 30 - 40% cheaper than the other countries. Monthly wages is shown Table 3.7.3.

Table 3.6.4 Wages

		All sectors (US$)	Industry (US$)
1996	1st quarter	102	165
	2nd quarter	111	163
	3rd quarter	118	173
	4th quarter	126	184
1997	1st quarter	112	164

Source: National Statical Agency

Certainly the prices quoted above for Kazakh machinery are in general very low compared to the prices of western equipment of similar specifications. It is questionable however whether the equipment is comparable in quality or productivity. Unfortunately none of the enterprises could provide detailed results of reliability tests or of productivity comparisons. In discussions with senior management it became clear that the extent of pre-production testing and post production monitoring that they expected to carry out was an order of magnitude lower than is now common amongst western manufacturers, and so it is difficult to believe that either the reliability or the productivity of this equipment can match that of its western counterparts.

(2) Quality

The materials and structure of machine were designed in Russia at least 10 - 20 years ago. From the points of engineering, they have some problems on the Quality, there are only company that has applied the quality control in welding and machining. It will take considerable time to break away from the practice that quantity is more important than quality.

The most important way to make good machines is to know what the customers want, and workmen should keep the engineering standards such as 1)task standard, 2)inspection standard.

(3) International competitiveness of Kazakhstan products

In most cases Kazakhstan machinery remains competitive on price within Kazakhstan compared with machinery from other CIS countries, though in some cases the "double VAT" problem makes it less competitive than it should be in Kazakhstan.

In many cases, foreign machinery is a bigger threat in both the Kazakhstan and other CIS markets. While the imported machines are usually far more expensive, they have taken a major share of the (very small) market.

3.7 Current Conditions of Railway Rolling Stock

3.7.1 Current Conditions of Railway Rolling Stock in Central Asian Railways

Central Asian Countries are blessed with abundant underground resources such as petroleum, natural gas, coal, iron ore, rare metal, etc. In the former Soviet Union era, they were the mining and supply bases for such resources and their railways carried out an important role in transporting their resources to processing and consuming centers. Both railways and roads have large transport capacities, but almost all goods have been transported by railway, because of the long distances, poor road maintenance and icy roads in winter. In Kazakhstan, 95~98% of freight transport has been effected by railway rolling stock is carrying out an important role.

Table 3.7.1 Current Conditions of Central Asian Railways

		Kazakhstan	Uzbekistan	Turkmenistan	Kyrgistan	Tajikistan
Year		1996 – 97	1996	1993	1993	1993
Operated Line Length (km)		14,140	3,660	2,138	370	481
Number of Rolling Stock	EL	652	155	0	0	Unknown
	DL	2,114	1,377	331	62	
	EC	140	66	0	0	
	PC	2,345	1,573	491	500	
	FC	98,900	16,902	12,814	2,612	
Rolling Stock Heavy Repair Workshop	EL	tbasar Depot Starts KP-1	ashkent Workshop Under Project)		Unknown	
	DL	hu Depot Under Project)	ashkent Workshop Under Project)	ntrust to Uzbekistan, kraine, etc.		
	EC	ntrust to Ukraine, etc.	ashkent Workshop Under Project)			
	PC	JSC Rysty-AECRW Almaty PC Depot Under Construction)	ashkent PC Depot o.2 Under Construction)	ntrust to Kazakhstan		
	FC	JSC AWRZ Atyrau Depot (Under Project)	FC Depot New Workshop (Under Project)	C Depot		

As for the railway rolling stock control system in the former Soviet Union era, in order to restrain independent railway service by each republic's railway administration, new manufacture and heavy repair rolling stock workshops have been specialized and dispersed outside the republic's

Regarding the new manufacture of rolling stock, electric locomotive (EL) is made in Russia, diesel locomotive (DL) in Ukraine, shunting locomotive (SDL) in Russia, Ukraine or Czechoslovakia, passenger coach (PC) in Russia or East Germany, and almost all freight wagons (FC) in Russia.

Regarding rolling stock maintenance, each Central Asian Railway is carrying this out by itself except heavy repair. As for heavy repair, Tashkent Workshop of Uzbekistan Railway is the sole workshop of Central Asian Railways capable to carring out heavy repair of DL since the former Soviet Union days. It is general practice to entrust heavy repair of EL to Russia and of DL to Uzbekistan, Ukraine or Latvia. At present, however, projects to carry out heavy repair of rolling stock in own their countries are proceeding. In Kazakhstan and Uzbekistan, construction of PC heavy repair workshops under OECF loans are under way. Kazakhstan Railway has a workshop construction project for EL, DL and tank wagon heavy repair and Uzbekistan Railway has one for EL and FC heavy repair.

The numbers of rolling stock allotted to each Central Asian Railway by the former Soviet Union (the numbers for Kazakhstan and Uzbekistan are based on the recent JICA study) and rolling stock maintenance system are shown in Table 3.7.1.

3.7.2 Rolling Stock Plan of Kazakhstan Railway (KTZ)

Rolling stock plan of KTZ is shown in Appendix-4.1 and Appendix-4.2. an outline and some comments follow,

(1) Current situation of KTZ rolling stock and some comments

1) The number in per cent of rolling stock as at December 1996, having an age of more than 20 years, is 32% for EL, 24% for DL, 29% for PC and 48% for SDL, and that, having an age of more than 16 years, is 58% for FC. It is noted that many EL and DL should be replaced before and after 2010, assuming their life is 30 years, because their age is concentrated from 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.

   At the time of the round trip by electric multiple unit train (EC) to Atbasar, 229km distant westward from Astana, the Study Team obitained information on EC as follows.

   The EC is the same type as that used Uzbekistan. One unit consists of one motor coach and one trailer coach. The EC made in 1975～76 numbers 15 units(30 cars), that in 1978, 5 units(10 cars), that in 1983, 45 units(90 cars), that in 1995, 5 units(10 cars) and the total is 70 units (140 cars). The EC is operated within a radius of 140～300km from Astana and in the suburbs of Pavlodar. Operating frequency is about one train per day in each direction, but many passengers use the EC.

2) Mean availability during the past 3 years is 54% for EL, 33% for DL, 100% for PC, 52% for FC and 59% for SDL. As for EL, DL, FC and SDL, they are surplus in number, because freight transport, which has been decreasing after breakdown of the former Soviet Union has not yet recovered. As for PC, it is supposed that PCs under periodical inspection and maintenance are included in the available number (normally, regarded as unavailable).

(2) Rolling stock plan

1) Condemnation plan

Based on the existing plan as at December, 1996, the number in % of these to be condemned before 2010 is planned to be 38% for EL, 95% for DL, 49% for PC, 60% for FC and 95% for SDL.

2) Supplementation plan

According to the supplementation plan based on the same condition as mentioned above, 32% for EL, 93% for DL, 271% for PC, 92% for FC and 137% for SDL will be provided. EL and DL, which are actually surplus, is to be maintained in the present state. Number of PC and FC is respectively increased by more than 200% and 50% of the present in the expecting of increase of passenger and freight transport. The following plan is considered as measures to be taken in the supplementation plan.

- EL : EL is surplus until 2000. Rehabilitation work to prolong the life of an old locomotive by using sound equipment and parts of another aging locomotive is being carried out.

- DL : Restructuring work to replace the old engine by a new powerful GE' engine is being carried out. This restructuring work will be continued for the time being.

- PC : Rehabilitation of old PC is planned.

- FC : Remodeling work to tank wagon from surplus open type wagon is being carried out due to a large demand for tank wagons.

- SDL : New procurement only.

3) Existing plan and some comments

The supplementation number in the existing plan of KTZ is the accumulated number assuming non-supplementation due to fund shortage. In case the complete supplementation is done for each year, the following table is valid.

Table 3.7.2 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

The number in per cent of rolling stock increase in 2010 in comparison with the number in 1996 is 0% for EL, 62% for DL, 174% for PC, 103% for FC and 81% for SDL. Passenger transport increase is expected.

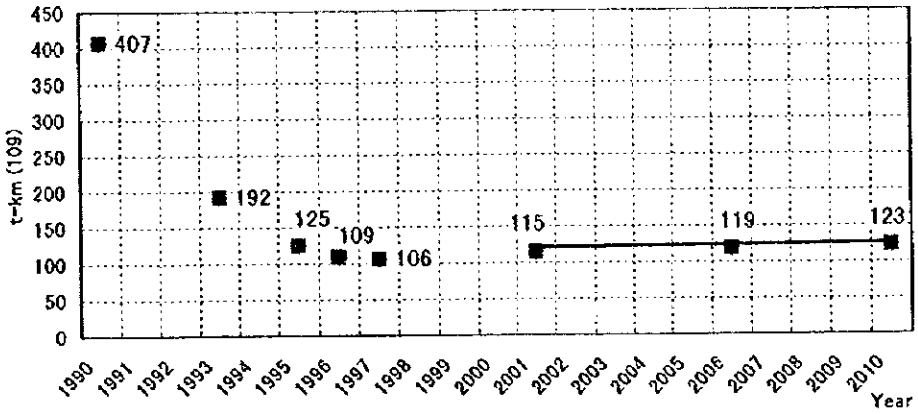


Fig. 3.7.1 State of Freight Transport

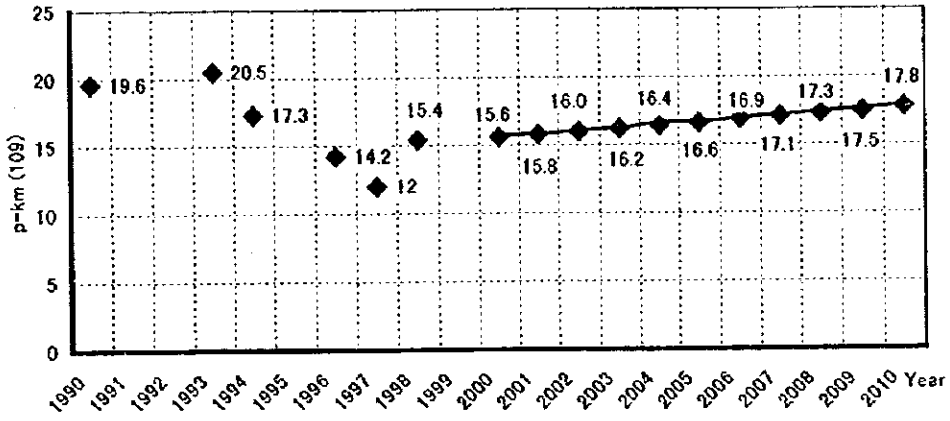


Fig. 3.7.2 State of Passenger Transport

The demand forecast in 1997 by European Bank for Reconstruction & Development (EBRD) is as follows. Regarding the freight transport, only the values of t-km for 2001 and 2006 are given. The value in 2010 is 123bln t-km as shown in Fig. 3.7.1, assuming linear growth. In case the value in 1996 is 100, that in 2010 is 113. As for passenger transport, the value of p-km for 1998 is given and 1.3 % increase per year in

and after 2000 is expected. Fig. 3.7.2 shows the result. In case the value in 1996 is 100, that of 2010 is 125. According to calculation, in consideration of present availability of PC and FC, necessary number of PC and FC in 2010 is 2,930 for PC and 58,000 for FC. Namely, number of PC and FC to be newly manufactured from 2000 to 2010 is 1,745 and 18,290 respectively. In case of KTZ plan, that of PC and FC is 2,905 and 62,490 respectively.

4) Rolling stock procurement plan

KTZ have no rolling stock procurement plan at present, and are studying the necessary number of rolling stock to meet transport demand in 1998, 1999 and 2000. Later they plan to.

Procure new rolling stock or take other measures in consideration of necessary holding and condemned numbers of rolling stock. Other measures are described in the above mentioned supplementation plan. Procurement price is shown in Appendix-4.2

3.7.3 Rolling Stock New Manufacture and Remodelled Manufacture

(1) There is no rolling stock manufacturing company in Kazakhstan and rolling stock is procured from CIS countries and other foreign countries.

(2) As for local manufacture of PC for which constant demand is expected in future and the manufacture of which is comparatively easy, a workshop construction plan is under study. In future, the production of subway cars, streetcars and freight cars in this workshop is also being considered.

Two alternative plans for construction new PC manufacturing of a plant are being considered. One is directed by the Ministry of Energy, Industry and Trade, Ministry of Science, and Science Academy, constructing the workshop in Petropavlovsk, where former military industrial plants are concentrated. The other is directed by the Ministry of Transportation and Communications and KTZ as shown in Appendix 4.1-4, constructing a workshop capable if manufacturing more than 100～150 PCs per year at the Rysty-AECRW plant in Almaty which is now undertaking heavy repair of PC. The detailed study is given 6.5.2

For the construction of a new PC manufacturing plant in Kazakhstan, it is necessary to obtain the license of Kazakhstan Standard Committee. In Kazakhstan,

however, there is no laboratory to undertake completion testing of PC. Therefore, the completed PC should be tested in Russia or a foreign country having a testing laboratory and should be certified.

(3) Kazakhstan has rich underground resources. It is considered that the export of fuel such as natural gas and petroleum is very important for the restructuring of the Kazakhstan economy. The railway as means of heavy freight transport means in the interior of the country must play an important role. Remodeling work of tank wagons from surplus open type wagons is to be carried out by DZMK a construction machinery builder in Taraz. The construction of new FC manufacturing plant is also under consideration.

According to the demand forecast of EBRD in 1997, there is a need for 175 new PCs annually.

3.7.4 Railway Rolling Stock Maintenance

(1) Current situation of maintenance and some comments

Inspection, maintenance and repair except heavy repair (KP-1 and KP-2) are carried out in the depots of KTZ. The heavy repair of PC is carried out by a local private repair company, Rysty-AECRW in Almaty, and now, in order to increase the capacity of PC heavy repair, a new workshop is under construction at the site of KTZ Almaty PC Depot under the OECF loan. The heavy repair of FC is done by a local private repair company, AWRZ in Akmola, especially for coal wagons, and by designated FC depots of KTZ. The heavy repair of EL, DL and SDL are entrusted to Russia, Ukraine and Latvia. In case a private company carries out heavy repair of the former Soviet Union made rolling stock, the company must have a license from the Russian Ministry of Railway. As for the depots of KTZ, it is not necessary to take such a license anew, they already have carried out the maintenance of rolling stock in former Soviet Union days.

According to the figures for PC heavy repair entrusted to Russia, the cost is 134 to 266% higher than that in Kazakhstan. Besides, 16 to 20 round trip days are lot in transportation, causing a increase useless in the holding number of PCs. Rolling stock heavy repair, including that of EL, DL and EC, should be carried out in Kazakhstan.

The time between heavy repairs of EL and DL is stipulated in running-km and their recent average running-km per year is shown in Appendix-4.2. According to rough calculation, the time between KP-1 is 5.5 years for EL and 4 years for DL, and the time between KP-2 is 16 years for EL and 9 years for DL. Incidentally, in the case of Uzbekistan Railway, that of KP-1 is 6 years for EL and 4.5 years for DL, and that of KP-2 is 12 years for EL and 9 years for DL. KP-1 is almost same but there is some difference for KP-2. It seems that KTZ advance.

(2) Rysty-AECRW

The Rysty-AECRW is selected as a model enterprise, because it is the sole company for heavy repair of PC in Kazakhstan and is the company expected for new PC manufacture. The company was established in 1943 and now is a Joint Stock Company (JSC). The company is carrying out heavy repair of PC, traction motor and wheel-set, and casting of brake shoe. The company is actively proceeding with the plan for new PC manufacture. Facilities such as cranes, etc. are already installed in the building and the necessary equipment and parts to manufacture prototype PC have already been arranged. As for the workshop construction for new PC manufacture, please refer to 6.5.2 . The outline of this company is shown in Appendix-2. The company has the license of the Russian Ministry of Railway for heavy repair of PC, traction motor and wheel-set, and casting of brake shoe.

(3) AWRZ in Astana

The AWRZ is selected as a model enterprise, because it is the sole company for heavy repair of FC in Kazakhstan. The company is carrying out heavy repair of freight wagons, excluding tank wagons, and wheel-sets, and produces oxygen for its own use and the general market. The company produces also simple spare parts for freight wagons such as washers, corner posts, step boards, latch, bolts, nuts, etc. The company has the license of the Russian Ministry of Railway for heavy repair of freight wagons. The outline of this company is shown in Appendix-2.

(4) ZIKSTO in Petropavlovsk

ZIKSTO in Petropavlovsk is expected to take over production of bogies and wheel-sets in the new PC manufacturing workshop construction plan. The company has received a letter from Director General of KTZ in early December

1997, requesting to carry out heavy repair of 520 tank wagons per year. The company has just prepared the work plan.

(5) 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 written.

3.7.5 Railway Rolling Stock Spare Parts

Regarding the 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 PC made in East Germany, the license is given at the time of procurement. Actually, most rolling stock spare parts, especially important ones, are procured from Russia and CIS countries and from Germany for PC. In the former Soviet Union days, the spare parts have been systematically provided under the state budget. However, at present, procurement of spare parts depends on the funding ability. There is no long-term procurement plan of spare parts due to lack of funds. Some companies in Kazakhstan casually make them in small lots. Depots of KTZ and rolling stock repair companies (Rysty-AECRW in Almaty and AWRZ in Astana) can make simple spare parts in small lots only for urgent needs.

As for other important spare parts of rolling stock, there are bearing and battery makers in Kazakhstan. There is the Stepnogorsk Bearing Plant (SBP) in Stepnogorsk, KAYNAR in Taldykorgan and KAZACCUMULATOR in Taldykorgan.

(1) SBP

The company was established in 1976 and fully privatized in November 1995. The company produces bearings only for railway rolling stock use in 10 automated production lines capable of producing 2 million bearings per year. Bearing assembly together with roller and ring manufacture is conducted in the main shop. Inner race and outer race are manufactured in the black smith's shop. The markets are Russia and CIS countries. Since 1977, 18 million bearings have been produced.

The reasons why the company produces bearings only for railway rolling stock

use are as follows. ① Current facilities are only for bearings of railway rolling stock. ② In the former Soviet Union days, there were 4 bearing manufacturers (2 in Russia, 1 in Ukraine and 1 in Kazakhstan). Manufacturers in Russia and Ukraine have produced general bearing together with railway rolling stock bearings. Their production output of general bearings fully meets the demand. ③ The company provides railway rolling stock bearings to CIS countries, taking a share of 70 %.

75 % of the employees are stock holders of the company and, as company policy, the value of them stock will increase according to the business results of the company. The company has an incentive system for quality improvement, production increase and cost reduction, and a merit award system in proportion to length of service.

The company is looking for a good foreign partner for future development.

(2) KAYNAR

The company was established in 1974. The company produces lead acid batteries for tractors and automobiles, but the railway rolling stock of KTZ does not use their lead acid batteries. The company is very active and the sales amount is 2,530 million Tenge per year. The workshop is very clean, but better environmental measures in handling lead and acid the needed.

(3) KAZACCUMULATOR

The company was established in 1977 and privatized in 1993 as a JSC, 90 % of whose stock is held by the Government. The company produces alkali batteries, dry batteries, pit lights for pit workers, etc. The company is in financial difficulties because of the sharp in decrease demand, because its customers are mainly the military, and Turkish and Chinese companies sell cheap but poor quality alkaline batteries. The company desires the Government to institute an import control policy for alkaline batteries. Generally, railway rolling stock is equipped alkaline batteries, because they are harmless for environment, maintenance is easy, and they weights less than lead acid batteries, despite high cost. The company is seeking adoption of alkaline batteries by KTZ.

(4) Current problems

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

1) It is necessary that many EL and DL are to be replaced before and after 2010.

2) One of the two alternative plans for new PC manufacture workshop construction should be selected.

3) Rolling stock heavy repair, including that of EL, DL and EC, should be carried out in Kazakhstan, from the view-points reduction of repair cost, reduction of necessary numbers and future development of rolling stock.

4) Railway rolling stock spare parts should be locally produced as far as possible, from the view-point of eliminating the problem of shortage spare and saving of valuable foreign currency.

3.8 Result of Analysis of Questionnaire Survey

3.8.1 Result of Analysis

(1) Method of Survey

Out of 480 companies supervised by MOEIT, 170 machinery companies operating at present were chosen and a questionnaire survey was made for them.

(2) Time of Survey

Distribution of questionnaire were made from middle November to beginning December 1997 and they were collected by 10th February 1998 Effective reply: 47 companies

(3) Result of Analysis

1) Location of enterprise: The locations of enterprises who replied to thequestionnaire are Ust-Kamenogorsk, Almaty, Pavlodar, Karaganda, Akmola,Lenger, Semipalatinsk, Toguzak, Kzyle-Orda, Kentau, Petropavlosk. Out of theseplaces, from Almaty the largest number of enterprises replied which amounts toabout a half. The next was Akmola and Karaganda in order.

2) Capital: Nearly about a half of companies whose questionnaire were recovered did not reply on their capital. The capital amount of the companies who replied were from U.S.$26,000 to U.S.$6,300,000 which differ much respectively.

3) Type of company: Almost all companies who replied were joint stock company.

4) Sales amount: Each companies differ much, but the largest are is the company manufacturing machinery relating to petroleum oil having the sales amount of U.S.$23.2 million, and only about 10 companies have the sales amount over U.S.$5 million.

5) Business line: Many manufacturers are in the line of agricultural machinery and mining machinery.

6) Market: Many enterprises are selling to local market and overseas, but mainly CIS countries, and there are some companies whose market one hundred percent is in overseas.

7) Owned equipment: Nearly half enterprises have the equipments of assembling, machine processing, sheet metal processing, heat processing, painting, etc. In addition, one-third enterprises have forging and casting equipments.

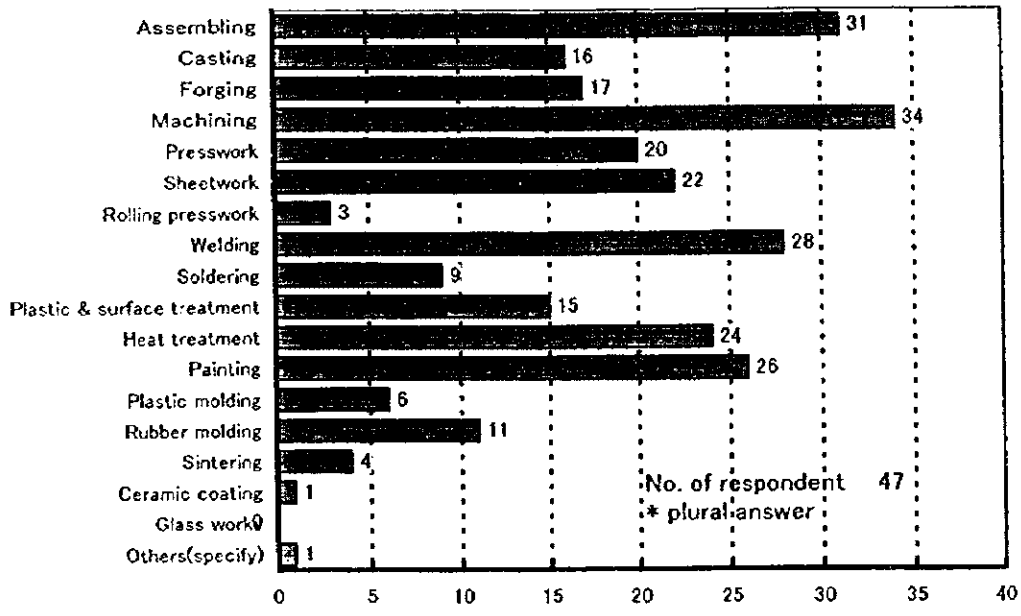


Fig. 3.8.1 Production Process

8) Sub-contractor: About one-third enterprises have sub-contractors and the rest do works by themselves independently.

Utilization of Sub-Contractor	
YES	NO
18	29

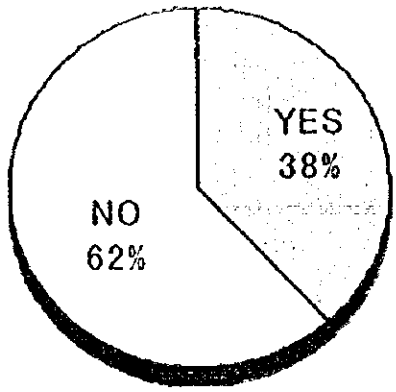


Fig. 3.8.2 Utilization of Sub-Contractor

9) Evaluation on sub-contractor: Parent companys' evaluation on sub-contract is low on quality, supply quantity, delivery, price, technology level, management, entrepreneurial spirit, etc., but satisfactory on the other factors.

Table 3.8.1 Questionnaire: Evaluation of Sub-Contractors

	Valuation	Low (-1)	Fair (+1)	Sufficient (+2)
Product Quality	1.11	2	10	6
Supply Capacity	1.40	1	3	6
Delivery	1.11	0	25	3
Costs competitiveness	0.50	5	6	3
Technical level	1.15	1	14	5
Management	1.11	0	16	2
Entrepreneur ship	1.06	0	17	1

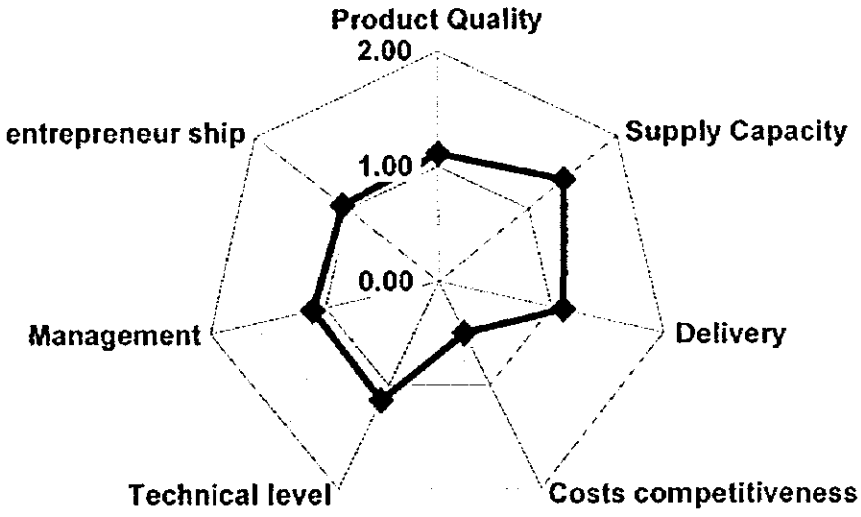


Fig. 3.8.3 Evaluation of Sub-Contractor

10) Management problem: The followings are the understanding on the problems relating to management.

- Production capacity: About half enterprises understand excess capacity, but the rest understand reasonable or not sufficient.
- Procurement of material: About half enterprises point out dear price of material, inability of stable procurement, quality problem, etc.
- Workers' number: Almost all enterprises understand it reasonable, but some insufficient.
- Workers' wage level: Almost all enterprises recognize no problem, but there are some pointing out high wage and high rise.
- Workers' technical level: Almost all enterprises are satisfied with workers' quality.
- Managers: About half enterprises evaluate the quality of managers fair, but about 20 percent of them evaluate not sufficient.
- Machinery and equipment: Although there are some enterprises having no problem, about half point out that there is some trouble for operation or the equipment are too old.
- Fund requirement: Although half enterprises have no difficulty for fund raising, there are some having difficulty.
- Pollution measures: About half enterprises have no problem, but on the other hand nearly same number of them have a problem consciousness on the necessity of some counter measures for air pollution and water pollution.
- Development of products: About half enterprises have no problem, but on the other hand nearly same number of enterprises point out the problem of technical level or shortage staff.

11) Company restructuring plans: The reply on the present condition and future program of the restructuring plan is as follows.

- Reduction of department: About one-third enterprises are on the way of reducing their scale, and other one-third have a plan to do it in future. Therefore total about 70 percent of enterprises are orienting themselves to reduce their scale to some extent and the rest 30 percent have no such plan.

Table 3.8.2 Questionnaire: Management Problems

	Not sufficient	Just sufficient	Excess
Production Capacity	2	13	15
	High price	Not stable delivery	Low quality
Materials	25	21	23
	Short	Enough	Too many
Workers' number	3	68	3
	No Problem	Too high	Too rapid increase
Workers' wage level	32	2	2
	Low	Medium	High
Workers' technical level	1	50	4
	No problem	Not enough skill	Not enough number
Managers	24	8	1
	No problem	Not smooth operation	Too old
Machinery & Equipment	5	21	12
	No problem	Difficult	
Fund recruitment	17	6	
	No problem	Necessary for air	Necessary for water
Pollution measures	17	11	7
	No problem	Not enough skill	Shortage of staff
Development of Products	18	11	5

- Setup another company: As for the plan of setup another company, about half enterprises have no such plan, the rest have it as future plan.
- Financial relationship with overseas company: About one-third of enterprises have no capital link-up with overseas companies and the rest have it already or are planning to have it, each one-third respectively.
- Technical relationship with overseas company: About one-third of enterprises have no relationship, but the rest have it or are planning to have it.
- Collaboration with Japanese company: The company not collaborating with Japanese company amounts to two-third. Only one company replied that they have a collaboration relation now and about one-third replied under planning.
- Investment on new product: The companies who replied they are investing on new products amount to about a half, which will occupy nearly 80 percent together with such companies who replied under planning.
- Investment on production technology improvement: Although about 30 percent of companies are not investing for production technology, about half companies replied they have such plan and about 70 percent, together with such companies who are practising, are active to tackle with improvement of their production technology.

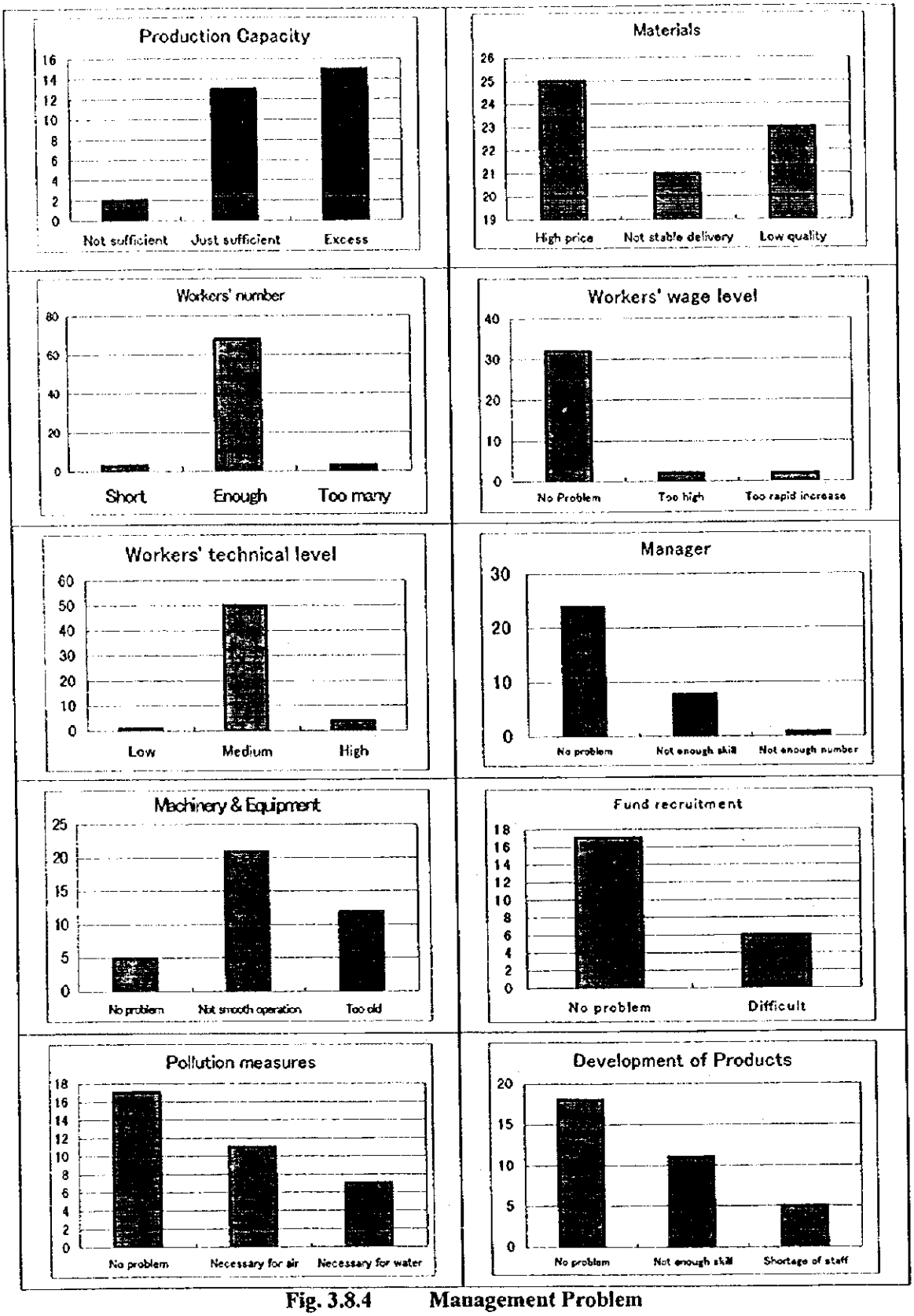


Fig. 3.8.4 Management Problem

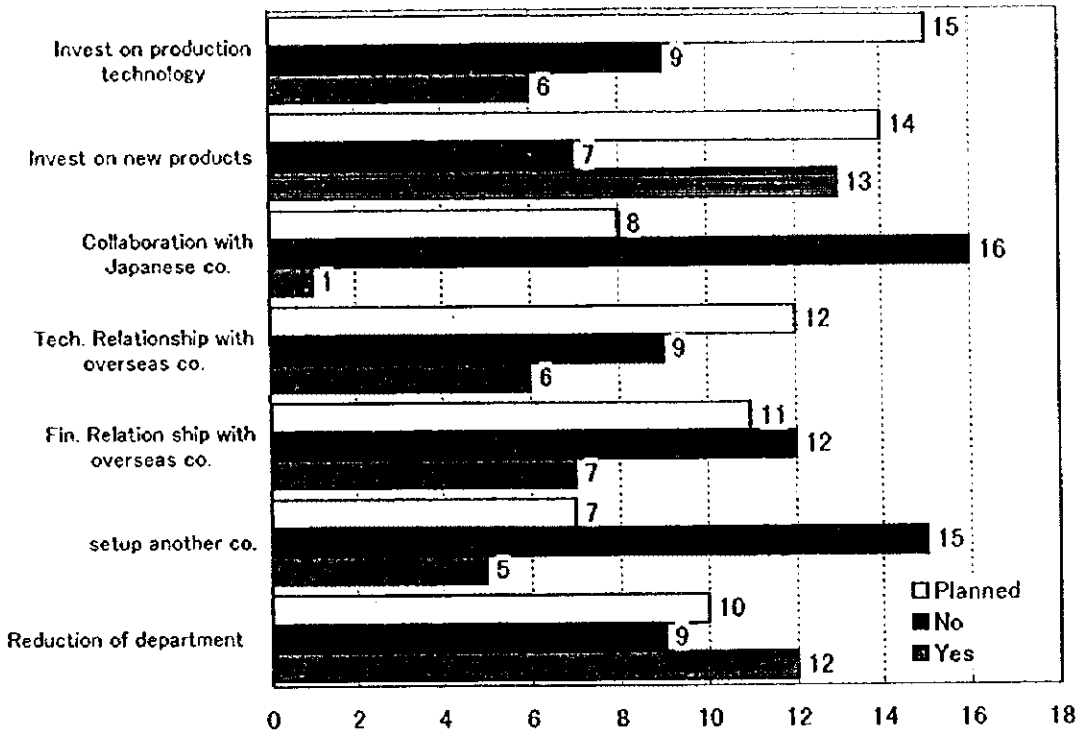


Fig. 3.8.5 Company Restructuring & Development Plans

12) Expectation from government: the followings are the result of the questionnaire on the expectation for technical or financial assistance from government.

- As for technical expectation, about half companies are expecting the tender information on technology and market. As for research and development (R&D), it also occupies about a half. Subsequently about 20 percent companies are desiring worker' job training, consulting service on trade practices, promotion of standarization, etc.

- As for financial expectation, about 60 percent companies are expecting tax reduction on investment and fund assistance and further there mush expectation on tax reduction on export also.

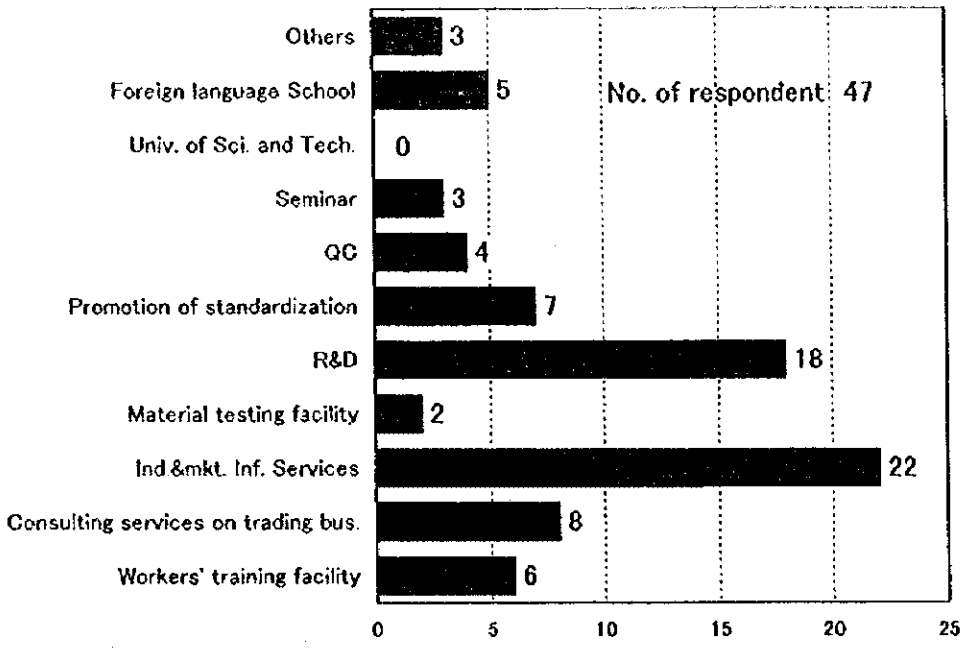


Fig. 3.8.6 Technical Assistance

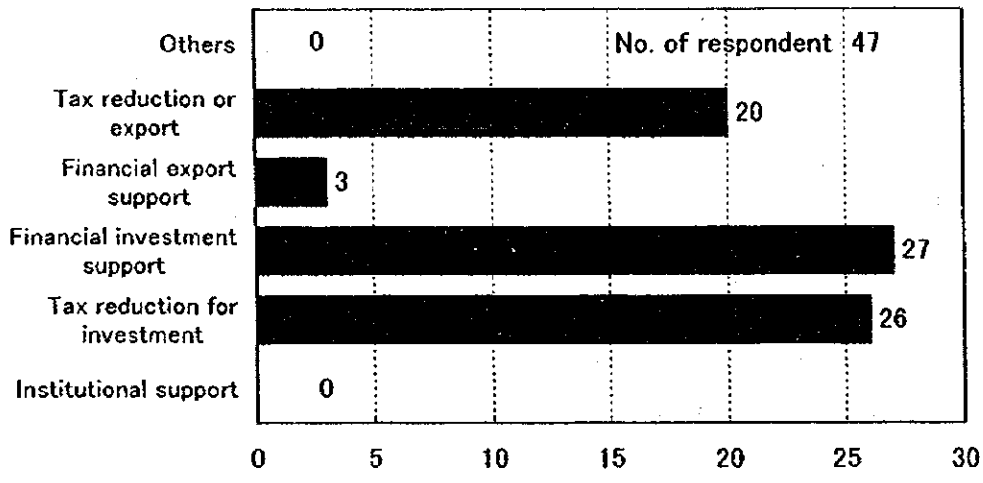


Fig. 3.8.7 Financial Support