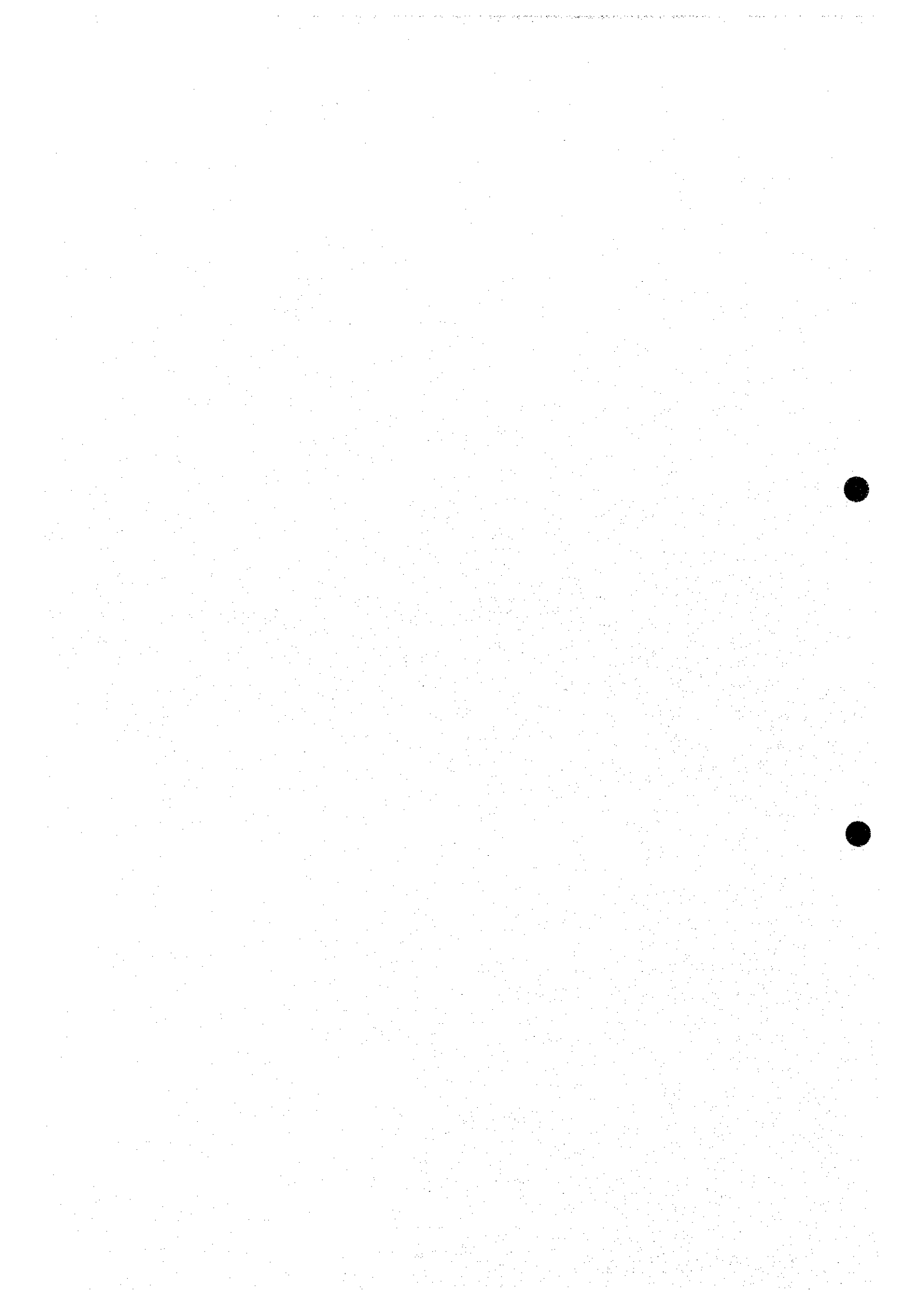


Part III : Action Plan



5. ACTION PLAN FOR THE MACHINERY INDUSTRY PROMOTION

5.1 Government Support Measures for Industry Promotion

Various government measures for machinery industry promotion, divided according to the short term, medium term and long term, were compiled and a schedule for the execution of these was proposed.

Here, the short term refers to the period between 1999-2001, the medium term to the period between 2002-2004, and the long term to 2005 onwards.

(1) Short to Medium Term Development Issues

In order for the machinery industry to survive in the medium to long term, it needs to achieve international competitiveness through pursuing specialization and tie-ups with international corporate groups, etc. However, before this can be achieved it is first necessary for companies to adopt market-oriented production system. Priority issues that first need to be tackled in order to achieve this are the disposal of existing surplus equipment and facilities and renewal of deteriorated equipment.

As for external factors that prevent the machinery industry from securing international competitiveness, review of VAT application and clarification of accounting criteria are just two of the areas where the government should provide immediate support. It is also necessary for the government to immediately improve fund provision functions to aid the reconstruction of companies.

Specific measures for achieving the above are described in section 5.2.

(2) Medium to Long Term Development Issues

On the company level, it is necessary to build a rational industrial structure and secure competitiveness in international markets. In order for the machinery industry to achieve international competitiveness, in addition to establishing specialist makers of parts and components, efforts should be made to bolster the industry as a whole and build a rational industrial structure. Moreover, through pursuing tie-ups with international corporate groups, companies should strive to introduce the latest technologies and produce competitive products.

As for government support measures, functions should be introduced and enhanced for providing the latest market and industry information required by companies, and for educating company personnel about market-oriented management and marketing.

Specific measures for achieving the above are described in section 5.3.

5.2 Legislative and Financial Support Improvement Measures

5.2.1 Review of VAT Application

It is desirable to see the existing dual system of VAT taxation be resolved. In the current environment of dual taxation, not only are domestic products deprived of price competitiveness compared to imports, but it is difficult to promote specialization. In order to eliminate double or triple VAT levied at the time of production or distribution of materials or products, the double tax system should be reviewed so that VAT on purchasing costs should be deducted from VAT levied on sales turnover.

5.2.2 Improvement of Liquidity

Deficiency of cash liquidity is one of the most basic problems facing the machinery industry. Barter trading and cash hoarding, etc. are extremely ineffective and make it even more difficult to achieve the liquidity that is needed for industrial restructuring.

(1) Restoration of Confidence in Financial Agencies

The government needs to improve confidence in financial agencies to encourage the movement of currently hoarded cash in mattresses to the official financial system, so that it can then be diverted for use in production activities. Since this issue revolves around the basic problem of trust in banks, it should be possible to restore confidence if the government takes measures to guarantee savings, etc. and so protect depositors.

(2) Public Bankruptcy Proceedings

There are currently many companies in a financially bankrupt state that are unwilling to file for bankruptcy due to administrative and psychological factors. From the viewpoint of improving liquidity, it is necessary to encourage such companies to dispose of their assets and file for bankruptcy.

In the machinery industry in Kazakhstan, there are companies (especially among those which are not model companies) that have not paid salaries and other working capital for a long time and are essentially in a non-operating state. Considering that the

those companies that have been insolvent or in debt for more than a year should be placed under government control and initial proceedings for their liquidation advanced upon conducting detailed study of those company affairs.

The Ministry of National Revenue and Agency of Restructuring and Liquidation of Enterprises should play the central role in clarifying bankruptcy criteria and proceedings, and the government should provide the necessary financial support and training of specialists to aid the execution of bankruptcy proceedings.

The following gives an outline of bankruptcy proceedings in Japan.

Range of application: Companies that are insolvent or in debt

Proceedings:

1. Petition for bankruptcy
2. Declaration of bankruptcy
3. Appointment of an administrator in bankruptcy
4. Staging of a meeting of creditors
5. Determination of claims by the administrator in bankruptcy
6. Conversion of company assets
7. Establishment of the bankrupt's estate
8. Payment of creditors from the bankrupt's estate
9. Company liquidation

5.2.3 Rationalization of Investment Procedures

(1) Disclosure of Information

Information disclosure is not carried out adequately due to the bureaucratic legacy of the former system. In order for information disclosure to be advanced, it is necessary for objective assessments to be carried out by external agencies. Moreover, through drawing up a comprehensive list of the necessary criteria, etc. for qualifications and procedures, an environment must be created whereby investment activities can be smoothly conducted. Such criteria should be clearly stipulated and published as information that is readily accessible to entrepreneurs.

(2) Strengthening the Role of the State Investment Committee

In order to resolve problems of investment proceedings, the State Investment Committee should make a greater effort to expressly stipulate and simplify proceedings. Comprehensive study of private business, including the monitoring of restraints on

investment activities, has not been conducted recently. This is something that should be included in the State Investment Committee activities, and the successful implementation of this would lead to the rationalization of legally established rules and proceedings.

5.2.4 Financial Support for Company Rehabilitation

Both state-owned and private sector enterprises do not possess the sufficient funds necessary to carry out the most urgently required improvements described above. Accordingly, financial support from foreign and international agencies is required to carry out company rehabilitation.

(1) Support by Foreign and International Agencies

The government needs to subsidize the funding that is required for the reconstruction of companies until investors emerge in the private sector. Investors, whether they be domestic or foreign, need to possess sufficient technical and financial capacity to lead companies towards success. Until companies become able to operate on a commercial base is, the government should seek the necessary funding for plant renewal from foreign and international agencies and lend these funds to agencies similar in nature to the Rehabilitation Banks so that they can provide loans to individual companies.

(2) Execution Measures

The following describes the process of implementing financial support.

- Upon reviewing whether or not the existing Rehabilitation Banks are able to act as windows for two-step loans, related government agencies such as the Ministry of Finance, Strategic Planning Agency and MOEIT should establish appropriate window agencies. It is desirable that such window agencies be staffed by foreign experts with ample work experience. However, since ODA funding cannot be secured unless the recipient country provides government assurance, it is first necessary for consensus to be established within the government.
- The MOEIT should take the initiative in selecting companies where reconstruction is still viable and allocating the necessary funds to these. Ordinarily speaking, companies themselves should take the initiative in formulating business reconstruction measures, however, judging from the current conditions in the machinery industry, external business consultants should be recruited to conduct

feasibility studies in cases where companies have difficulty in formulating their own measures.

- Since some companies do not even possess enough funds to cover the cost of a feasibility study, the government should consider bearing all or part of the cost. Also, consideration should be given to implementing technical cooperation by foreign countries or international agencies.
- In selecting companies where reconstruction is viable, the wishes and opinions of company managers should be respected and prospective companies should be advertised through newspapers and other forms of mass media. From the companies that apply, those with high priority should then be selected as targets for funding. At this point, the reasons for selecting the target companies should be publicly disclosed with a view to gaining the consent of citizens regarding the use of public funds.
- Companies where reconstruction is viable should be selected based on the following criteria:
 - Industrial sector capable of producing products for which future demand can be envisaged
 - Industrial sector where there is good business management and technical potential
 - Industrial sector capable of attracting new investment

5.3 Development of Functions for Machinery Industry Promotion

5.3.1 Development of Industrial Associations

The machinery industry is currently faced with a number of issues as it strives to come to terms with the shift to a market economy; for example, the production setup in the industry is not oriented to a market economy, there is hardly any linkage between companies, and business managers need to start by reforming their own thinking. Meanwhile, the government and industry itself are aware of the need to develop industrial associations to aid company growth, and a number of such associations have already been established. The Industrialists and Businessmen's League, which was established in September 1992, is a association for relatively large-scale business owners; whereas the Entrepreneurs of Kazakhstan is a group intended for small and medium enterprises. Both of these associations operate by means of a membership system and do not receive any financial support from the government.

Since it would be difficult in the current conditions to establish industrial associations to serve only the machinery industry, it is more realistic to set up machinery industry subcommittees and promote diversified development within these existing associations. If the MOEIT could maintain close links with these associations to monitor industry developments and reflect wishes of the associations in government policy, it would be possible to establish a joint setup of cooperation between the public and private sectors.

The desired activities of industrial associations are as follows:

1. Exchange of industry information
2. Activities to promote capital and technology tie-ups
3. Human resource development and technical upgrading
4. Joint research and development
5. Policy recommendations to the government
6. Participation in the establishment of quality criteria as national standards
7. Exchange with neighboring countries

5.3.2 Enhancement of Functions for Collection and Provision of Market and Industry Information

Functions for the collection and provision of market and industry information, which is necessary to promote the product development and production activities and retailing and servicing activities of companies, are required. In view of the current conditions in Kazakhstan, the government should provide leadership and support in developing such functions. It is necessary to establish a Machinery Industry Information Center in order to promote the collection and provision of market and industry information.

Fig. 5.3.1 illustrates the system of information collection and provision that is envisaged in the Machinery Industry Information Center.

The envisaged roles of the Machinery Industry Information Center are as follows:

1. Authorization of information that is required by machinery industry producers, investors and other participants in the machinery market, and drafting of information collection plans
2. Implementation of information collection activities
3. Standardization and analysis of output
4. Advertisement and provision of collected information

Moreover, it would be realistic to develop the Machinery Industry Information Center based around the Machinery Industrial Center, which was established by government ordinance in January 1998. The steering committee of the Machinery Industrial Center consists of representatives selected from the Ministry of Science, the Ministry of Defense, the Ministry of Agriculture and the MOEIT, and its duties also include the collection and analysis of machinery industry marketing information.

Furthermore, as a temporary measure to serve until establishment of the Machinery Industry Information Center, the existing Machinery Industrial Center should be given the responsibility of providing information on used equipment, in order to expedite the disposal of surplus equipment and facilities (an issue that requires immediate attention).

5.3.3 Enhancement of Management Technology and Marketing Education Functions

Another issue requiring urgent attention in the machinery industry concerns the fostering of business managers who are capable of responding to the rigorous demands of the market economy. Education functions particularly need to be enhanced regarding the areas of management and marketing.

Education concerning management and marketing is currently mainly implemented by the Kazakhstan State Academy of Management and the International Academy of Business. The Kazakhstan State Academy of Management operates as a university education agency, while the International Academy of Business also conducts a correspondence course for businessmen who have at least three years' work experience.

In addition to the above, management and marketing courses are provided by a number of vocational training schools.

Common business subjects for all industries are being provided by these organizations, however, the specialized matters for the machinery industry should be planned and implemented by the Machinery Industrial Center in cooperation with other related organizations.

Moreover, concerning dissemination of the ISO certification system, a setup centering around the State Standard Committee of Kazakhstan, which currently handles ISO affairs, should be established to train inspectors and internal auditors in companies.

5.3.4 Support of Testing and Research and Enhancement of Production Technology and Skill Training

In order to aid research and development and the advancement of production technology and skills in companies, it is necessary to establish a public body that possesses the following functions:

1. Implementation of testing and research consigned by companies
2. Provision of advice and guidance to companies on testing and research plans and equipment
3. Training in advanced production technology and skills

For development of testing and research, since the Engineering Academy already conducts research and development of machinery elements and implements some of the above functions, research and development functions for the machinery products will be incorporated in the Machinery Industrial Center in future and the Engineering Academy will be also member of the Committee of the Machinery Industrial Center.

5.3.5 Measures for the Development of the Machinery Industrial Centre

The functions required for the promotion of the machinery industry stated above can be summarized as follows:

- Information collection and provision
- Planning and implementation of training
- Support of research and development

The Machinery Industrial Center should be nurtured as an agency possessing the following functions in cooperation with the other related organizations.

As of January 1998, the functions of the Machinery Industrial Center are prescribed as follow: 1) marketing and development planning of machinery products, 2) machinery research and development, 3) support and dissemination of quality control, and 4) manufacture of special equipment (for emergency support activities) for the Ministry of Defense. Concerning the fourth function, it is desirable to set up a separate organization to enable the acceptance of technical support from overseas, however, if this is not possible, it is necessary to prepare a setup whereby it can be explained to the third parties that this work is limited to manufacturing equipment for emergency support

measures.

The action plan for the aforementioned machinery industry promotion measures, as well as links with related agencies and division of responsibilities, etc., are indicated in Tables 5.3.1.

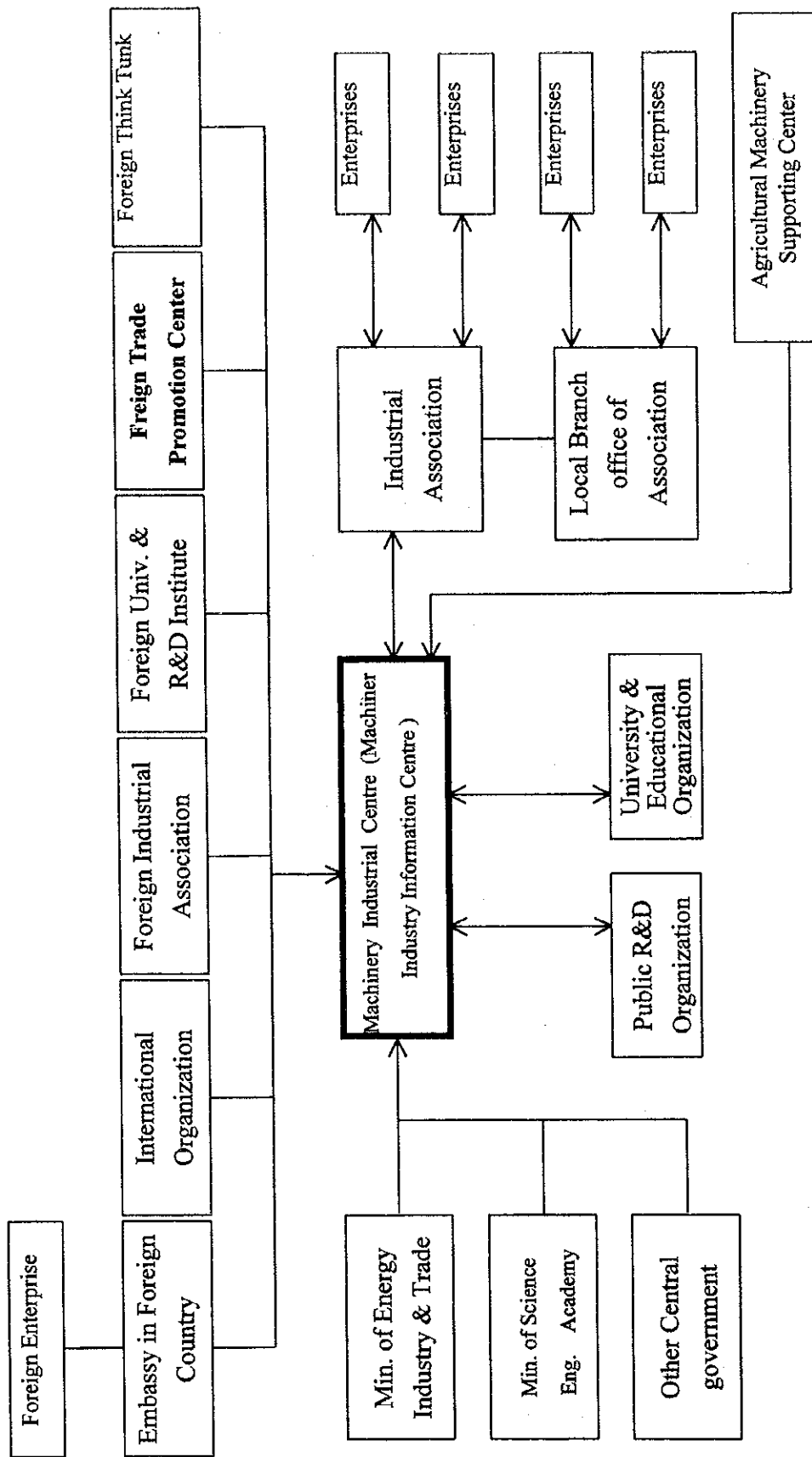


Fig. 5.3.1 Collection and Supply System of Machinery Industry Information by Center

Table 5.3.1 Roles of the Related Agencies in the Development of Machinery Industry Promotion Functions (1)

	Proposed Program	Ministry of Energy, Industry and Trade	Machinery Industrial Center	Engineering Academy	Science Academy	Technical Universities	Kazak State Academy of Management	International Academy of Business	Industrialists and Businessmen's League	Entrepreneurs of Kazakhstan	Investment Promotion Center	State Standard Committee of Kazakhstan
I	Industrial Associations								©	Small and medium enterprises		
(1)	Organization of information systems and information provision	Provision of information on systems and policy							Collection and analysis of industry information	Collection and analysis of industry information		
(2)	Activities to promote capital and technical tie-ups	Attraction of foreign investors	Provision of technical tie-up information								Introduction of foreign capital	
(3)	Human resource development and technical advancement, etc	Planning guidance					Arrangement of seminars, teaching materials, lecturers and facilities	Arrangement of seminars, teaching materials, lecturers and facilities	Review, planning and implementation of seminar contents	Review, planning and implementation of seminar contents		
(4)	Joint research and development		Provision of development information		Provision of development information	Research support			Research support	Research support		
(5)	Policy recommendations to the government	Information exchange							Hearing of companies' opinions and drafting of recommendations	Hearing of companies' opinions and drafting of recommendations		
(6)	Participation in establishment of quality criteria as national standards								Staging of standard establishment review meetings			Establishment of standards
(7)	Exchange with surrounding countries	Guidance and support of exchange plans							Planning	Planning		
II	Enhancement of information collection and Provision Functions		©									
(1)	Drafting and coordination of information collection plans	Guidance of planning	Planning									
(2)	Information collection activities		Collection of market information		Collection of product development information				Collection of company information	Collection of company information	Collection of investment-related information	Collection of standard establishment information
(3)	Output standardization and analysis activities		Review of necessary information									
(4)	Advertisement and provision of information	Provision of information on systems and policy	Advertisement and provision of information contents						Provision of information to companies	Provision of information to companies		

(Note) ©: Agencies that play the central role

Table 5.3.1 Roles of the Related Agencies in the Development of Machinery Industry Promotion Functions (2)

Proposed Program	Ministry of Energy, Industry and Trade	Machinery Industrial Center	Engineering Academy	Science Academy	Technical Universities	Kazak State Academy of Management	International Academy of Business	Industrialists and Businessmen's League	Entrepreneurs of Kazakhstan	Investment Promotion Center	State Standard Committee of Kazakhstan
III Management Technology and Marketing Education						©	©				
(1)	Planning guidance					Planning and staging of management technology seminars		Advertisement of seminars	Advertisement of seminars		Dissemination of the ISO certification system
(2)	Planning guidance						Planning and staging of marketing seminars	Advertisement of seminars	Advertisement of seminars		
IV Support to Testing and Research and Production Technology Education		©	©								
(1)		Implementation of testing and research	Implementation of testing and research		Implementation of joint research						
(2)		Advice and implementation	Advice and implementation	Advice and implementation							
(3)	Planning guidance	Provision of technical information	Setting of plans		Education activities in the regions			Advertisement to companies			

(Note) ©: Agencies that play the central role

5.4 Implementation Schedule

The major policies and execution schedule relating to legislative and financial support and development of machinery industry promotion functions as described above, have been compiled in the manner shown in Table. 5.4.1.

Table 5.4.1 Implementation Schedule of the Proposed Program

	1999	2000	2001	2002	2003	2004	2005	Degree of Priority
A. Legislative and Financial Support Improvement Measures								
1. Improvement of VAT								1
1) VAT dual taxation and review of the tax rate	■							
2. Improvement of liquidity								1
1) Review of improvement measures for protecting depositors	■							
2) Execution of policies based on the review findings		■						
3) Expediting of bankruptcy proceedings		■						
4) Expediting of the disposal of surplus equipment and facilities		■	■	■				
3. Rationalization of investment procedures								2
1) Disclosure of information	■	■	■	■	■	■	■	
2) Strengthening the role of the State Investment Committee	■	■						
4. Financial support for company reconstruction								1
1) Fund raising and setting of window agencies	■	■						
2) Implementation of feasibility studies for company reconstruction	■	■						
3) Selection and financial support of target companies		■	■	■				
B. Development of Machinery Industry Promotion Functions								
1. Development of the Machinery Industrial Association								2
1) Enhancement of existing business association	■	■						
2) Establishment of a machinery industry subcommittee		■	■					
3) Establishment of operating regulations for industrial association			■	■				
4) Establishment and activities of industrial association				▼	■	■	■	
2. Enhancement of Information Collection and Provision								1
1) Enhancement of the existing Machinery Industry Center (collection and provision of information on used equipment)	■	■						
2) Strengthening of analysis and provision of information		■	■					
3) Establishment of operating regulations for the new center			■					
4) Establishment of the Machinery Industry Information Center				▼	■	■	■	
3. Implementation of management and marketing education								2
1) Confirmation of company needs	
2) Formulation of education plans	
3) Holding of seminars and short-term schools	
4. Support of Testing and Research, and Technology Education								2
1) Detailed examination of the contents of testing and research (Machinery Industrial Center, Engineering Academy)	■							
2) Human resource strengthening at the related Organizations		■						
3) Installation of necessary facilities and equipment			■	■				
4) Implementation of testing and research, and technology education					■	■	■	

: Periodic implementation

The figure "1" indicates top priority issues

▼: Establishment and start of activities

6. INDUSTRIAL RESTRUCTURING PLAN

6.1 Industrial Restructuring Basic Plan

As was mentioned earlier, the machinery industry finds itself in a very difficult environment, and the same is also true of priority sectors. Accordingly, it is necessary for almost all companies to take measures such as downsizing and division of labor in order to achieve appropriate company size. Then, in the second stage of medium to long term measures, an industrial restructuring basic plan which aims to expand production should be formulated.

6.1.1 Subjects from the Short to Medium Term Viewpoint (liquidation and downsizing of surplus equipment and facilities)

With a view to achieving rational disposal based on information exchange within the industry, it is recommended that measures for the liquidation and downsizing of surplus equipment and facilities be advanced in the following order: 1) compile development strategies on the level of companies, and 2) provide government support for the disposal (selling and scrapping) of equipment and facilities.

(1) Drafting of Development Strategies on the Individual Company Level

Companies need to decide whether to concentrate on parts and components manufacture or on final assembly, based on judgment of marketability and competition in international markets, etc. As was proposed in Chapter 4, since the survival of companies, i.e. the securing of profits based on marketability, should take priority, it is desirable that consideration first be given to the manufacture of parts and components.

Based on consideration of the potential for making marketable products, it is necessary to properly assess the organization of companies, the quality of their employees and the business resources (personnel, goods, cash) they possess.

Based on judgment of this market potential and quality of business resources, business owners should establish a future concept for their companies and compile development strategies in which they decide on the departments to maintain and the ones to abandon.

Concerning company equipment and facilities, the target is to raise current operating rates to 70%. Based on the contents of subjects from the medium to long term viewpoint described in 6.1.2, companies should consider selling or scrapping equipment and facilities that are deemed to be surplus to requirements.

(2) Support Measures for Disposal of Equipment and Facilities

As was mentioned in the preceding chapter, in order for companies to downsize their equipment and facilities, it is necessary for the government to provide support in terms of both legislation and financial assistance.

Since much machine equipment is deteriorated and surplus to requirements, most of it will end up being scrapped, however, since there will be cases where equipment deemed to be unwanted by one company can be utilized by other companies, it is important that companies exchange information regarding the disposal of equipment.

Moreover, since there are also cases where equipment deemed unnecessary by other companies can be incorporated into line revisions that improve production efficiency, the existing Machinery Industrial Center should be allowed to function as a collector and provider of used equipment information and the government should support the overall industry in efficiently disposing of equipment to CIS and other nearby countries. Moreover, in Japan, since the recycling business, whereby reusable parts from used machinery intended for scrapping are removed, repaired and sold, has become an established business sector, consideration should be given to fostering similar businesses in Kazakhstan. It should be relatively easy for companies that have operated in the machinery industry until now to change over to this line of business. The growth of such a business will enable the sale and scrapping of deteriorated machinery to be conducted efficiently. Since Kazakhstan is a large country and its major cities are spread out, recycling businesses should be developed in each city so that scrap machinery can be recycled as raw materials for casting.

In line with the downsizing of equipment, it is necessary for companies to reduce the scale of plant facilities. Since funds are also required to alter overall plant layouts including power and water utilities, the government needs to provide financial support to companies to encourage equipment and facilities renewal.

6.1.2 Subjects from the Medium to Long Term Viewpoint (key products and development methods)

The objectives of industrial restructuring are as follows: to enable machinery manufacturing companies to achieve a relative position of quality and price superiority in competition with rivals in foreign countries; to establish production system that are

responsive to the size and growth potential of markets (domestic and international); and to build a rational industrial structure that guarantees stable production into the future.

The MOEIT and Science Academy compiled a draft plan for the short term entitled the State Program of the Machinery Complex Development in the Republic of Kazakhstan for 1998-2000, in February 1998. Whereas this program considers only the short term, the plan discussed here explores methods of carrying out industrial restructuring in both the short term and also the medium to long term (2001 and beyond).

The State Program of the Machinery Complex Development in the Republic of Kazakhstan for 1998-2000 has already identified and set numerical targets for products that should be developed in each sector. It is necessary to investigate the contents of these targets and an attempt was made to forecast product-separate demand in this study, however, due to a lack of data concerning market scale and the supply and demand balance, it was not possible to make quantitative judgments. Having said that, regarding the identification of key products, parts and components for development, elements affecting product development (Refer to Fig. 6.1.1 Conceptual Diagram of the Approach to Industrial Restructuring) have been proposed for each priority sector based on consideration of current internal and external marketability by product.

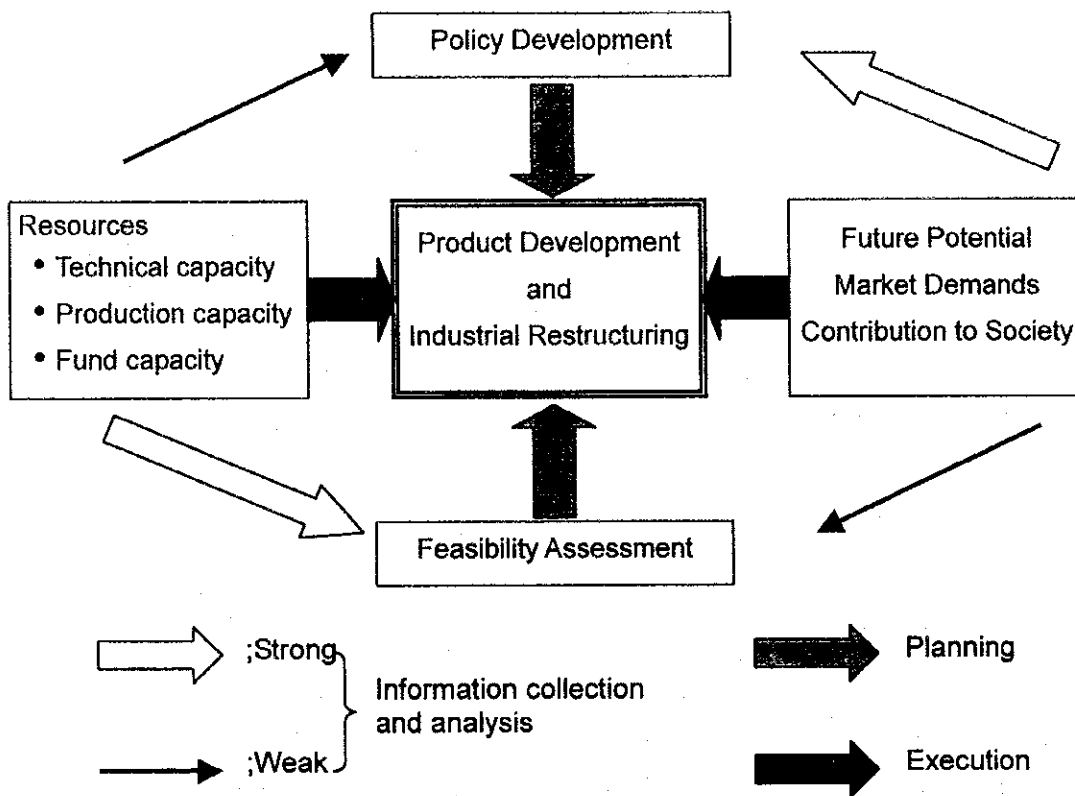


Fig. 6.1.1 Conceptual Diagram of the Approach to Industrial Restructuring

6.2 Industrial Restructuring Plan for Farm Machinery

6.2.1 Key Products Development

In consideration of section 3.4.1 (Farm Machinery), the selected types of farm machinery that are in particular need of corrected quality targets supply setup rationalization are the following products used in the production of cereals:

- 1) Large and medium, four-wheel-drive wheel tractors and medium crawler tractors for pulling tillage, farmland consolidation and sowing machines
- 2) Large crawler combine harvesters and pulled ground levelers and sowing machines. These agricultural work machines are selected for use in the central northern grain belt, where climatic conditions make it necessary to finish sowing and harvesting work in a relatively short period.

The selected key products are as indicated in Table 6.2.1: these consist of six finally assembled products and five key components that are fitted into these final products.

Table 6.2.1 Key Products Development

Product	Type	Work Capacity Class and Content	Product No.
Wheel tractor	4-wheel-drive	Large, 5 tons (equivalent to the K-700 series)	mpa114
Wheel tractor	4-wheel-drive	Medium, 4 tons	mpa113
Crawler tractor	Non-rigid, suspended	(equivalent to the T-150 series) Medium, 4 tons (T-95)	mpa112
Combine harvester	Crawler	Large (reaper width: 7.6-8.6 m)	mpa121
Cultivator	Pulled	Heavy duty	mpa123
Cultivator sowing machine	Pulled		mpa124
Key Components			
Diesel engines	For tractors	Large 1 model, medium 2 models	mpa210
Various power transmission devices	For tractors	Large 1 model, medium 2 models Final speed and deceleration 3 types, for work machines	mpa220 mpa230
Hydraulic equipment		Pumps, motors, control valves, cylinders	mpa250
Electrical equipment		Electronic controllers, instrument panels, etc.	mpa260

There are a number of companies capable of supplying the six key products, but the most promising companies are Pavlodar Tractor and Petropavlosk ZIKSTO for producing the three tractor products, and Akmolaselmarsh for producing the three work machines. Concerning the key components, Kostanai Diesel Engine is most capable of supplying engines, while privatized companies converted from military plants can supply the other components.

Fig. 6.2.1 is a conceptual diagram showing the short, medium and long term process for localizing production of the key farm machinery products, and it also indicates those companies deemed to be capable of participating in this production based on assessment of current conditions. Fig. 6.2.2 is a map showing the distribution of these companies throughout the country.

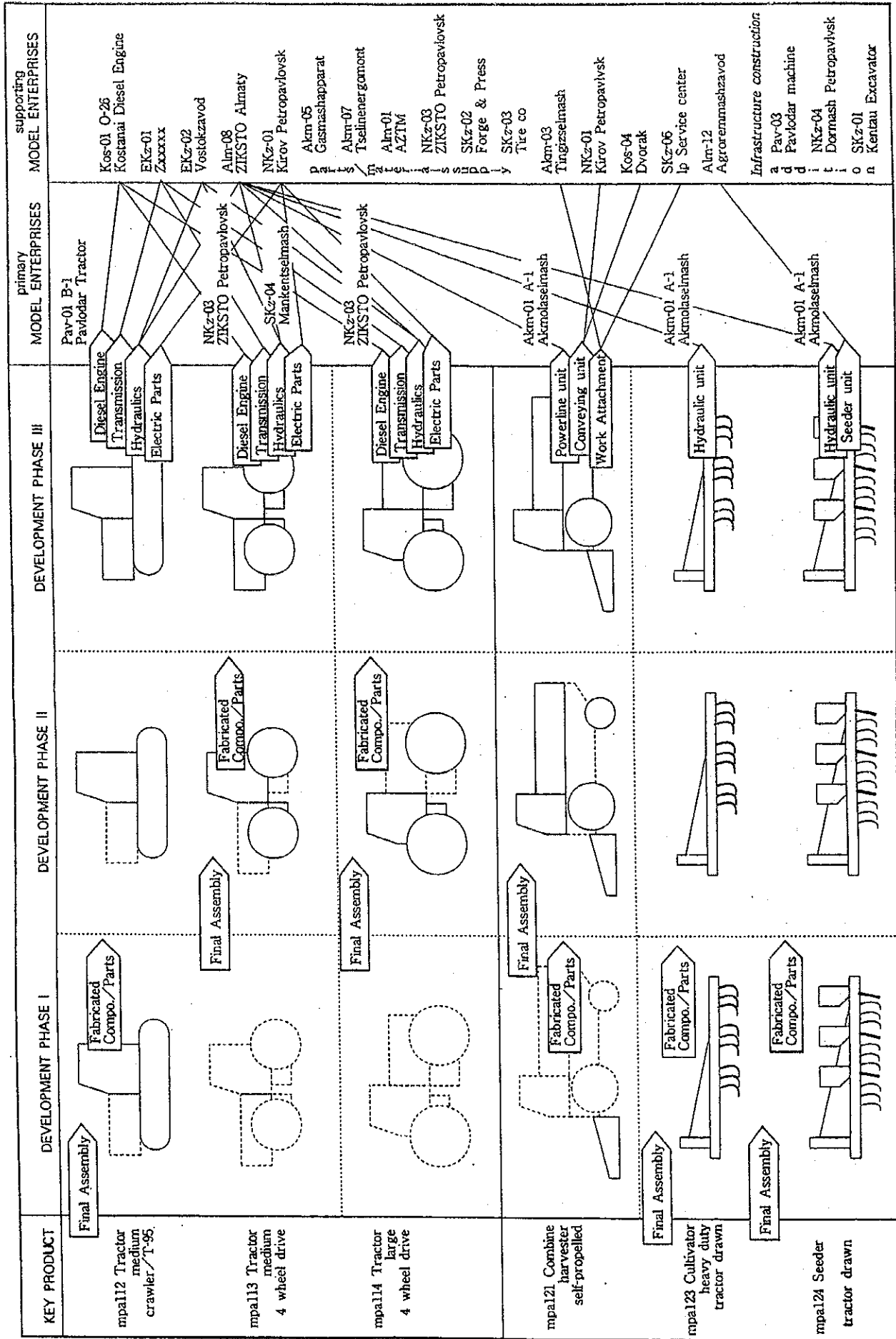


Fig. 6.2.1 Conceptual Diagram of the Plan for Promoting the Localization of Farm Machinery Design

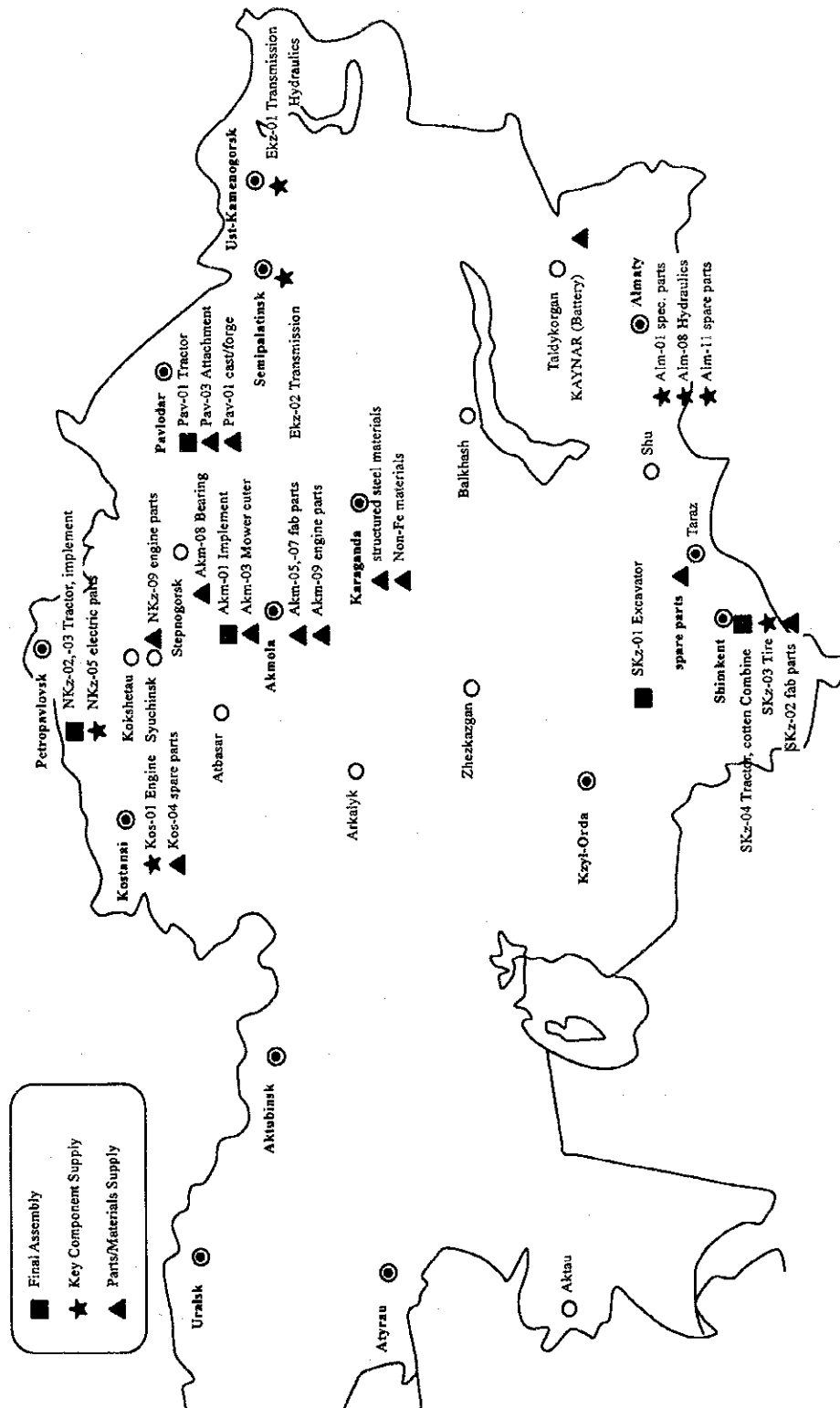


Fig. 6.2.2 Distribution of Machine Manufacturers in the Selected Sector

Concerning the three giant corporations of Pavlodar Tractor, which was designated as an agricultural tractor production plant under the division of labor system of the Soviet era, Akmolaselmarsh (former name: Kazakhselmarsh, later Tselinselmarsh), which was designated as an agricultural work machinery plant, and Kostanai Diesel Engine, which was constructed towards the end of the collapse of the former Soviet Union as a mass production plant of diesel engines for Kamaz Truck, they should first rid themselves of the delusion that massive demand exists to the extent envisaged in the production plans of the old system and realize that there is no possibility of them once again using their current equipment and facilities which were constructed as single item mass production lines. Upon doing this, they should concentrate their efforts on the development and production of marketable products based on their superior technical capabilities.

6.2.2 Reinforcement of Retailing and Service Network

Since the farm machinery industry was built on a basic framework of proper production and supply targeting only the former Soviet Union, in the Current day 10 years after reform of the political system, the industry does not possess any agencies to act as points of contact between producers and consumers. In other words, to fill the void created by the disappearance of agricultural technology committees, regional agricultural machinery corporations, machine and technology exchange stations and specialist repair service centers of the old system, there are currently no organizations capable of serving as retailing agents, which are essential for conducting business in a market economy environment. As a result, producers have no means of understanding market demands regarding their products, and they do not know the extent of their markets within even the CIS. As a top priority measure to remedy this situation, it is recommended that the building of retailing and service organizations be promoted and an Agricultural Machinery Support Center be established to ensure the thorough implementation and enhancement of product support.

6.2.3 Implementation Plan

Measures for the restructuring and promotion of the farm machinery industry are a package of activities designed to supply products of sufficient quality to the market. These measures revolve around the following three points:

- In order to strengthen product development capacity and supply products as demanded by the market, bolster technology accumulation and the setup for accepting the introduction of technology from outside the industry.
- In order to strengthen production system, re-examine the current setup in which equipment productivity is regarded as the main priority and convert it into a new setup that is capable of rapidly responding to market demands. In order to achieve this, firmly carry out the division and disposal of plants and build small lot production systems by introducing flexible equipment and facilities.
- Through building links with a network of product retailing and service centers, accurately grasp market information and build a setup which allows product support to be carried out.

The above implementation plan is indicated in Table 6.2.2. It will be necessary to set targets and manage actual performance for each area of activity in the short term (1999-2001), medium term (2002-2004) and long term (2005-2010), and also be prepared to amend and revise medium and long term plans.

Table 6.2.1 Implementation Plan for Farm Machinery Development and Production

Implementation Item	1999-2001 (short term)	2002-2004 (medium term)	2005-2010 (long term)
[Product Development]			
1. Development of crawler tractors (4 t)	○ →	→ ●	
2. Localization and development of wheel tractors (4 t)	○ → ▲	→ ●	
3. Localization and development of, and introduction of technology for, wheel tractors (Successively according to varieties)		○ → ▲	→ ● (successively according to varieties)
4. Localization and development of power line components (Successively according to varieties)	○ → ▲	→ ●	→ ● (successively according to varieties)
5. Localization of hydraulic equipment	○ → ▲	→ ●	→ ●
6. Localization of electrical parts and gages	○ →	→ ▲	→ ●
7. Localization and development of combine harvesters		○ → ▲	→ ●
8. Improved development of sowing machines	○ → ▲	→ ●	
[Product Support Setup]			
9. Expansion of retailing and service center networks	○ →	→ ●	
10. Organization of farm machinery technical station associations	○ → ●		
11. Establishment of farm machinery support centers		○ → ●	
12. Organization of the retailing, service and quality assurance contract setup	○ → ●		
13. Establishment of a setup for feedback of customer claims and market information	○ →	→ ●	
14. Standardization of systems for processing important quality problems	○ →	→ ●	
Note	○: Plan commencement ●: Completion (final product development is the point of completion) ▲: Introduction of technology		

6.3 Industrial Restructuring Plan for Food Processing Machinery

The majority of manufacturers of food processing machinery pursue other business interests and can generally be divided into the following three groups. These companies entered the food machinery manufacturing sector in response to market needs:

Group-1: Private companies established based on the technical capacity of owners

Group-2: Small and medium companies originally established as farm machinery repair plants

Group-3: Large-scale companies established as military suppliers

In view of the fact that the scale of the food processing machinery industry is small, industrial restructuring should be promoted centering around small and medium companies.

6.3.1 Key Products Development

It is first necessary to give priority consideration based on conditions in Kazakhstan to milling and feed making machinery and processing equipment, which are indispensable items in food processing. Then, as the market for processed foods expands, it will be necessary to bolster control of safety and hygiene. Accordingly, it is forecast that demand will increase for packing and refrigeration-related machinery and equipment.

In order for Kazakhstan to produce internationally competitive food processing machinery, it is necessary for local makers to acquire various technologies and know-how including manufacturing technology that satisfies food hygiene standards both at home and in advanced countries, product development technology, and distribution and safety control technology, etc. through binding technical tie-ups with foreign makers, etc.

6.3.2 Implementation Plan

The action plan of food processing machinery development and production is shown in Table 6.3.1.

Table 6.3.1 Implementation Plan for Food Processing Machinery Development and Production

Implementation Item	1999-2001 (short term)	2002-2004 (medium term)	2005-2010 (long term)
[Product Development]			
1. Milling, bread making and small processing machinery	○	→●	
2. Dairy product, Meat processing and equipment	○	→▲	→●
3. Vegetable and fruit juice processing equipment	○	→▲	→●
4. Cold storage and refrigeration equipment	○	→▲	→●
Note	○: Plan commencement ●: Completion (final product development is the point of completion) ▲: Introduction of technology		

6.4 Industrial Restructuring Plan for Mining Machinery

6.4.1 Key Products Development

Judging from Current trends of minerals production (see section 3.4.3), it is unlikely that the demand for machinery will increase. In order to expand production, it is necessary to start by localizing the production of currently imported parts which are relatively easy to manufacture.

Major parts and components used in mining machinery such as bulldozers, scrapers and shovels are hydraulic pumps, engines, transmissions and cylinders.

Hydraulic pumps, engines and transmissions are currently imported, but it is thought that local production is possible. Concerning these hydraulic machine parts, if a cooperative production setup can be established centering around the two companies of Vostokzavod (maker of prototype front end loaders) and Karagormash (maker of hydraulic equipment), it is thought that parts procurement sufficient for production can be achieved in the two regions of Ust-Kamenogorsk and Karaganda.

Moreover, over the medium to long term, the development and production of surface wheel loaders is considered to be a promising area for the following reasons:

1. Manufacturing technology already exists for underground wheel loaders.
2. Surface wheel loaders and underground wheel loaders differ in terms of their bucket arms and cabins, etc., but the same components and parts can be used.
3. Mining methods are shifting from underground mining to surface mining.
4. Until now companies have focused on the manufacture and processing of casting and forging materials, however, if efforts are made to develop the manufacture and processing of hydraulic equipment, it will be possible to foster makers of wheel loaders and machinery that utilize a lot of such equipment.

A target of 2005 is set for the manufacture of wheel loaders. Until then companies should seek to conduct transfer of technology and raise the quality of key parts and components through binding tie-ups with top-class foreign machinery makers.

6.4.2 Implementation Plan

(1) Status of Wheel Loaders as Mining Machinery

The main types of machinery used in mining development are, in the case of underground mining: jumbos, loaders and dump trucks, and in the case of surface mining: drills, shovels, loaders and dump trucks (42 tons and 110 tons).

Of the above it is recommended that Kazakhstan pursue the development of loaders, since the local side wishes to pursue this and it is judged from the findings of the company visit surveys that potential for such development exists. It is recommended that underground wheel loaders, which are commonly used in Kazakhstan at the moment, be modified with a view to developing surface loaders of standardized design.

(2) Estimation of the Size of the Wheel Loader Market

Judging from the current production of 75 million tons of ore per year, it is estimated that the average demand for wheel loaders is 42-45 medium wheel loaders and 116-124 small wheel loaders per year. By also taking into account demand from the construction sector and so on, it is estimated that a market for around 200 wheel loaders (medium and small) per year exists.

(3) Development and Production Implementation Plan

The development and production plan for wheel loaders and components is shown in Table 6.4.1.

Table 6.4.1 Implementation Plan for Wheel Loader Development and Production

Implementation Item	1999-2001 (short term)	2002-2004 (medium term)	2005-2010 (long term)
[Product Development]			
1. Wheel loaders	○ —▲—	→●	
2. Components (engines, transmissions, hydraulics)	○ —▲—	→●	
[Retailing Setup]			
1. Preparation of materials and public relations for introducing products	○ —	→●	
2. Expansion of the service setup	○ —	→●	
Note	○: Plan commencement ●: Completion (final product development is the point of completion) ▲: Introduction of technology		

6.5 Industrial Restructuring Plan for Railway Rolling Stock

6.5.1 Railway Rolling Stock Manufacturing Plant Construction

(1) Electric Locomotives (EL) and Diesel Locomotives (DL)

Concerning diesel locomotives, reinforcing works whereby old engines are replaced with powerful GE engines are conducted, however, regarding the manufacture of new electric locomotives and diesel locomotives, until local technical capability and profitability can be gauged, it is likely that purchasing from Russia and Ukraine will continue.

(2) Electric Cars (EC)

It is possible to manufacture electric cars in a new passenger car manufacturing plant if there are sufficient needs, but it will be necessary to introduce manufacturing technology from abroad.

(3) Passenger Cars (PC)

As was described in section 3.4.4 (3), there is a plan to construct two new passenger car plants. Table 6.5.1 compares the case of building a manufacturing plant onto the existing passenger car repair workshop of Rysty AECRW, with the case of building a new plant within the PZTM Group.

Table 6.5.1 Outline Comparison of Rysty AECRW and the PZTM Group

	Rysty AECRW	PZTM Group
Location	Almaty	Petropavlosk
Current work areas	PC heavy repairs	Sheet metal, machinery and electric-related (but no experience with rolling stock)
PC production equipment	Additional investment will suffice because PC heavy repairs are currently performed	Except for the building, new investment will be necessary
New PC manufacturing technology	A fair amount exists	Hardly any
Investment	Little will suffice	A lot is required
Introduction of technology	Introduction of management technology and other technologies that are currently lacking is necessary	Wide-ranging introduction of manufacturing technology is necessary
Feasibility	Feasible	Futuristic

It is desirable in the short term to combine the manufacturing plant with the existing Rysty AECRW repair workshop. In the long term, however, considering availability of site space, it is more advantageous to construct a new plant within the PZTM Group.

(4) Freight Cars (FC)

It is possible to manufacture new freight cars by restructuring a passenger car manufacturing plant or freight car repair workshop, however, since it is thought that AWRZ in Astana (experienced in freight car repairs) and DZMK in Taraz (reformer of uncovered cars to tank cars) have the will and technical capability to manufacture new freight cars, development of both these companies should be pursued.

6.5.2 Passenger Car Manufacturing Plant Construction Plan

(1) Basic Steps in Passenger Car Manufacturing Plant Construction

Hardly any of the materials and parts used in railway rolling stock are produced in Kazakhstan, and it will be necessary to largely rely on imported parts if passenger car manufacture is to be conducted. Accordingly, when viewed in the long term, it is necessary to compile a passenger car manufacturing plant construction plan that also considers the local production of rolling stock parts and it is desirable to follow the steps shown in Table 6.5.2 when implementing the plan.

Table 6.5.2 Steps in Passenger Car Manufacturing Plant Construction

Step	Step 1	Step 2	Step 3
Maximum production volume (single shift system)	175 cars/year	175 cars/year	175 cars/year
Rolling stock specifications	Same rolling stock as Current	Improved rolling stock (lighter, faster and lower cost)	Modified rolling stock and electric cars (LRT, etc.)
Investment	Minimization of investment through restructuring of repair lines	Installation of automated machinery	Additional installation of sheet metal-related machinery, plus mainframe computer and testing equipment
Introduction of technology	Management technology and production technology	Production technology	Management technology, rolling stock design technology and production technology
Parts manufacture	Internal manufacture of parts	Cast steel parts, interior panels, trolley parts and hood devices	Electrical parts

(2) Tentative shedule of new PC manufacture work shop construction

At the present, both Rysty (is now undertaking PC repair) and PZTM group (has no facilities and experience in rolling stock manufacturing) have plans of new PC manufacture work shop construction respectively.

The former is able to produce new PC by the ultiziation of present repair lines and by the improvement of facilities, skill and so on, but the latter must set up new manufacturing lines, facilities and must acquire every production technique.

As shown in Table6.5.3, there are some differences between both companies on the first step at the start of this project.

(3) Examination of the Passenger Car Manufacturing Plan

Table 6.5.4 is an examination of the space required for a comprehensive railway rolling stock maker producing around 175 passenger cars including LRT and subway electric cars at the time of step 3 completion. Since the production setup and rolling stock specifications differ from similar cases in Japan, it is not possible to make a direct comparison, but it is roughly estimated that enough space for 80 rolling stock cars is required. This works out as follows:

$$80 \text{ cars} \times 6 \text{ m (width)} \times 30 \text{ m (length)} = 14,400 \text{ m}^2$$

Table 6.5.4 Necessary Space for Passenger Car Manufacture

Work Area (Line Name)	Roughly Required Space	Work Details
Metal work	10 cars	Sheeting
Same as above, parts preparation	4 cars	Sheet metal parts welding
Rolling stock block manufacture	20 cars	Manufacture of frames, sides and roofs
Body assembly	6 cars	Body joining and assembly work
Coating line	8 cars	Body coating
Outfitting and interior finishing line	16 cars	Rolling stock assembly
Rolling stock inspection	6 cars	Inspection of finished rolling stock
Trolley manufacture	10 cars	Trolley manufacture
Total	80 cars	

Table 6.5.3 Schedule of New PC Manufacture

Detail of work	Year (STEP)	1999~2001	2002~2004	2005~2010
<p>(1) Case of re-structure of repair line (Rysty)</p> <p>① Improvement of present rapair line •Improvement of management system •Modernization of facilities •Modification of rapairline layout</p> <p>② Set up of new PC line(Mix Line)</p> <p>③ Increasement of shop made parts</p> <p>④ production •PC repair in Mix Line with new syste •New PC production in Mix Line</p>	(FIRST STEP)		<p>repair & new PC production in Mix Line</p> <p>Hard seat & Box car</p> <p>Soft seat & dining car</p>	
<p>(2) Case of new Work Shop (PZTM group)</p> <p>① Build up of new management system •Start of new PC production project •Settlement of master plan.</p> <p>② Introduction of design,manufacturing, inspection technology.</p> <p>③ Set up of manufacturing work shop •Line & Facilities</p> <p>④Production •Car cell assembly start by KnockDown style evolution to Complete KnockDown Increasement of shop made parts •internal parts fitting & equipment</p>	(FIRST STEP)		<p>assembly in shop</p> <p>assembly</p>	
<p>(3) Production of advanced new PC</p> <p>①Light weight car & Hi-speed car •design •invest of machines •education and training</p> <p>②Production</p>	(SECOND STEP)		<p>production</p>	
<p>(4) Production of EC and LRT</p> <p>①Improvement of line(facility and machine)</p> <p>②Introduction of total management syst</p> <p>③Start of elctric parts manufacturing</p> <p>④Production</p>	(THIRD STEP)			<p>production</p>
<p>(5) Bogie</p> <p>•Assembly of bogie frame</p> <p>•Assembly of bogie</p> <p>•Increasement of shop made parts</p>		<p>purchase</p>	<p>production in shop</p> <p>production in shop</p> <p>metal parts → frame → brake parts</p>	

Notes: O : start ▲ : introduction of technology ◎ : intermediate check ● : completion
 ⇌ : production(assembly)

6.5.3 Freight Car Plant Reconstruction

One old line, which was constructed to repair freight cars during the Soviet era but is not fully operating now, should be rebuilt as a mixed line capable of repairing all kinds of freight cars and also producing new freight cars.

(1) Restructuring of Freight Car Repair Lines

The AWRZ freight car repair workshop in Astana currently possesses a number of specialized production lines and, although production volume has fallen recently, these lines are still used unchanged. Accordingly, operating rates on the production lines are extremely low and the production setup is inefficient. In order to raise production efficiency in spite of the small production volume, it is necessary to make production lines more compact, enable mixed production of different car models to be performed on the same lines, and build lines where small lot production can be conducted.

(2) Tank Production Line Restructuring

DZMK in Taraz possesses the basic equipment and sufficient workspace necessary for producing tanks (not the types used with tank cars). Therefore, by introducing technology relating to tank specifications and production and a few items of equipment that are currently lacking, it will be possible to manufacture high and low pressure stationary tanks, container tanks and lorry tanks, for which there is demand in Kazakhstan. The idea of mounting tanks that have been produced on a newly built tank line onto tank cars is the best approach to building an efficient production system with little investment and expanding work load.

6.5.4 Maintenance of Railway Rolling Stock

(1) Concerning railway rolling stock maintenance, heavy repairs of electric locomotives and diesel locomotives are consigned abroad, but all maintenance and repair work should be conducted in Kazakhstan. For the sake of the future development of the rolling stock industry, it is important that the following circular flow of work be established:

“Rolling stock planning” – “Design” – “Manufacture” – “Commercial use” – “Daily maintenance” – “Heavy maintenance” – “Rolling stock planning”

The implementation of this will enable the realization of a rolling stock industry that is capable of pursuing future technical development, reducing rolling stock manufacturing and maintenance costs and responding to future social needs.

If heavy repairs of electric locomotives and diesel locomotives can be performed locally, expenses will be reduced to less than 80% of the current consignment cost.

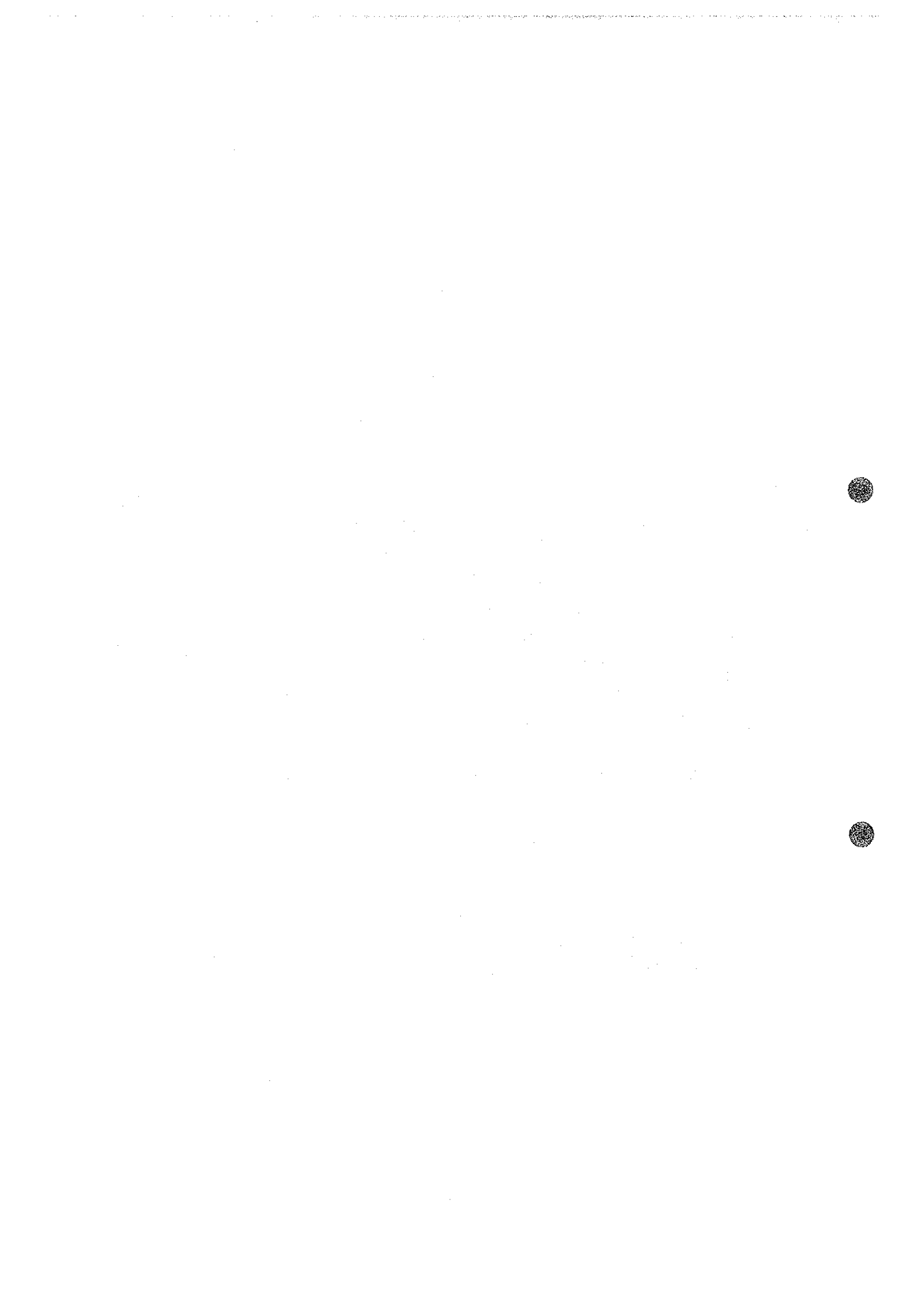
(2) KTZ has plans to locally carry out heavy repairs of electric locomotives, diesel locomotives and tank cars, and these plans should be promoted.

6.5.5 Localization of Spare Parts for Railway Rolling Stock

(1) Various problems confront the local production of spare parts for railway rolling stock (for example, licenses need to be obtained from the Russian department of railways), however, localization is something that should be promoted from the viewpoints of resolving spare parts shortages and economizing on the use of foreign currency. AWRZ, a freight car repair company in Astana, is eager to pursue the local production of spare parts, and companies like PZTM in Petropavlosk and Pavlodar Tractor in Pavlodar have the capability to manufacture spare parts. Concerning the manufacture of spare parts for rolling stock made in the former Soviet Union, such companies should be willing to acquire licenses from the Russian department of railways and actively promote research and prototype fabrication.

(2) The development of KAZACCUMULATOR, a maker of alkali batteries, should be pursued because alkali batteries have future potential for use in railway rolling stock. Although such batteries are expensive, they are light and harmless.

(3) SBP, a maker of bearings, has a highly automated plant but only produces bearings for railway rolling stock. For the sake of its own development, this company should expand its activities to include production of general use bearings, and it is recommended that it acquires ISO 9000 certification.



7. MANAGEMENT IMPROVEMENT PLAN FOR MODEL ENTERPRISES

7.1 Outline of Companies and Improvement Issues by Sector

There are approximately 200 machinery manufacturers in Kazakhstan, however, only around 80 companies were visited and surveyed, and the assessment is an overall evaluation of those companies by the selected sector.

In compiling the model enterprises management improvement plan, an overall assessment of production management and quality control conditions, modernity of owned equipment, current state of surplus equipment and facilities, and product development capability, was conducted and issues for improvement were identified by sector. A five-stage assessment, in which an "A" ranking denotes parity with the standard of advanced industrial nations and an "E" ranking denotes the lowest standard, was conducted (refer to the Notes).

Distribution of equipment operation ratios by selected sector in the machinery industry is shown in Fig. 7.1.1.

Table 7.1.1 Enterprise Contents and Improvement Issues by Sector

Sector	Number of Subject Factories		Production and Quality Control Standard	Current Equipment and Facilities		Product Development Technical Capability	Improvement Issues
	Total	Visited		Modernity	Sufficiency		
Farm machinery	(120)	50	D	D	Surplus	D	<ul style="list-style-type: none"> • Introduction of QC • Introduction of small lot production technology • Strengthening of research and development • Enhancement of retailing and service system • Disposal of surplus equipment and facilities
Food processing machinery	(20)	9	D	D	—	D	<ul style="list-style-type: none"> • Demand study and promotion of research and development • Improvement of product quality and post-sale service
Mining machinery	(40)	15	D (1 enterprise C)	D	Surplus	D (1 enterprise C)	<ul style="list-style-type: none"> • Introduction of QC • Promotion of research and development and retailing • Disposal of surplus equipment and facilities
Railway rolling stock	(20)	9 +7 (Note 2)	C (1 enterprise B)	C	Partially shortage	C (1 enterprise B)	<ul style="list-style-type: none"> • Improvement of management standards • Sophistication of processing technology • Development and plant construction for new rolling stock manufacture
Total	(200) (Note 1)	83 +7 (Note 2)					

Note 1: Figures are estimates, but a total of 201 machinery manufacturing companies is given in the State Program of the Machinery Complex Development in the Republic of Kazakhstan for 1998-2000.

Note 2: "4,7" refers to the number of national railway depots.

Note 3: Eight companies also produce food processing machinery.

Note 4: Assessment ranks:

A: Same level as advanced industrial nations

B: Not up to the level of advanced industrial nations

C: Much improvement needed to reach the level of advanced industrial nations

D: Even more improvement needed to reach the level of advanced industrial nations

E: Achievement of industrialization is very difficult.

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Food processing machinery	(20)	9	D	D	—	D	<ul style="list-style-type: none"> • Demand study and promotion of research and development • Improvement of product quality and post-sale service
Mining machinery	(40)	15	D (1 enterprise C)	D	Surplus	D (1 enterprise C)	<ul style="list-style-type: none"> • Introduction of QC • Promotion of research and development and retailing • Disposal of surplus equipment and facilities
Railway rolling stock	(20)	9 +7 (Note ²)	C (1 enterprise B)	C	Partially shortage	C (1 enterprise B)	<ul style="list-style-type: none"> • Improvement of management standards • Sophistication of processing technology • Development and plant construction for new rolling stock manufacture
Total	(200) (Note 1)	83 +7 (Note 2)					

Note 1: Figures are estimates, but a total of 201 machinery manufacturing companies is given in the State Program of the Machinery Complex Development in the Republic of Kazakhstan for 1998-2000.

Note 2: "47" refers to the number of national railway depots.

Note 3: Eight companies also produce food processing machinery.

Note 4: Assessment ranks:

A: Same level as advanced industrial nations

B: Not up to the level of advanced industrial nations

C: Much improvement needed to reach the level of advanced industrial nations

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E: Achievement of industrialization is very difficult.

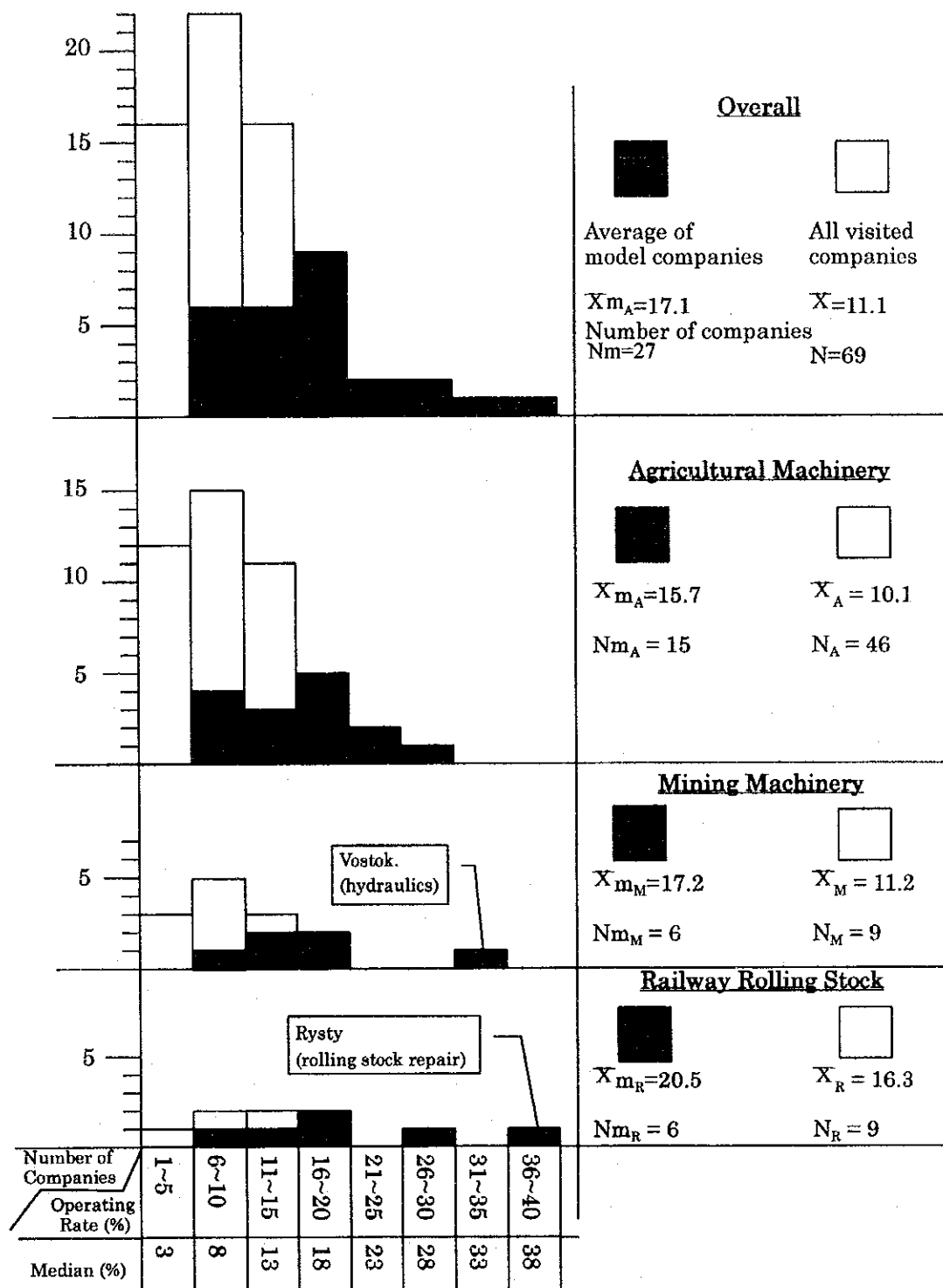


Fig. 7.1.1 Equipment Operating Rates in the Machinery Industry (observed during the enterprise visits)

7.2 Basic Approach for Management Improvement of Model Enterprises

Taking account of restructuring of the key sectors, 80 enterprises were surveyed and 27 enterprises are selected as a model enterprise among them.

7.2.1 Drafting of Development Strategies

In the formulation and modification of strategic plans, the following subjects should be considered for periodic review.

- Should the enterprise in question concentrate on manufacturing final products or supplying component parts?
- Should the enterprise in question maintain its independence or seek a foreign partner?
- What kind of products is it desirable to become competitive in?
- Are existing equipment, facilities and organizations worth reconstructing, or should they be discarded?

When business owners examine the problem points discussed in the following sections with a view to promoting enterprise improvement, they should also give consideration to the following problems. Many revisions are required on both the software and hardware sides. In other words:

- Software revisions (revision of the management system and business approach)
- Hardware revisions (revision of physical assets and plant layout)

As the extent of required changes becomes clearer the answer to this question should be reviewed. It is certainly one of the key questions asked by any potential foreign investor. The judgment of most foreign investors to date is that restructuring of existing enterprises is not worthwhile; they would rather start to build a completely new enterprise with new management structure and team and new production facilities. Certainly a domestic investor might rationally come to a different conclusion. His options for introducing new technologies might be more limited and more expensive, and financing will certainly be more expensive. Never the less the judgment showed by the international market cannot be totally ignored.

7.2.2 Basic Approach for Management Improvement

The following diagram illustrates the links that exist between priority issues faced by companies and basic subjects for management improvement.

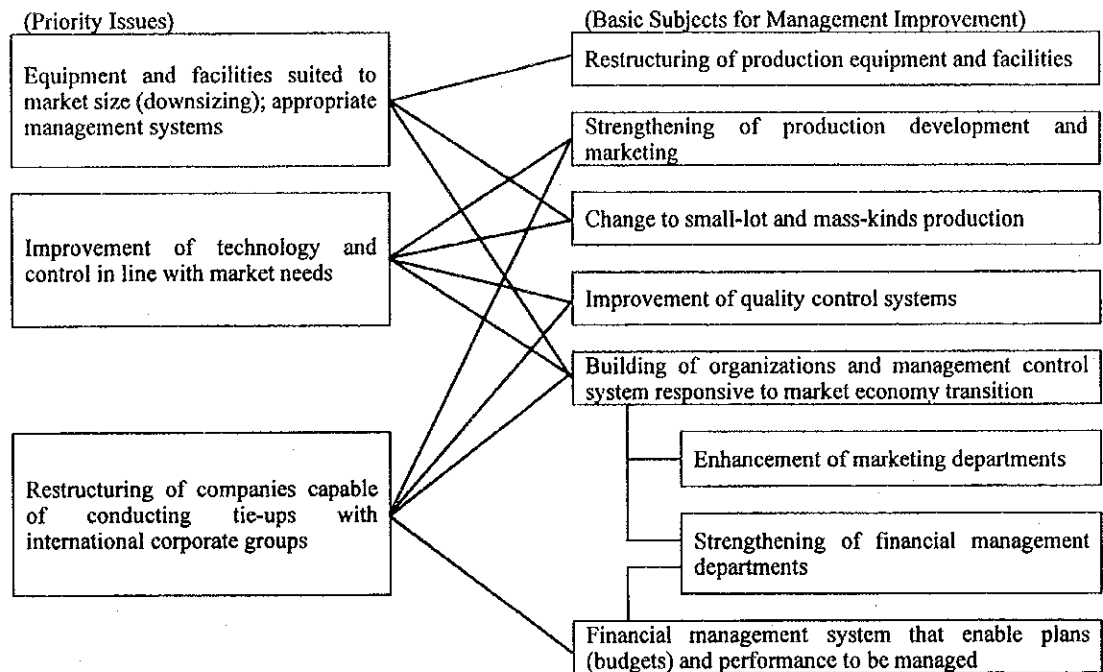


Fig. 7.2.1 Linkage Between Key Issues and Basic Subjects for Management

7.2.3 Management Improvement by Model Enterprise

The basic subjects for management improvement mentioned above are described individually in the following sections. Table 7.2.1 compiles the subjects for improvement that has been deemed to be important for each model enterprise based on the findings of the company visit surveys.

In determining the importance of improvements, consideration was given not only to the current conditions of the companies, but also to the future roles of companies (responsibility for key product development and production, etc.) within the industrial restructuring plan.

Table 7.2.1 Management Improvement Subjects by Model Enterprise

No. (Note ¹)	Model Enterprise Name	Basic Subjects for Management Improvement						Remarks (main roles in industrial restructuring)
		Downsizing of production equipment/facilities	Strengthening of marketing functions	Strengthening of product development	Introduction of small lot production system	Improvement of quality control	Strengthening of financial management	
A 1)	AZTM	※	※	※	※			Special material precision parts
2)	Pavlodar Tractor	※	※	※	※		※	Medium tractor improvement
3)	Die&Tool Division, P.T.	※	※	※			※	Food processing plant equipment
4)	Pavlodar Machine	※			※	※	※	Parts manufacture and repair
5)	October Lathe	※	※	※			※	Food processing plant equipment
6)	PZTM	※		※		※	※	Parts manufacture
7)	ZIKSTO Petropavlovsk	※	※	※		※	※	Medium and large tractor development
8)	Kierov	※		※	※	※	※	Electronic parts and work machine parts
9)	Akmolaselmash	※	※	※		※	※	Crawler combine harvester development
10)	Gas Apparatus	※	※	※			※	Storage equipment manufacture
11)	Tselinenergomont			※	※			Farm machinery parts manufacture and repair
12)	Eikos		※	※	※			Food processing machine development
13)	Pisheremash		※	※	※			Food processing machine development
14)	Diesel Engine Factory	※	※	※		※	※	Engine series standardization
15)	Agroremmash		※	※	※			Food processing machine and work machine development
M 1)	Almaty Lathe	※	※	※	※		※	Gear box development
2)	AZTM	※	※	※	※		※	Large precision parts manufacture
3)	Karaganda gormash	※	※	※			※	Hydraulic equipment expansion
4)	KAMZ	※	※			※	※	Parts manufacture
5)	Vostokmashzavod	※	※	※		※	※	Wheel loader development
6)	Karaganda Parhomenko	※	※	※	※		※	Coal washer machine and parts manufacture
R 1)	Rysty-AECRW			※	※	※		Repair and manufacture of passenger car
2)	Pavlodartractor	※	※		※	※	※	Rolling stock parts manufacture
3)	PZTM	※		※	※	※	※	Passenger car manufacture
4)	Stepnogorsk P. J.	※	※	※			※	Rolling stock and general use bearings manufacture
5)	AWRZ				※	※		Freight car repairs
6)	DZMK					※		Tank wagon manufacture

Note 1 (No. column):

A: Farm machinery manufacturing manufacturing

M: Mining machinery manufacturing

R: Railway rolling stock

Note 2 (Importance of improvement subjects)

*: Important ※: Very important

7.3 Restructuring Procedure of Production Equipment and Facilities

The procedure for reviewing and restructuring the existing production equipment and facilities is indicated below.

(1) Formulation of Product Strategies

Concerning the key products, components and parts that are handled by each manufacturing company, a medium to long term product strategy shall be formulated based on the Industrial Restructuring plan of Chapter 6.

It should be noted that final assembly companies must have past experience of mass producing and assembling final products, and other companies shall first give consideration to the production of components and parts.

(2) Preparation of Production Equipment and Facilities Plans

Plans for installing the production equipment and facilities necessary for the manufacturing processes to be handled by each company shall be prepared. As a precondition for calculating the production capacity of the required equipment and facilities, it must be possible to achieve the target production volume with an equipment operating rate of 70%.

(3) Preparation for Streamlining of Production Equipment and Facilities

Manufacturing companies that have made the management decision to engage in the manufacture of key products and key components and parts shall next prepare for the streamlining of production equipment and facilities.

1) Gathering of Information on the Current Conditions of Production Equipment and Facilities

With respect to processing equipment, equipment lists shall be revised and the manufacture dates, specifications, uses, operating conditions, any problems and book values, etc. of equipment shall be surveyed and recorded. Equipment shall then be ranked according to its potential for future utilization.

Selection and Classification of Surplus Processing Equipment

The current state of processing equipment shall be gauged according to the following table.

Table 7.3.1 Current Conditions of Processing Equipment

Model (including date of manufacture)	Machine Specifications	Applicable Range	Required Specifications	Operation	Maintenance Cost	Performance Evaluation (precision, productivity, reliability)	Book Value	Judgment (use or disposal by selling or scrapping)

Facilities shall be surveyed and ranked in the same manner.

2) Selection of Surplus Equipment and Facilities

Based on the information obtained above, each company owner shall quickly determine whether equipment and facilities should be utilized or disposed by selling or scrapping upon considering their importance in the medium to long term strategy and current operating conditions.

Determination of the Utilization or Disposal (Selling or Scrapping) of Processing Equipment

(Basic Approach)

- Equipment shall be minimized in order to reduce costs incurred in holding on to surplus equipment.
- Machine operating rates and processing efficiency shall be raised through using general purpose machine equipment.
- With respect to low productivity processes, based on the assumption that process machine equipment will either be sold or scrapped, the parts produced by these processes shall be ordered externally.

(Conditions for Equipment Utilization)

1. The equipment satisfies the required specifications of target products.
2. Productivity is high.
3. Operating rates are high.
4. Consideration shall be given to maintenance costs and repair frequency.

(Conditions for Scrapping)

1. The equipment is deteriorated and does not satisfy required specifications.
2. Breakdowns are frequent and maintenance is expensive.

(Conditions for Selling)

1. The equipment is surplus to requirements in the Current and future production plan.
2. Productivity and operating rates are low.

3) Relocation and Transfer

For the sake of asset management and securing efficiency on production lines, surplus equipment shall be moved and orderly stored in separate areas away from the production lines. Moreover, when moving and installing useful equipment, floor improvement must be carried out.

(4) Disposal by Selling or Scrapping

Before scrapping equipment, ample consideration shall first be given to the possibility of selling.

It is necessary to promote information exchange and selling activity within the industry based on the exchange of information relating to machinery specifications and current conditions of maintenance. In this case, it would be effective for machinery makers such as Almaty Lathe Co., etc., which already have experience of selling used machinery overseas through industrial associations, to take the initiative in forming committees and promoting the sale of equipment throughout the whole industry. As for the collection of information relating to demand, it would be appropriate to make use of the Machinery Manufacturing Center.

7.4 Strengthening of Marketing and Products Development

7.4.1 Strengthening of Marketing Functions

No machinery manufacturers have yet managed to establish strong marketing and distribution functions. Companies need to invest more resources than ever in order to develop their marketing departments and distribution departments. The largest marketing department observed among the interviewed companies was composed of five staff out of a total work force of 2,200 employees. The ratio of marketing expenditure to sales among the surveyed companies was less than 1% of the equivalent figure among companies in the West.

The internal reform of companies is required. In the current conditions of financial crisis, almost all companies regard marketing and distribution as necessary evils accounting for one of the many indirect expenses they must bear. However, without efficient marketing departments, it will be impossible for companies to survive in the long term. Marketing departments need to not only identify and create markets for existing products, they must also identify potential markets for new products. Companies should allocate sufficient budgets to marketing and count them as a single cost item.

A marketing department conducts the following kind of work:

- Collection and analysis of market information
- Sales planning
- Sales promotion and advertising
- Repair and servicing
- Parts supply, etc.

7.4.2 Importance of Product Development

The marketing departments and engineering departments of companies must work closely in the development of new products. The selection and development of new products should be well balanced. Moreover, companies must respond to market needs while at the same time giving consideration to their current technology and manufacturing capacity.

7.5 Change to Small Lot and Multiple-Kinds of Production

7.5.1 Transition to Small Lot Production

The objectives of small lot production are reduction of manufacturing costs, improvement of competitiveness and expansion of markets.

Targets for this are as follows:

- Enable companies to extricate themselves from their existing cumbersome, large-scale production systems.
- Build production systems that have high operating rates and can flexibly respond to current production scale and product diversification.
- Reduce production lead times from design through to delivery in response to needs.
- Through introducing small lot production management systems, reduce inventory size, shorten delivery times and cut costs.

In existing production systems, machine processing is predominantly carried out using special purpose machine lines, and sheet metal pressing is performed using single function tool presses (cutting, bending, drawing). Such production systems are highly expensive, inefficient and unproductive for producing small lots, which are now required as a result of the declining scale of markets. Flexible production systems that can handle small lot production and design changes, etc. are required.

7.5.2 Transition to Multipurpose Machinery

Almost all the machinery currently owned by production plants has no general applicability at all. It is thus necessary to establish the following kind of production system through introducing multipurpose machinery.

- System where a single item of multipurpose machinery has the same production capacity as 20 or more existing single function machines.
- System that enable products to be easily upgraded and new products to be produced with a minimum of plant investment.

(1) Machine Processing

Production in machine processing has fallen to below 10% of the equipment capacity and many processing machines are single function machines with little general applicability. As a result of the equipment surpluses and low productivity, etc. that are created by these conditions, manufacturing costs are inflated and quality is reduced. In future it will be necessary to make production systems more flexible by mainly introducing machining centers (MC) and NC lathes.

(2) Sheet Metal and Pressing

In a similar way to the case of machine processing, existing production systems are totally inappropriate in comparison to their production volumes. Production systems employ numerous single product lines where press punching and drawing are the main activities and die changes are kept to a minimum. Such systems are unable to handle small lot production. Falling production is generating problems such as reduced equipment operating rates, die depreciation and inability to handle design changes, etc. With respect to pressing, it is necessary to minimize the number of presses by taking measures to reduce die changeover times, adopt cutting methods that remove the need for dies, and implement other steps with a view to raising machine operating rates and building flexible production systems.

(3) Introduction of CAD/CAM

When introducing NC machines, it is necessary to raise the productivity of programs. In the initial phase, programs need to be prepared using automatic programming devices, but eventually it will be necessary to introduce CAD/CAM to carry out integrated control from design through to program preparation.

7.6 Improvement of Quality Control Systems

Production plants are operating at only 10-20% capacity and conditions of plant management and equipment maintenance are deteriorating. Non-conforming products are disposed together with cutting waste, etc. and plant interiors are disorderly. In these circumstances, it is thought that quality control cannot be sufficiently observed. The situation is also unsatisfactory concerning the recording and storage of inspection data and statistical processing.

It is necessary to rebuild quality control system, starting with thorough implementation of the "five S's" (Japanese expression referring to tidying, housekeeping, cleaning, cleanliness and discipline), recording and storage of inspection data and use of statistical processing techniques.

Reducing nonconformity rates is absolutely essential for the realization of small lot production. The future objective of companies should be to use the seven tools of quality control (Pareto diagrams, check sheets, histograms, graphs, scatter diagrams, cause and effect diagrams, and control charts) in acquiring ISO certification so that they are able to target international markets.

The philosophy of company-wide quality control should also be introduced to encourage all organizations to approach their work with the right attitude. Company-wide quality control requires participation by all company employees and also cooperation between staff working in production processes. Operators should have a positive group consciousness that ensures they play an active role in overall system improvements. Moreover, in order for company-wide quality control to be successful, company managers themselves need to adopt a quality-oriented way of thinking and it is important that quality control staff possessing authority and executive powers should be assigned.

7.7 Improvement of Management Control

7.7.1 Management Training

Almost all business owners and upper management staff are aware of the need (and also want) to receive training in management methods under market economy conditions. They should actively take part in training activities and programs that are provided through government support.

7.7.2 Financial Planning

It is necessary to take great care in financial planning. Introduction of a business plan is the first step that has been taken by a few companies, but it is necessary to expand these activities much more. At this stage of the business plan, it is necessary to analyze cost effectiveness (profit and loss) within the company, and the next step is to gauge

manufacturing costs for each manufactured product and part and compile cost improvement plans.

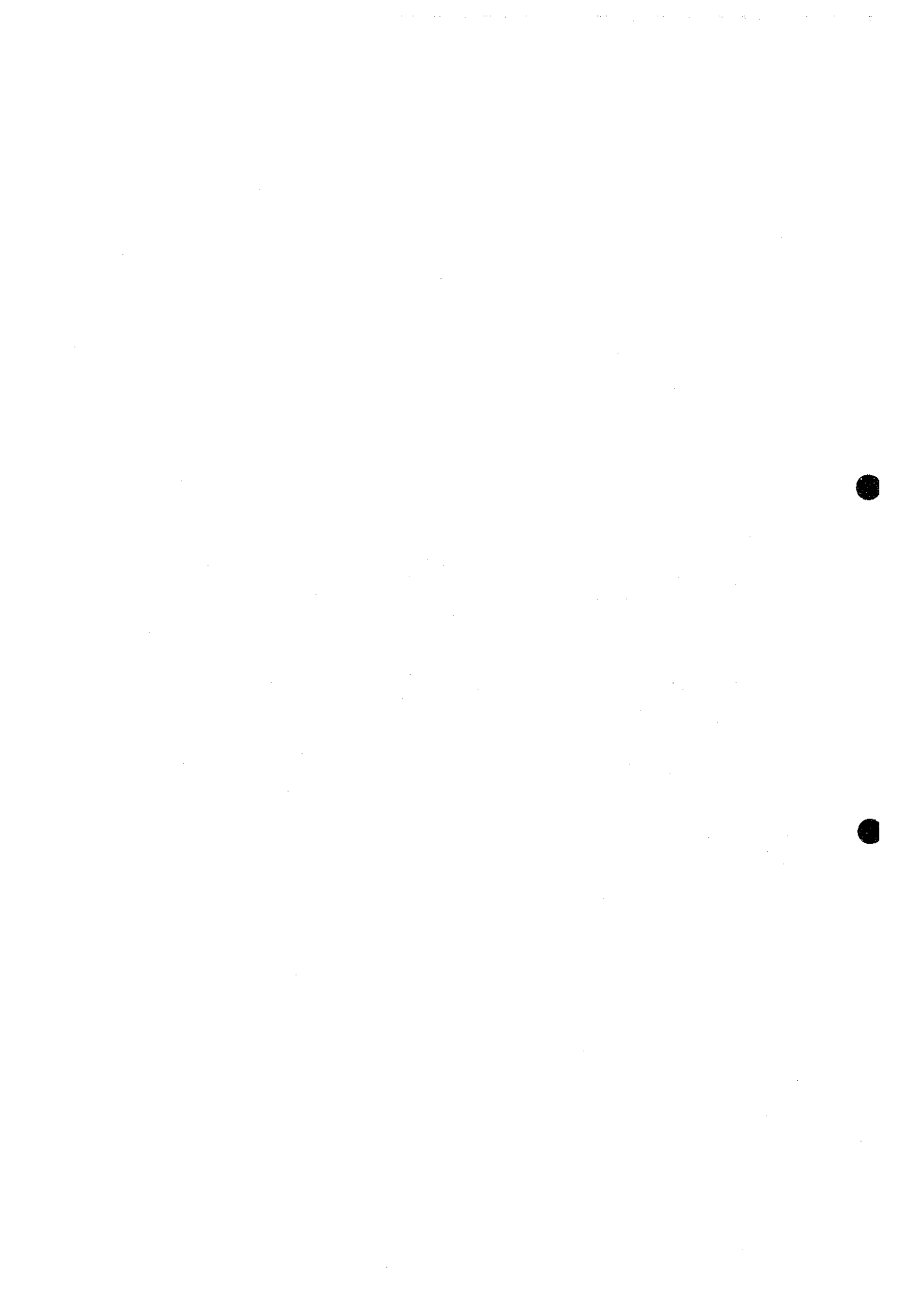
In order to give priority to book profits, inappropriate methods of accounting treatment should be avoided and treatment should be conducted in strict accordance with company accounting principles. Moreover, when conducting financial analysis, it is necessary to avoid concentrating solely on profits as indicated on income statements, but to also analyze cash flow.

7.8 Improvement of Materials Processing Section

The majority of large-scale machinery manufacturing companies possess casting and other materials processing departments. However, production technology in this section is at least 20 years behind the level of advanced industrial nations and needs to be improved. Recommendations for improving the production technology of materials processing section are given in Table 7.8.1.

Table 7.8.1 Recommended Improvements for Materials Processing Section

Department	Recommended Direction	Specific Contents
Casting department	Molding 1. Enhancement of sand treatment equipment 2. Molding process selection 3. Forming and molding rationalization 4. Large-scale molding rationalization	1. Enhance basic sand treatment equipment in order to reduce casting non conformities. 2. Select the alloy type and size of castings, number of lots, required dimensional precision, molding cost, work environment, and ease or difficulty of waste treatment and sand recycling, etc. according to the company's own products. 3. Upgrade to high pressure molding, high speed molding and impact molding in accordance with the quality, production volume and dimensional precision, etc. of castings. 4. Treat cast iron items with resin sand according to casting quality and dimensional precision, etc.
	Melting 1. Securing of casting quality 2. Chemical analysis of solution	1. Refining of cast steel solution is necessary. 2. It is important to confirm solution quality before casting. 3. Introduce machine analysis by spectrometer, etc. to speed up analysis.
	Material quality 1. High level strengthening of castings	1. Master ductile iron manufacturing technology.. 2. Methods of solution spheroidizing Low frequency induction furnace melting – Sandwich method 3. AZTM, Vostokmash and Karaganda Casting and Machinery, etc. should consider introduction first.
Forging department	Improvement and expansion of die forging technology	1. Establish alloy steel die forging technology. 2. Develop die manufacturing technology. 3. Master non-ferric metals die forging technology.
Sheet metal department	General applicability of machine equipment	Standardize methods of attaching dies.
Welding department	Technical improvement	1. Conduct technical research.
Surface treatment and heat treatment section	Promotion of the practical application of new technologies	1. Expand applications to various machine parts. 2. Utilize plasma, lasers and other forms of heat energy. 3. Promote research into metal surface reforming technology.





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