

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
SECRETARIA DE COMERCIO Y FOMENTO INDUSTRIAL (SECOFI)
THE UNITED MEXICAN STATES

**THE STUDY
ON
MASTER PLAN FOR THE PROMOTION
OF THE SUPPORTING INDUSTRIES
IN
THE UNITED MEXICAN STATES**

**FINAL REPORT
(SUMMARY)**

FEBRUARY 1997

JICA LIBRARY



J 1135566 [6]

UNICO INTERNATIONAL CORPORATION

TOKYO, JAPAN

MPI
JR
97-023

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SECRETARIA DE COMERCIO Y FOMENTO INDUSTRIAL (SECOFI)

THE UNITED MEXICAN STATES

**THE STUDY
ON
MASTER PLAN FOR THE PROMOTION
OF THE SUPPORTING INDUSTRIES
IN
THE UNITED MEXICAN STATES**

**FINAL REPORT
(SUMMARY)**

FEBRUARY 1997

UNICO INTERNATIONAL CORPORATION

TOKYO, JAPAN



1135566(6)

Contents of Summary of Final Report

	<u>Page</u>
Introduction	
1 Background of the Study	S-1
2 Objective of the Study	S-1
3 Scope of the Study	S-2
4 Methodology and Content of the Study	S-2
5 Outline of the Field Survey	S-3
 I Economic and Social Development Policy and Programs	
I.1 Economic Development Policies Announced by the Zedillo Administration	
	S-5
I.2 SMEs Promotion Policy	
	S-7
I.2.1 Definition and Positioning of SMEs in Mexico	S-7
I.2.2 Policy Framework Related to SMEs	S-8
I.2.3 Organizations Driving SME Policy Implementation	S-9
I.2.4 SME Promotion Policy and Its problems	S-12
I.3 Export Promotion Policy, Investment Promotion Policy and NAFTA.....	
	S-13
 II Mexican Automotive and Electrical/Electronic Industries	
II.1 Economic Outline	
	S-18
II.1.1 GDP and Employment.....	S-18
II.1.2 Trade Balance.....	S-18
II.2 Supporting Industry's Present Situation and Future Prospects	
	S-23
II.2.1 Automotive Parts Industry	S-23
II.2.2 Electrical/Electronic Parts Industry	S-27
II.2.3 Differences between the Automotive Industry and the Electrical/Electronic Industry in Mexico	S-29

III	Industrial Standardization in Mexico and Technical Support Organizations	
III.1	Industrial Standardization	S-32
III.1.1	Instruments and Procedures for Establishment of Industrial Standards	S-32
III.1.2	Accreditation and Certification System	S-34
III.1.3	Calibration System	S-34
III.1.4	Major Issues Related to Industrial Standardization in Mexico	S-36
III.2	Technical Support Organizations	S-37
III.2.1	Overview of Technical Support Organizations in Mexico	S-37
III.2.2	Visitation Survey on Technical Support Organizations	S-39
III.2.3	Problems in Technical Support Organizations	S-40
IV	Technology Level of Supporting Industry	
IV.1	Diagnosis Method of Technology and Assessment	S-42
IV.1.1	Enterprises which Received Technological Diagnosis	S-42
IV.1.2	Method for Diagnosis of Technology Levels.....	S-42
IV.2	Analysis of Technology Level Diagnosis Results	S-44
IV.2.1	Technological Diagnosis for the All Samples.....	S-44
IV.2.2	Comparison and analysis of the technology level with Thailand	S-47
IV.2.3	Technology Level of SMEs with Mexican Shareholders	S-51
V	Analysis of the Result of the Questionnaire Survey	
V.1	Analysis of the Result of the Questionnaire Survey by Interview	S-52
V.1.1	Corporate Profiles	S-52
V.1.2	Result of the Questionnaire Survey and Analysis	S-52
V.2	Analysis of the Result of the Questionnaire Survey for Maquiladora Companies	S-57
V.2.1	Purpose and Methodology of the Questionnaire Survey	S-57
V.2.2	The Result of the Questionnaire Survey and its Analysis	S-58

VI Selection of Priority Technology Areas

VI.1	Considerations for Selecting Priority Technology Areas.....	S-63
VI.2	Overall Evaluation and Conclusion.....	S-64
VI.2.1	Overall Evaluation.....	S-64
VI.2.2	Conclusion.....	S-67

VII Conclusion, Recommendations, and Master Plan

VII.1	Basic Framework of the Study.....	S-68
VII.1.1	Target Group and Core Problem Identified	S-68
VII.1.2	Priority Promotion Areas	S-69
VII.1.3	Basic Guidelines of Master Plan Development	S-70
VII.2	Basic Strategy for Promotion of Supporting Industries	S-71
VII.3	Conclusion and Project Proposal	S-72
VII.3.1	(Strategy 1) Technology Upgrading.....	S-74
VII.3.2	(Strategy 2) Subcontracting Promotion.....	S-76
VII.3.3	(Strategy 3) Entrepreneurship development.....	S-78
VII.3.4	(Strategy 4) Manpower Development	S-80
VII.3.5	(Strategy 5) Improvement of Financial Support	S-82
VII.3.6	(Strategy 6) Laying the Foundation for SMEs Promotion	S-84
VII.4	Master Plan	S-86
VII.4.1	Composition of Master Plan.....	S-86
VII.4.2	Priority of Projects for Implementation	S-91
VII.4.3	Five-year Plan and Time Schedule.....	S-94



Introduction

1 Background of the Study

Manufacturing industries in Mexico are facing intensive competition with imported products as a result of economic liberalization that rapidly progressed in recent years and due to market opening under NAFTA that enacted in January 1994. To effectively compete with imports, they have to strengthen international competitiveness.

Meanwhile, automotive and electrical/electronic industries which are leading export industries in the country have been boosting exports steadfastly in recent years, while attracting waves of foreign investment. It should be noted, however, that export growth occurs in assembled cars and systems without raising local content, i.e., export growth accompanies the increase in import of parts and components for automobiles and electrical and electronic products.

The situation has made the government and industry alike realize the importance of fostering supporting industries which supply parts and components to these major export sectors.

The Government of United Mexican States requested the Government of Japan for formulation of a master plan for promotion of supporting industries. In response, Japan International Cooperation Agency (JICA) sent a preliminary study team to Mexico at the end of August 1995, and on the basis of the result of the preliminary study, the Scope of Work concerning the implementation of the formal study was agreed and signed by the two governments. Pursuant to the provisions of the Scope of Work, JICA sent a study team to the country for field survey and in-depth analysis. This report has compiled the results of the study and related research.

2 Objective of the Study

The study is designed to formulate a master plan for development of supporting industries for the purpose of promoting local production of automotive and electrical/electronic parts and components in Mexico. The master plan consists

of, among other things, improvement measures for supporting industries in technical aspects and recommendations related to basic promotion policy.

3 Scope of the Study

For the purpose of this study, "supporting industries" refer to industries specialized in supply of parts and components required for assembly of automobiles and electrical and electronic equipment.

Industrial subsectors and product segments considered under the study are as follows.

(1) Automotive parts industry

Automobiles mean four-wheel vehicles including buses and trucks.

(2) Electrical/electronic parts industry

Electrical and electronic equipment consists of the following product segments:

1) Consumer electrical equipment

Washing machines, refrigerators, air-conditioners, electric fans, and microwave ovens, not including equipment for power generation and distribution, such as generators, boilers, and turbines.

2) Consumer electronic equipment

Including video equipment, TV receivers, and audio equipment

3) Industrial electronic equipment

Including telephones, facsimiles, copiers, wordprocessors, and computers

4 Methodology and Content of the Study

(1) Phases I and II

The study was conducted in the following two phases. The study team consisted of 12 members including a coordinator.

(2) PCM (Project Cycle Management)

The study employed the PCM method under which related parties participated in developing a master plan in the form of workshop.

During the study period, four PCM workshops were conducted at SECOFI, as

follows:

February 7, 1996	Participants analysis	(37 participants)
June 13, 1996	Problem analysis I	(31 participants)
July 4, 1996	Problem analysis II	(34 participants)
September 9, 1996	Objective and alternative analysis	(39 participants)

5 Outline of the Field Survey

The field survey was conducted three times, totaling 113 days, and is outlined as follows:

(1) Number of enterprises and organizations visited

	Automobile	Electrical / Electronic	Total
Assembler	4	19	23
Parts/Components supplier	73	58	131
Sub-total			154
Federal Government			13
Local Government			23
Financial Organization			17
Technical Institution			53
Association and Other ¹⁾			63
Sub-total			169
Total			323 ²⁾

Note: 1) includes industrial and trade associations, trading companies, consulting firms and etc.

2) shows total number of visits including duplication.

(2) States visited

The following thirteen states and their major cities were visited twice on average:

- | | |
|--------------------|-------------------|
| 1) Baja California | 2) Chihuahua |
| 3) Coahuila | 4) Nuevo León |
| 5) Tamaulipas | 6) Aguascalientes |
| 7) San Luis Potosí | 8) Jalisco |
| 9) Guanajuato | 10) Querétaro |
| 11) México | 12) D.F. |
| 13) Puebla | |

(3) Parts manufacturers visited for technology assessment

The number of enterprises subject to the assessment of technology levels during the visiting survey of (1), with breakdown by size and subsector, is as follows:

Size (Employees)	Autoparts	Electparts	Total
Small (100 or fewer) ¹⁾	10	22	32
Medium (101~250)	16	11	27
Large (251 or more)	20	16	36
No answer	1	1	2
Total	47	50	97
(Average employees)	(368)	(259)	(312)

Note : 1) Micro-scale enterprises with 15 or fewer employees are included in "Small" because of small number of samples.

(4) Responses to questionnaire surveys

1) Questionnaire survey by local consultant (316 responses)

The survey was conducted to understand the overall picture related to supporting industries other than Maquiladoras.

2) Questionnaire survey by the Team during the visit to enterprises (including assemblers) (109 responses)

The survey was conducted at each enterprise visited by the Team.

3) Questionnaire survey for Maquiladoras by facsimile (73 responses)

Questions focused on reasons for not buying local parts and intention to increase local procurement.

I Economic and Social Development Policy and Programs

I.1 Economic Development Policies Announced by the Zedillo Administration

This section reviews series of economic policy and industrial development policy announced by the Zedillo administration that inaugurated on December 1, 1994.

Table I.1-1 Summary of Economic Policies Proposed by the Zedillo Administration

Year/month announced	Policy proposal	Major initiatives
January 1995	Emergency Economic Program (AUSEE)	<ul style="list-style-type: none"> - Foreign exchange policy - Revenue policy - Public utility charges - Privatization - Tax revenues and system - Expenditure policy - Deregulation - Assistance to small enterprises and industries - Establishment of National Council on Small-and Medium-Sized Enterprises - Financial policy - Agricultural policy - Labor policy - Wage policy - Price policy
March 1995	Action Program to Reinforce AUSEE (PARAUSEE)	<ul style="list-style-type: none"> <Foreign exchange> <Expenditure> <Revenue> <Finance> - Domestic debt rescheduling for small enterprises for 5 - 12 years <Wage> - To raise minimum wage by 10%, starting in April
May 1995	National Development Plan (PND) 1995-2000	<ol style="list-style-type: none"> 1 Sovereignty 2 The rule of law 3 Democratic development 4 Social development 5 Economic growth <ul style="list-style-type: none"> - Domestic saving - Stabilization of government finance, foreign exchange, financial system - Resource mobilization for growth - Environmental policy supporting growth - Sectoral policy

October 1995	Alliance for the Recovery of Economic Growth (APRE)	<ul style="list-style-type: none"> I Government finance <ul style="list-style-type: none"> - Tax incentives, corporate asset tax exemption (up to December 1996) - Taxation measures to promote job creation by automobile and related industries II Foreign exchange and financial policy <ul style="list-style-type: none"> - Maintaining freely fluctuating foreign exchange rate system III Promotion of saving and infrastructure development IV Deregulation <ul style="list-style-type: none"> - Cooperation with state governments V Employment promotion by small enterprises <ul style="list-style-type: none"> - Establishment of Corporate Competitiveness Center VI Development bank and housing VII Employment and vocational training VIII Wage IX Social expenditure X Assistance to agricultural sector
May 1996	Program of Industrial Policy and International Trade	<ul style="list-style-type: none"> i Macroeconomic stability and financial development ii Creation and improvement of physical infrastructure and the human and institutional foundation iii Promotion of the integration of production chains iv Improvement of technological infrastructure for industrial development v Economic deregulation vi Export promotion vii International trade negotiations viii Promotion of competition

Source : JICA Team summarized.

In the context of various policy measures described earlier, the fostering of supporting industries, a primary purpose of the present study, should be included in small enterprise promotion policy, for most of supporting industries are classified under the category of SMEs.

The former administration did not have a particular policy to promote SMEs and let a market mechanism work to promote growth of Micro-enterprises and SMEs. The Zedillo administration is now placing priority to promotion of those enterprises.

AUSEE (January 1995) prescribes 1) to warrant the government procurement provisions favoring SMEs under NAFTA; 2) to establish the National Small and Medium Enterprise Council and reinforce support for SMEs; 3) to nurture the linkage with large enterprises; and 4) to increase competitiveness of labor-intensive export industries. PARAUSEE (March 1995) has announced a support program for SMEs.

PND (May 1995) has formally endorsed AUSEE's policy as part of national development plans. Then, APRE (October 1995) announced 1) tax incentives for 1996, plus employment promotion at micro-enterprises as well as SMEs, including 2) the establishment of Corporate Competitiveness Centers, 3) promotion of technical information service, and 4) extension of line of credit for small enterprise financing. On the basis of PND, SECOFI has proposed policy measures for the commerce and industry sectors in May 1996.

I.2 SMEs Promotion Policy

Supporting industries that are the major subject of this study consist of manufacturers of automotive parts and electrical/electronic parts. At present, Mexico does not have clear promotion policy for supporting industries. However, it is relevant here to discuss about the country's small- and medium-sized enterprises (SMEs) promotion policy since most of enterprises that belong to the supporting industries are SMEs.

I.2.1 Definition and Positioning of SMEs in Mexico

(1) Definition

The present definition of small- and medium-sized enterprises and micro-enterprises in Mexico is set forth in "Comprehensive Development Plan for Small- and Medium-Sized Enterprises" and is restated with some modification in "Modernization and Development Plan for Small- and Medium-Sized Enterprises 1991-94."

Table I.2-1 Definition of SMEs

	Employment	Net annual sales
Micro-enterprises	15 or less	1.5 million pesos or less
Small-sized enterprises	16 - 100	15 million pesos or less
Medium-sized enterprises	101 - 250	34 million pesos or less

Net annual sales are established by SECOFI to indicate the upper limit for each category, either in actual or projected amount. For newly established enterprises, projected net annual sales must be consistent with production equipment installed and projected employment. Note that the above figures

are announced by SECOFI.

(2) Positioning and trend

In the manufacturing sector, small- and medium-sized manufacturers including micro-enterprises account for 98% of the total. In fact, micro-enterprises dominate with a 80% share. In terms of employment, micro-enterprises account for 12%, and together with small- and medium-sized enterprises, represent 49% in 1994.

Table I.2-2 Composition of Manufacture and Employee in 1994

	(Unit : %)				
	Large	Medium	Small	Micro	Total
No. of manufacture	2%	3%	15%	80%	100%
No. of employee	51%	16%	21%	12%	100%

Source : SECOFI, IMSS

In terms of both the numbers of establishments and employees, micro-enterprises and small enterprises peaked out in 1992 and 1991 respectively. In 1994, small enterprises showed a significant decline, decreased nearly 10% in the numbers of establishments and employees. Although large and medium sized enterprises faced similar downturns in 1994 from their peak levels, their rates of decrease were not as large as those of small enterprises, and also they started to increase in the same year.

I.2.2 Policy Framework Related to SMEs

(1) National development plan and SME policy

National Development Plan (PND, 1995 - 2000) announced in 1995 states, in Chapter 5 "Sectoral Policy," that one of the major focuses in industrial plan is to promote micro-enterprises and SMEs, and at the same time, to strengthen labor-intensive industries with international competitiveness. In addition, the "Export Promotion" section in Chapter 5 sets forth the following measures:

- 1) To facilitate supply of trade finance to SMEs through the development bank; and
- 2) To incorporate export promotion measures into SMEs engaged in

indirect export.

The "Technology Policy" section in Chapter 5 points out poor technical levels of small enterprises that lag behind large enterprises, and states the reinforcement of research and development organizations, dissemination of technology, and private investment toward technical innovation.

(2) **Outline of SME policy**

As mandated by PND, SECOFI has formulated its industrial policy (Program of Industrial Policy and International Trade, May 1996). The development of SMEs is one of key elements in this program and various action plan related to SMEs are stated. Among those programs, "Integration of Production Chains" is especially related to SMEs. This policy is to reintegrate production chains which has been severed by trade liberalization. Production Chains will be integrated with enforcement of linkage between micro, small and medium size companies supplies inputs and final producers. Following sectors for promotion of linkages of production chains are selected.

The follow-up and evaluation of the program will work in the National Council for Micro, Small and Medium Enterprise.

1.2.3 Organizations Driving SME Policy Implementation

(1) **Government organizations and trade associations involved in fostering SMEs**

Traditionally, SME promotion policy in Mexico has been led by various organizations, mainly SECOFI and Development Banks. SECOFI's General Office for the Promotion of Micro, Small and Medium Size Companies and Regional Development is responsible for formulation and implementation of industrial policy including promotion and organization of subcontractors as well as related administrative guidance. Two government financial institutions (Development Bank), NAFIN and BANCOMEXT, provide financial support including investment and medium- and long-term loans for fostering and promotion of industries.

A private organization, National Chamber of the Manufacturing Industry

(CANACINTRA), is playing a leading role in the policy implementation stage. CANACINTRA's activities include: 1) coordination of opinions among micro-enterprises and SMEs; 2) exchange of ideas with government; 3) dissemination of information on technology, policy, and economy; 4) education and training; 5) legal advice; 6) promotion of standardization; 7) trade promotion; 8) intermediary for subcontracting; and 9) technology transfer.

However, the present organizational arrangement and promotional measures have proven to have various drawbacks: 1) they fail to provide effective support for SMEs; 2) there is lack of coordination between government organizations and individual enterprises; and 3) support measures are loosely focused. To overcome these drawbacks and provide effective policy support required by SMEs, an ad-hoc organization, The National Council of Micro, Small and Medium Size Enterprises, was established under participation of related government agencies, representatives of private organizations and enterprises. The council's profile, objectives, and activities are described in the following section.

(2) The National Council of Micro, Small and Medium Sized Enterprises
(Consejo Nacional de la Micro, Pequeña y Mediana Empresa)

The council represents a new initiative for SMEs launched on May 23, 1995 under a decree. It consists of representatives of both the public and private sectors. It is expected to clearly redefine the direction of promotion policy for micro-enterprises and SMEs.

The council has the following objectives:

- a) To coordinate and plan support measures to reinforce competitiveness of micro-enterprises and SMEs and coordinate various methods for implementation;
- b) To consider and design a mechanism to enable micro-enterprises and SMEs to have more comprehensive and professional advice, particularly in the areas of commercialization, market exploitation, technology, production process, and standardization;
- c) To promote organization of micro-enterprises and SMEs, reinforce their

linkage with large enterprises, for the purpose of the integration and the efficiency of production chains;

- d) To develop strategies for micro-enterprises and SMEs, both direct and indirect;

(3) Programs for SMEs

Various programs serving as instruments to promote SMEs are described as follows.

1) Integrated enterprises (Empresas Integradoras)

Integrated enterprises are established by a group of SMEs to share resources as well as information for the purpose of improving productivity and reinforcing competitiveness. In particular, integrated enterprises carry out joint marketing and sales of products manufactured by their members as well as joint purchase of raw materials.

2) Unification of administrative service outlets

"Unified counters (ventanilla única)" - one-stop service centers - are established to ensure smooth implementation of SME programs, handling various licensing and approval procedures related to incorporation and operation of an enterprise. In Mexico City, the service center is located within CANACINTRA, where various administrative services are provided for small- and medium-sized manufacturers, jointly with Federal District Department (DDF).

3) Provision of consulting service, technical assistance, and education and training

Technology Transfer Center (UTT) under CANACINTRA is providing consulting service for SMEs in the field of industrial technology. NAFIN's Entrepreneur Fostering Program (PRODEM) provides training and technical support for SMEs. In 1994, 12,311 entrepreneurship courses were conducted and participated by 235,253 people in total. 490 courses on professional training were provided for 9,418 people.

4) **Subcontract intermediary system (Bolsa de Subcontratación)**

The system is under way as part of SECOFI's policy and is designed to build a data base containing information on SMEs in order to encourage subcontracts. The system is managed by private organizations including CANACINTRA, Chamber of Manufacturing Industry of State of Jalisco (CAREINTRA), and that of Nuevo León (CAINTRA).

In addition to the SME data base, SECOFI conducted three exhibitions for promotion of subcontract work in 1995. At these exhibitions, companies requiring materials and parts displayed their products and met with suppliers for meeting.

5) **SME loan programs of NAFIN and BANCOMEXT**

APRE envisages to increase public loans to export industries and SMEs by 30%. In response, NAFIN and BANCOMEXT plan to increase their SME loans.

6) **Credit Unions**

Another instrument for SME production are credit unions which are established by a group of companies under their contribution to form the fund. NAFIN sets up a line of credit for each unions equivalent to 10 times the amount of the fund and extends loans to member companies.

1.2.4 SME Promotion Policy and its problems

- (1) Since existing SME promotion policies are not laws but programs, its sustainability are not certain.
- (2) Consejo Nacional de la Micro, Pequeña y Mediana Empresa is only a coordination body with limited executing capability.
- (3) Allotment of the central government, state governments, development banks and each industrial organizations are not clear. Duplication of task are often seen.
- (4) There is a lack of human resources who can handle issues of SME.
- (5) There is a lack of attractive incentives for SMEs to operate their business.

I.3 Export Promotion Policy, Investment Promotion Policy and NAFTA

The Mexican economy is being liberalized by means of the "Automobile Decree" which mandates localization of automotive parts, the "Maquiladora Decree" about the bonded processing zone, the "Temporary Import Program (PITEX)" to encourage exports, the "New Investment Law" to lighten the foreign investment regulations and "NAFTA" - the free trade agreement among the U.S., Canada, and Mexico. The Automobile Decree, the Maquiladora Decree, the PITEX and the New Investment Law, have been gradually deregulated by NAFTA that became effective in 1994 as well as Mexico's joining the GATT in 1986.

The effect of NAFTA on major laws in Mexico relevant to the present study, i.e., how they are deregulated after NAFTA, is summarized in the table I.3-1.

**Table I.3-1 Comparison of Regulatory Impacts
of Major Industrial Promotion Laws Before and After NAFTA**

Law/decree	Before NAFTA	After NAFTA
Automobile Decree (Promulgated on December 11, 1989, Amended and added on May 31, 1995)	1) Domestic value-added rate of 36% or over 2) Trade balance: Each company is required to achieve positive balance of foreign currency position (exports > imports) 3) Restriction on newly assembled car imports: Manufacturers may import up to 20% of domestic unit sales.	1) 34% up to 1998, and will be lowered by 1% each year to 29% in 2003. To be abolished in 2004. 2) Export/import ratio at enterprise level was reduced from 1.0 to 0.8 in 1994, and will be down to 0.55 in 2003. To be abolished in 2004. 3) Volume import restriction was abolished immediately, with increased ceiling for foreign currency usable for imports
Maquiladora Decree (Promulgated on December 22, 1989, Amended and added on December 24, 1993)	1) Ownership: 100% share may be owned by foreign capital 2) Export obligation: Products equivalent to 50% of exports (value basis) may be sold to the domestic market. 3) Bonded imports (No customs on imported goods (raw materials, machinery and equipment))	1) Remain unchanged. However, the new foreign investment law will authorize companies wholly owned by foreign capital, depriving Maquiladora of the privileged status. 2) Will be deregulated from 55% in 1994 to 100% in 2001, i.e., domestic sales up to the value of exports in previous year. 3) Scheduled to be abolished on January 1, 2001.
Foreign Investment Law (Partially amended by decree on March 9, 1973, Entirely amended on December 28, 1993)	1) Industrial sectors allowing foreign investment: After 1989, companies wholly owned by foreign capital may be established without approval, except for designated sectors. 2) Performance requirements (localization rate, export obligation, trade balance, etc.)	1) Except for automotive parts, 100% foreign companies may be established in most manufacturing sectors without approval. 2) Performance requirements will be discontinued, excepting interim measures for the Automobile Decree and the Maquiladora Decree.

Source : JICA team summarized.

Figure I.3-1 illustrates the yearly progress of liberalization in 4 areas which are strongly related to this study.

- 1) NAFTA's schedule on the complete abolition of tariffs
- 2) Ratio allowed to sell Maquiladora products to the domestic market.
- 3) Relaxation of automobile regulations regarding added value in the domestic market
- 4) Reduction of tariff rates on CTV decided by NAFTA

Figure I.3-2 illustrates the average ratio of the four in different years. The liberalization rate of the NAFTA region, which amounted to 65% in the end of 1995, is expected to shoot up to almost 90% by 2001.

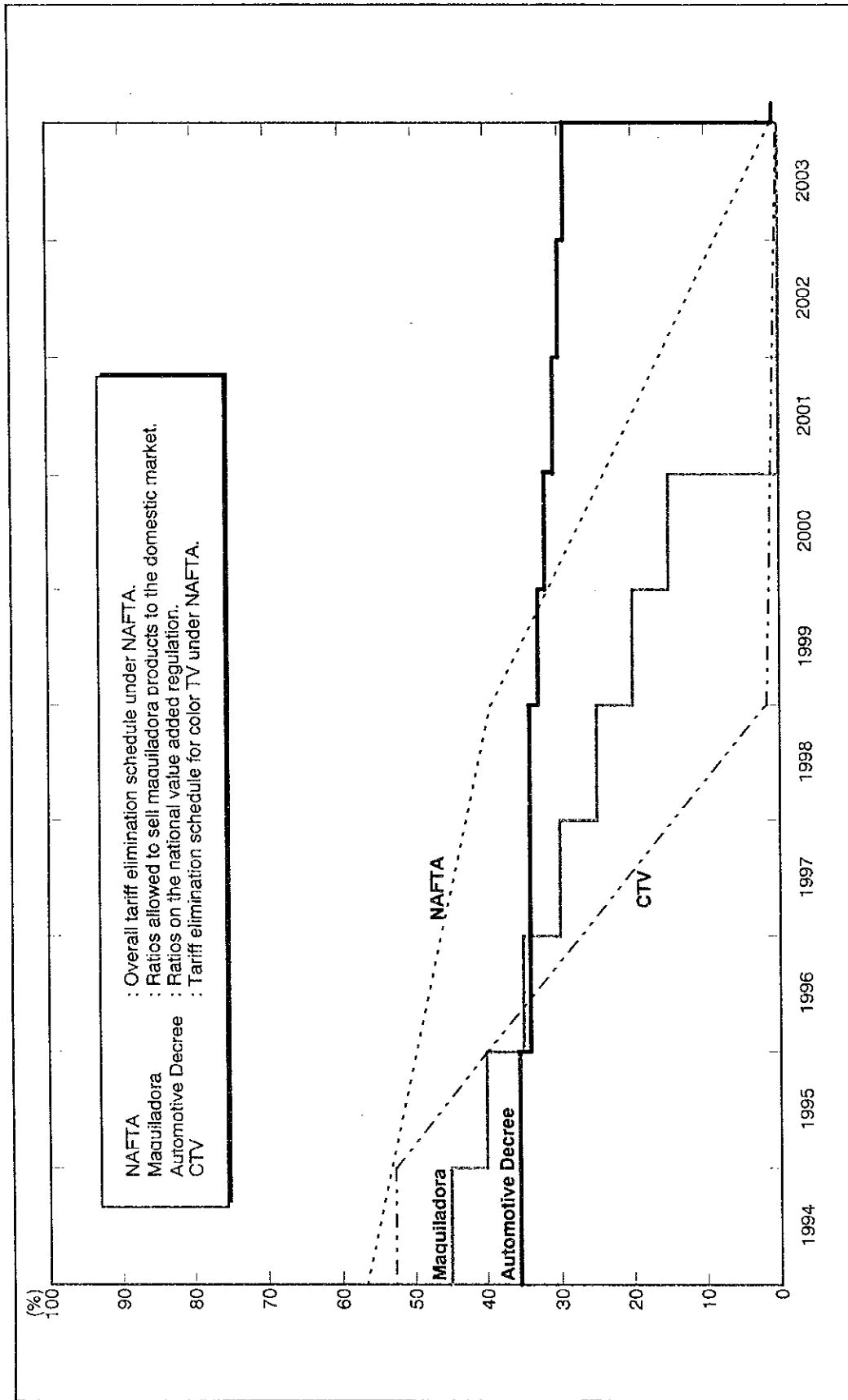


Figure I.3-1 Deregulation Schedule of Major Elements under NAFTA

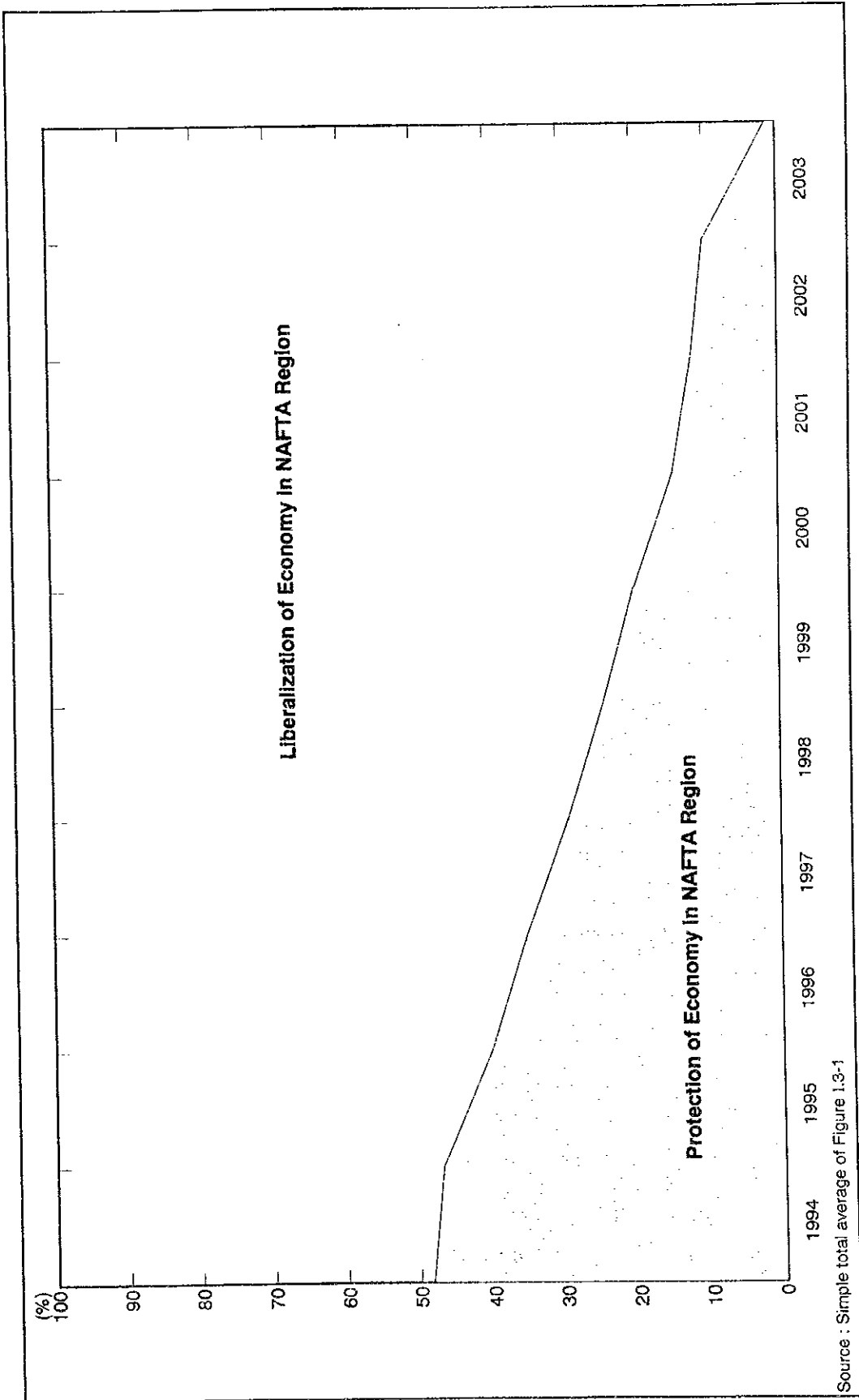


Figure 1.3-2 Image of Overall Trend of Liberalization under NAFTA

II Mexican Automotive and Electrical/Electronic Industries

II.1 Economic Outline

II.1.1 GDP and Employment

Automobile and electrical/electronic industries, including final products and parts, are included in Item VIII of the macro-economics statistics. Item VIII is divided into 11 sections (Rama), out of which the following 4 sections are covered by this study .

53	Electrical
54	Electronic
56	Automotive assemblers
57	Autoparts

Tables II.1-1 and II.1-2 illustrates the GDP and employment by aforementioned classification(Rama).

Measured by the four-year average after 1990, the automotive industry (including both finished products and parts) accounted for 10.0% of the manufacturing sector's share of real GDP (2.3% of total GDP). As for employment, it accounted for 6.2% of the manufacturing sector's share and 0.7% of total employment. In comparison, the electrical/electronic sector amounted to 2.6% of the manufacturing sector's share in terms of real GDP (0.6% of total GDP), and 3.0% in terms of employment (0.6% of total employment).

INEGI's data were used for employment among various statistical data available.

II.1.2 Trade Balance

Table II.1-3 and II.1-4 shows the share of the entire manufacturing sector in total exports and imports, in addition to the respective shares of the automobile and electrical/electronics industries. Note that the figures include parts exports and imports, and that both household- and industrial-electrical equipment are taken into account with regard to electrical/electronic industries.

Table II.1-1 GDP Share of Electrical/Electronic and Automotive Industries

		(Unit : Thousand Pesos at 1980 Price)					
		1990	1991	1992	1993	1994	1995
Total GDP		5,271,539	5,462,729	5,615,955	5,649,674	5,857,478	5,451,600
Gran-Division III	Manufacturing Industry	1,203,800	1,252,200	1,280,700	1,270,800	1,317,100	1,232,472
Division VIII	Metal Products, Machinery and Equipment	252,100	283,300	293,200	291,500	316,600	281,725
53	Electrical domestic appliances	7,206	8,229	8,789	8,229		
54	Electronic appliances	22,604	22,733	25,128	24,658		
	Total (53+54)	29,810	30,962	33,917	32,887		
	% of Total GDP	0.57	0.57	0.60	0.58		
	% of Manufacturing Industry	2.48	2.47	2.65	2.59		
56	Automotive - Assemblers	67,434	85,563	95,771	93,965		
57	Automotive - Parts and components	36,773	42,296	42,222	39,764		
	Total (56+57)	104,207	127,859	137,993	133,729		
	% of Total GDP	1.98	2.34	2.46	2.37		
	% of Manufacturing industry	8.66	10.21	10.77	10.52		

Source : INEGI

Table II.1-2 Employment of Electrical/Electronic and Automotive Industries

(Unit : Thousand Employment, Annual Average)

	1990	1991	1992	1993	1994	1995
Total	22,536	23,112	23,218	23,251	23,453	
Ran-Division III	2,510	2,500	2,447	2,325	2,303	
Division VIII	519	522	509	470	466	
53 Electrical domestic appliances	18	18	18	15		
54 Electronic appliances	55	53	56	56		
Total (53+54)	73	71	74	71		
% of Total	0.32	0.31	0.32	0.31		
% of Manufacturing Industry	2.91	2.84	3.02	3.05		
56 Automotive - Assemblers	60	63	63	57		
57 Automotive - Parts and components	88	93	90	82		
Total (56+57)	148	156	153	139		
% of Total	0.66	0.67	0.66	0.60		
% of Manufacturing Industry	5.90	6.24	6.25	5.98		

Source : INEGI

Table II.1-3 Export Share of Manufacturing Industry

(Unit : %)

	1992	1993	1994	1995
Export Total	100.0	100.0	100.0	100.0
Manufacturing	78.3	81.9	83.9	84.7
Automotive Industry	15.8	17.2	17.7	19.1
Electric/Electronics	25.4	27.0	28.4	26.2
Others	37.1	37.7	37.8	39.4
Others	21.7	18.1	16.1	15.3
Export - Maquiladora	100.0	100.0	100.0	100.0
Manufacturing	99.9	100.0	100.0	100.0
Automotive Industry	6.7	7.6	7.7	7.3
Electric/Electronics	56.1	56.4	56.5	57.8
Others	37.1	36.1	35.7	34.9
Others	0.1	0.0	0.0	0.0
Export - Excluding Maquiladora	100.0	100.0	100.0	100.0
Manufacturing	63.6	68.8	71.7	74.9
Automotive Industry	22.0	24.1	25.3	26.8
Electric/Electronics	4.6	5.7	7.0	5.8
Others	37.1	38.9	39.3	42.4
Others	36.4	31.2	28.3	25.1

Note : Shaded numbers are percentage against Export Total.

Source : Banco de México, "Indicadores del Sector Externo"

Table II.1-4 Import Share of Manufacturing Industry

(Unit : %)

	1992	1993	1994	1995
Import Total	100.0	100.0	100.0	100.0
Manufacturing	93.7	94.2	93.8	93.2
Automotive Industry	14.7	14.5	14.5	13.1
Electric/Electronics	17.7	19.1	19.3	22.7
Others	61.3	60.6	60.0	57.3
Others	6.3	5.8	6.2	6.8
Import - Maquiladora	100.0	100.0	100.0	100.0
Manufacturing	97.6	96.4	95.7	94.7
Automotive Industry	3.4	2.8	2.8	3.4
Electric/Electronics	42.9	44.6	45.4	47.0
Others	51.3	49.1	47.4	44.3
Others	2.4	3.6	4.3	5.3
Import - Excluding Maquiladora	100.0	100.0	100.0	100.0
Manufacturing	92.6	93.4	93.1	92.3
Automotive Industry	18.0	18.4	18.5	18.7
Electric/Electronics	10.4	10.6	10.2	8.9
Others	64.2	64.4	64.4	64.7
Others	7.4	6.6	6.9	7.7

Note : Shaded numbers are percentage against Import Total.
Source : Banco de México, "Indicadores del Sector Externo"

The average share of the manufacturing sector in total exports was approximately 84% during the 2-year period between 1994 and 1995, or 73% if Maquiladora's contribution is excluded. The average share for 1992 and 1993 was 80.1% and 66.2%, respectively, indicating the steady growth of the manufacturing sector's weight in exports.

In 1995, automobiles and electrical/electronic products in total accounted for nearly half (45.3%) of all exports, serving as major foreign-currency earners. While both industries play a crucial role in Mexico's exports, their relations with Maquiladora differ significantly. Comparing Maquiladora firms' contribution to total exports with that of non-Maquiladora companies, as far as the automotive industry is concerned, the former accounted for 2.9% and the latter 16.3%, indicating that exports of completed cars and automotive parts by non-Maquiladora sources represent a much larger share. On the other hand, exports of electrical/electronic products by Maquiladora companies accounted for 22.7% of total exports, and non-Maquiladora 3.5%, the former outstripping the latter.

II.2 Supporting Industry's Present Situation and Future Prospects

II.2.1 Automotive Parts Industry

- (1) Compared to the pyramid structure seen in industrialized countries, the automotive industry in Mexico appears to have the umbrella structure where down streams are weak (Figure II.2-1). While primary suppliers are increasingly building up their supply capabilities, most of parts that would otherwise be produced by secondary and tertiary suppliers are imported.
- (2) Trade balance for the automotive industry as a whole turned to a surplus in 1995, thanks to a rapid increase in exports of completed built-up cars and engines, together with a slump in domestic demand for new cars due to the devaluation of the peso in 1994. Trade balance for automotive parts remains in deficit, as continued from 1990 after the Automobile Decree was amended (Figure II.2-2).
- (3) In the automotive parts industry, the primary suppliers have already matured and assemblers do not have any serious concerns about this tier of subcontracting.

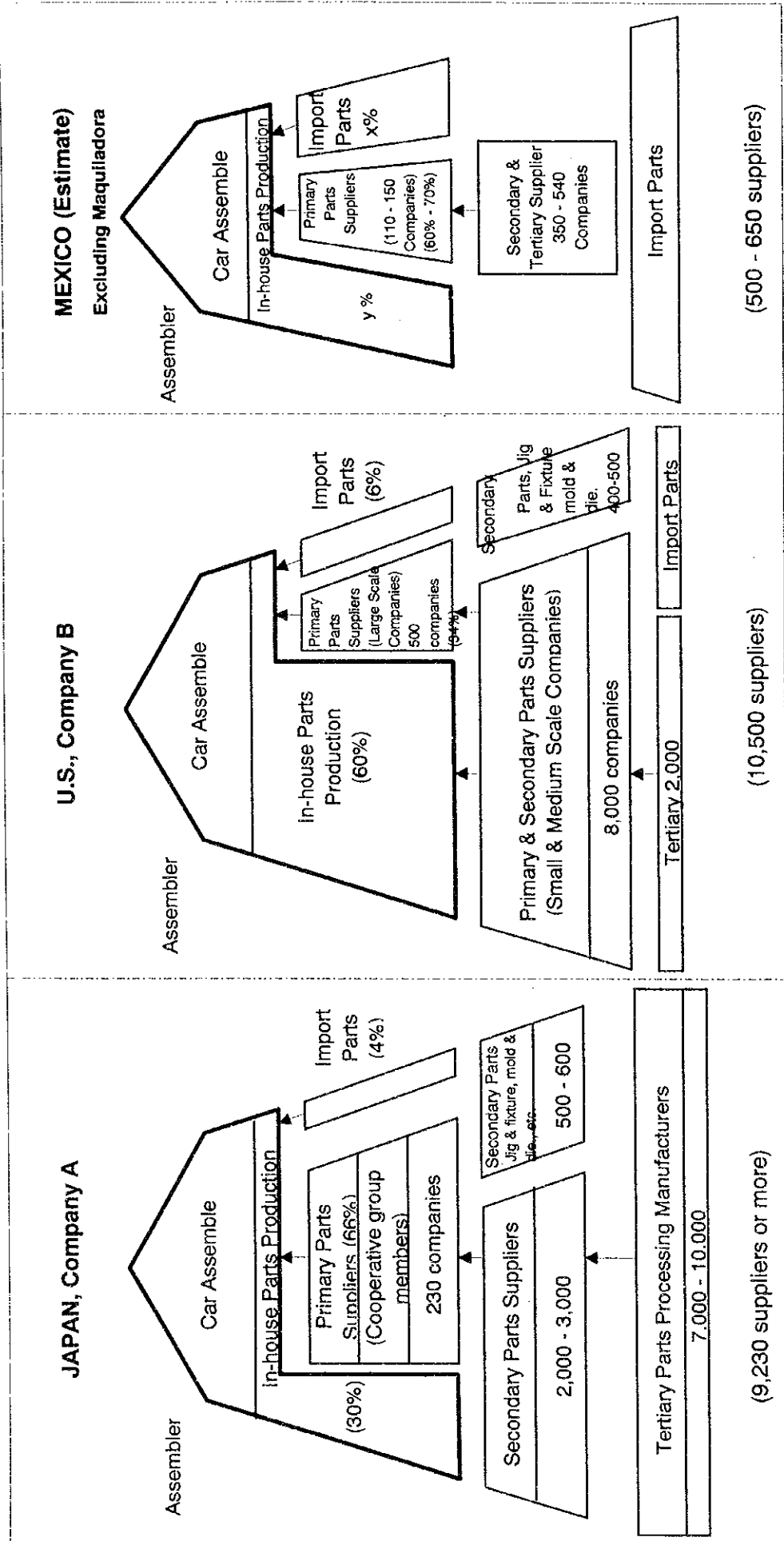


Figure II.2-1 International Comparison of Car Assembling
(Conceptual Drawing)

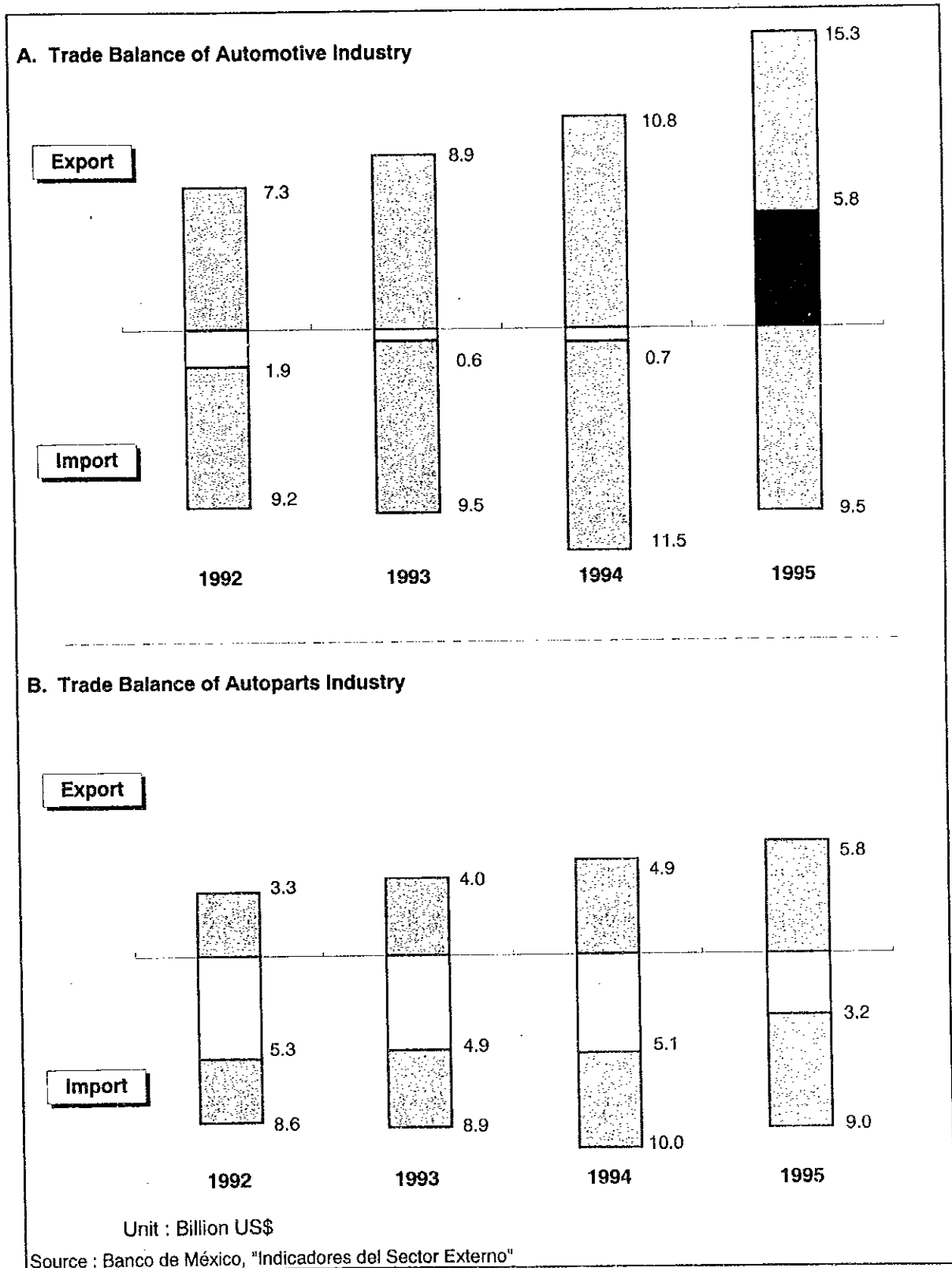


Figure II.2-2 Balance of Automotive and Autoparts Industry

- (4) Some well-established, large primary suppliers have corporate groups which include the secondary suppliers. In this type of parts supply system, the groups produce final components in an integrated process starting from raw materials. These suppliers tend to be internationally competitive and also engage in the direct export of their products.
- (5) Those stand-alone or unit type primary suppliers, which are relatively new and have not formed corporate groups, are trying to identify and develop domestic secondary suppliers as an alternative to importing parts. Japanese primary suppliers who have invested in Mexico during the 1990s belong to this category.
- (6) The demand for the secondary suppliers in industries such as casting, forging and large-part plastic molding is weak because the primary suppliers in these fields have already established solid production lines within their groups and even stand-alone primary suppliers have substantial production capacity. Most of the demand from the primary suppliers satisfied by the secondary suppliers is for small stamped parts.
- (7) A major and utmost challenge for the industry is to increase local procurement of parts. However, coercive measures by the Automobile Decree are no longer acceptable in the midst of the liberalization process. Besides, major assemblers have their own global sourcing strategies and are not likely to manufacture or procure all the parts locally. Under these circumstances, the trade deficit in automotive parts must be dealt with by fostering secondary and lower tier suppliers who are also the weakest element of the hierarchy in the Mexican automotive industry.
- (8) If automobile production in Mexico increases in the future, the production of the primary suppliers will be focused on the manufacturing, processing and assembling of the medium- to large-size processed materials. Therefore, some medium-size parts and small parts, including stamped parts as well as plastic and rubber parts, will be subcontracted to the secondary suppliers.

II.2.2 Electrical/Electronic Parts Industry

- (1) In Mexico, the electrical and electronic industry is one of major export industries, and 86% of export are made by Maquiladora companies (Figure II.2-3). It should be noted, however, that a trade surplus produced by Maquiladora mostly comes from value added by labor force under labor-intensive production practices, while the localization rate or the percentage of local parts and components used in final products is very low (2 - 3 %).
- (2) Both assemblers and suppliers who have served the domestic market are hit hard by import liberalization. It is therefore important to nurture parts and components industries newly targeting Maquiladora companies, including color TV production that is largest in the world.
- (2) A very low localization rate of Maquiladora companies in electrical and electronic parts does not necessarily mean that "there are few primary suppliers, and small- and medium-sized enterprises which are largely secondary suppliers do not have a chance of entering the market." The industry is structurally different from the automotive industry.
- (4) In the electrical/electronic industry, many assembly manufacturers produce primary and secondary components on their own, which sub-parts are now imported. They may be subcontracted if conditions are met.
- (5) In Maquiladora areas, there are many primary suppliers producing key functional parts, which also import parts. This is another market opportunity for supporting industries consisting of SMEs.
- (6) In case of targeting Maquiladora companies, functional components will likely be supplied by foreign capital oriented companies (foreign investment in this area is already on the rise) and large local manufacturers. On the other hand, the major concern of the present study is small- and medium-sized supporting industries, and thus the focus should be placed on local suppliers who supply parts for the functional components. This means promotion of secondary and lower suppliers, which is consistent with the major target contemplated for the automotive industry.

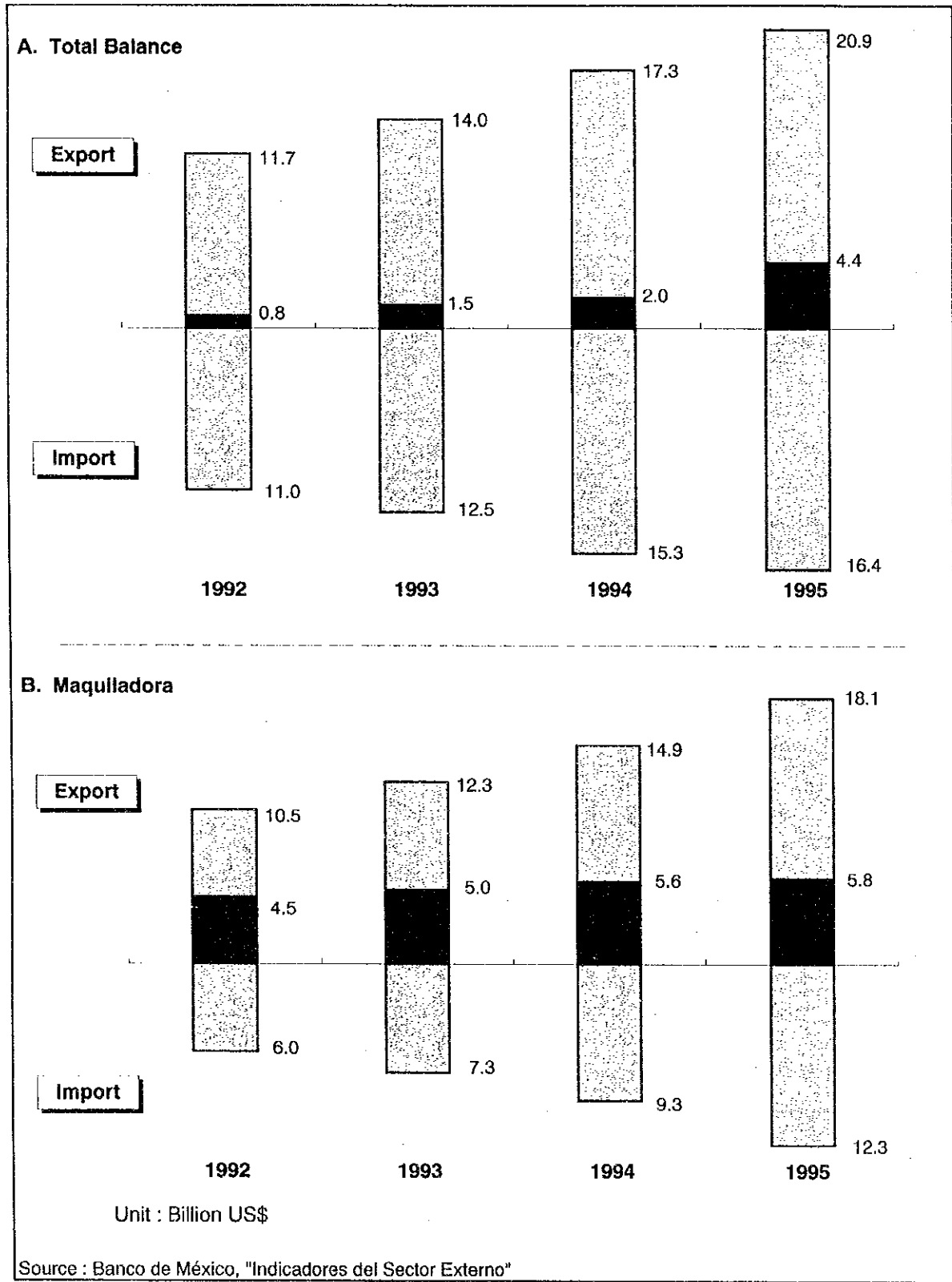


Figure II.2-3 Trade Balance of Electrical/Electronic Industry

- (7) The most important factor to gain access to Maquiladora is the ability of the supplier to meet buyer's needs, namely quick and reliable procurement of parts. In particular, they want to purchase various types of parts or functional parts assembled from multiple parts from a single supplier.

II.2.3 Differences between the Automotive Industry and the Electrical/Electronic Industry in Mexico

(1) Subcontracting system

In the automotive industry, however, all the assemblers are more or less the same in terms of distribution of parts sourcing, i.e., the same parts are made by assemblers, primary suppliers, and secondary or lower suppliers. On the other hand, in the electrical/electronic industry, all the assemblers do not necessarily manufacture the same parts internally, and neither do subcontractors, resulting in significantly different patterns of subcontracting system from one assembly company to another.

To illustrate the diverse subcontracting system in the industry, Figure II.2-4 shows an example of the TV industry. At the center, TV assembly operation is illustrated and surrounded by functional parts of TVs, such as CRTs, mounted PCBs, cabinets and back covers, and yoke coils. These core assembly parts are surrounded by a group of functional parts at the next level, then by low-functional or non-functional parts (although not illustrated in the figure) to form the entire productive chain of TV assembling.

In this illustration, TV assembler A manufactures mounted PCBs internally, in addition to TV assembly operation. Assembler B manufactures CRTs and cabinets in addition to mounted PCBs, together with various parts mounted on PCBs. Assembler C produces a different combination of parts internally (Note that most of TV assemblers manufacture mounted PCBs). In fact, diversity of internally produced parts is not limited to Mexico and is observed throughout the world. Many assemblers supply internally produced parts to other companies, thus serving as the assembler and parts supplier. Accordingly, the similar diversity can be observed among primary suppliers which directly supply parts to assemblers.

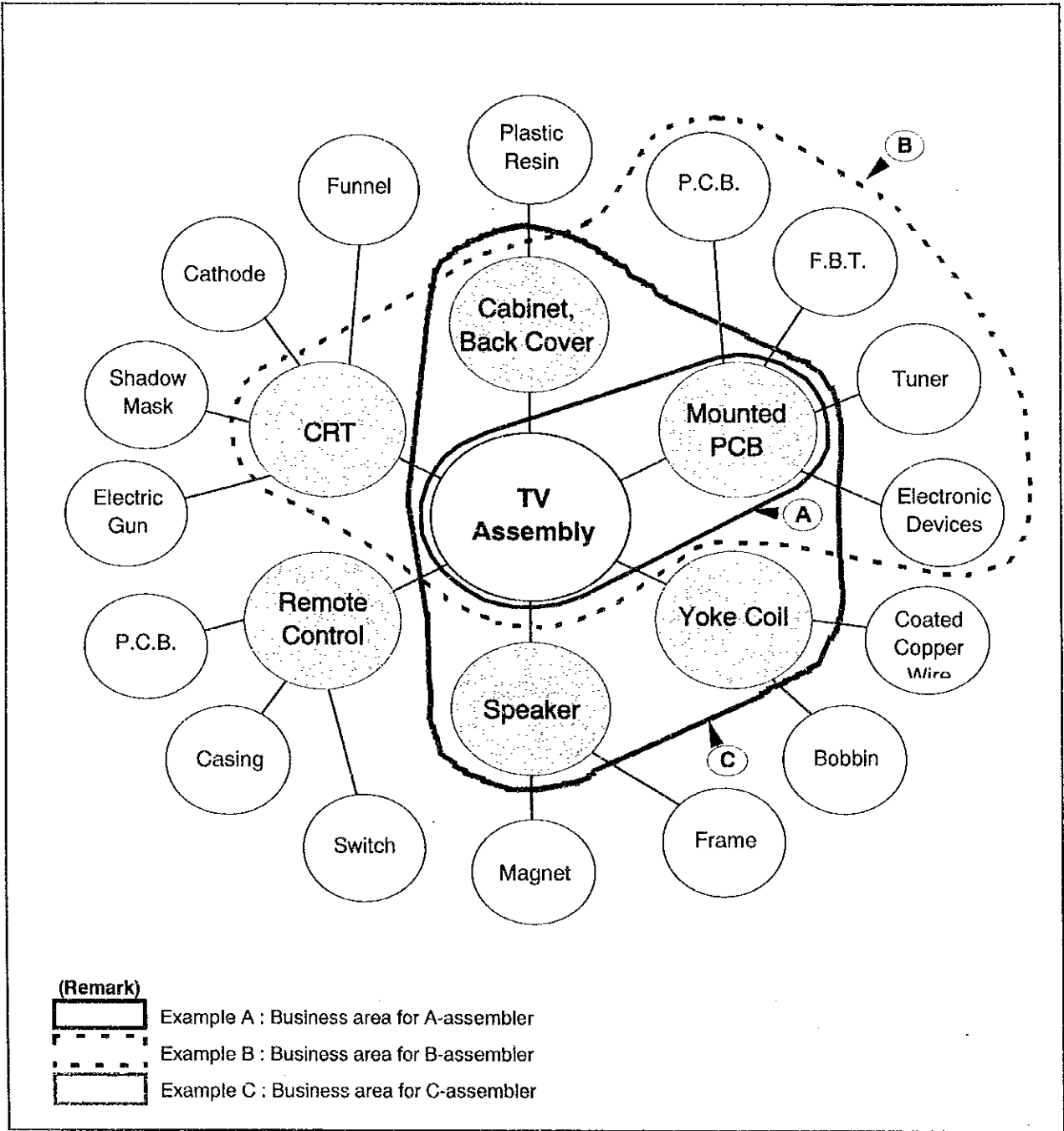


Figure II.2-4 Productive Chain of TV Assembling

(2) Parts industry protection policy

While subcontractors in the automotive industry are protected under the Automobile Decree, there is no such protection measures applicable to the electrical and electronic industry. As a result, parts suppliers have experienced free competition and thus have failed to form a rigid parts supply system seen in the automotive industry. This is reflected in a very low rate of local parts procured by the industry (2%-3% in case of Maquiladora), much lower than the automotive industry (over 60%).

(3) Maquiladora companies

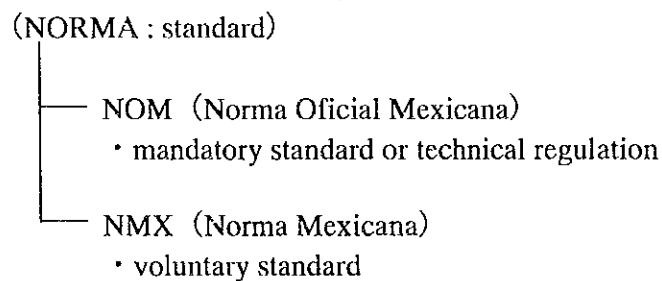
There is no car assembler as Maquiladora. On the other hand, electrical and electronic assemblers operating as Maquiladora for export purposes account for major portions of domestic production (98% for TV). To foster the electrical/electronic industry, strategy should therefore focus on the huge Maquiladora market (in case of TV, world largest production) that uses few locally produced parts by making entry with international competitive products. The situation is clearly different from that facing the automotive industry.

III Industrial Standardization in Mexico and Technical Support Organizations

III.1 Industrial Standardization

III.1.1 Instruments and Procedures for Establishment of Industrial Standards

Under the Law for Weights and Measures and Standardization of 1992, national standards in Mexico are organized as follows:



(1) National Commission for Standardization (CNN: Comisión Nacional de Normalización)

CNN was established to promote standardization policy in Mexico and coordinate activities of various organizations involved in standardization. CNN's functions are defined as follows:

- 1) Approval of the national standardization program and the monitoring of its progress
- 2) Establishment of coordination rules for related government authorities, private organizations, and others
- 3) Development and proposing of standards
- 4) Resolution of discordance at CCNN
- 5) Submission of opinion related to accreditation on standardization of a national organization
- 6) Encouragement of merging of research and testing organizations, including guidance
- 7) Proposing of measures and devices for promotion of proper standardization
- 8) Instruction on framework of CCNN
- 9) All the other activities required for implementation of 1) through 8)

(2) Establishment of NOM - Consultation Commission for National Standard (CCNN)

NOM as mandatory standard or technical regulation is established according to the following procedures:

- 1) Pursuant to National Program for Standardization, a draft standard to be added to NOM is prepared by a government authority responsible for an area of industry which the standard is related to.
- 2) The draft standard is submitted to CCNN, which submits its opinion within 75 days after the submission.
- 3) The government authority that prepared the draft standard is required to respond to CCNN's opinion within 30 days after receiving it.
- 4) The standard is announced on the official gazette published daily by the federal government. The interested parties should submit comments to CCNN within 90 days.
- 5) CCNN considers comments submitted by the interested parties and modifies the draft standard, as required, within 45 days after reception. Response to the comments or modification should be announced as soon as possible.
- 6) The standard that has completed CCNN's review is published on the official gazette by the minister of the responsible department and is reported to DGN for registration.

(3) Establishment of NMX - National Organization for Standardization (ONN)

NMX as voluntary standard is established by National Organization for Standardization (ONN) that is a private organization. ONN is accredited by SECOFI in each area of industry. As of 1995, 6 organizations were accredited, and two additional organizations are scheduled to obtain accreditation by the end of 1996.

The accredited ONN is expected to assume various obligations to maintain fairness and manage a data base:

- 1) It must accept participation of the interested parties in the NMX

establishment process.

- 2) It must submit all the relevant records to SECOFI upon request.
- 3) It is required to publish each NMX established.
- 4) It must conclude an agreement with SECOFI concerning the recording and maintenance of NMX information.
- 5) It must accept a representative of SECOFI as a member.
- 6) It must create and maintain a system for identification and classification of standards.

Note that NMX in an industrial area where no accredited ONN exists is established and revised by a responsible government authority. The government intends to increase accredited ONNs gradually to delegate the NMX establishment process to the hands of private organizations.

III.1.2 Accreditation and Certification System

Accreditation of organizations related to standardization is conducted by SECOFI's DGN. DGN accredits, in addition to ONN, certification institutions, testing laboratories, calibration laboratories, and verification units including individuals and corporations. Organizations and individuals accredited by DGN are authorized to evaluate and certify that a company provides a product or service that complies with specific standards, or adopts a compliance process or system. Organizations certifying products are the same as ONN that is responsible for establishing NMX. Organizations certifying a process or a system of quality control include IMNC and CALMECAC.

III.1.3 Calibration System

(1) Calibration organization

Under SECOFI/DGN, National System for Calibration (SNC: Sistema Nacional de Calibración) has been created, and Evaluation Committee has been established to accredit calibration laboratories. The committee is organized by representatives of government authorities responsible for a particular industrial sector, universities and other academic institutions, research institutes, National Metrology Center (CENAM), and accredited calibration laboratories.

CENAM is the primary level, accredited calibration laboratory and is responsible for calibration of measuring instruments owned by secondary-level, accredited calibration laboratories, while providing calibration service for private enterprises. Needless to say, measuring instruments of testing laboratories conducting certification tests for NOM or NMX must be calibrated by accredited laboratories on a periodical basis.

(2) National Metrology Center (CENAM)

CENAM originated in an academic center established in 1980 to meet the needs derived from National System for Calibration (SNC) and became independent as the present organization in 1994. Today, CENAM is equipped with latest equipment including standards and measuring instruments purchased under assistance of World Bank.

Major objectives of CENAM are as follows:

- 1) To maintain standards as the primary-level calibration laboratory and, based on which, provide metrology and calibration service for industries;
- 2) To evaluate secondary-level calibration laboratories and calibrate their measuring instruments;
- 3) To help establish secondary-level calibration laboratories nationwide, provide necessary guidance and assistance, and contribute to the rise in technical level of small- and medium-sized industries; and
- 4) To contribute to the establishment of national standards and metrology standards.

CENAM consists of 6 departments, Electrical Metrology, Physical Metrology, Material Metrology, Mechanical Metrology, Technical Support and General Affairs/Accounting. It employs 230 persons as of March 1996.

(3) Secondary-level calibration laboratories

According to CENAM, the current state of second-level calibration laboratories is as follows. As of 1996, there are 37 secondary-level laboratories in the country, many of which belong to large enterprises in major industries such as petrochemical, electricity, and automobile, with

geographical concentration in some areas. As a result, the scope of calibration service is limited to certain areas, and only a handful of laboratories are providing service for the public. At present, the federal government and CENAM are jointly constructing secondary-level laboratories in six areas, Querétaro, Aguascalientes, Mérida, León, Guadalajara, and Saltillo, which will start commercial operation a year later.

III.1.4 Major Issues Related to Industrial Standardization in Mexico

(1) Establishment of standards

Classification of NOM and NMX is unclear, and within each category, some duplication is seen in interface between government authorities and between organizations. Also, long-term plans for standards establishment have not been defined.

(2) Service for SMEs

- 1) The draft NMX is established by the technical committee of the accredited organization that is in charge of a specific industrial sector. However, corporate members of the committee are dominated by representatives of large corporations, making it doubtful if it can establish NMX that adequately covers activity areas of small- and medium-sized enterprises.
- 2) Secondary-level calibration laboratories mainly belong to large corporations in specified industrial sectors, with some geographical concentration as well as deviation in type of measuring and testing equipment. There is the lack of secondary-level laboratories that can be used by SMEs.

(3) Disseminative activity

- 1) The 25% of 69 enterprises visited by the Team during the second field survey answered that they did not know of "Quality Week". Disseminative activity on a national level should be further prompted. Another initiative backed up by law, "National Quality Prize," mainly recognizes efforts of large enterprises at present.
- 2) NOM and NMX are not easily accessible, particularly in rural regions where many publications are not available.

III.2 Technical Support Organizations

III.2.1 Overview of Technical Support Organizations in Mexico

The following are the main functions of external technical support organizations required by automotive and electrical/electronic parts suppliers (SIs), the target of the project.

- a) Assistance to R&D of production technology
- b) Support to human-resource development schemes
- c) Consulting services on technical and managerial issues
- d) Assistance to entrepreneurs
- e) Information services

Obviously, most organizations are engaged in activities which combine several of the above. This section deals with technical support organizations that are normally available to private enterprises, especially SMEs. Refer to section III.1 "Industrial Standardization" in this report for the details of organizations which certify products, system and those which calibrate measuring instruments under NOM and NMX.

As a list of Mexican organizations engaged in technical R&D and education, the directory produced by the "Consejo Nacional de la Micro, Pequeña y Mediana Empresa" is worth looking at, since it covers 91 technical research institutes and 213 educational institutions. The following are organizations other than financial institutions and organizations whose name and object clearly indicate that they have nothing to do with the manufacturing sector.

Technical research institutes:	Public	36
	Private	15
Educational institutions:		168

Among these, the distribution of technical research institutes (51 institutes) is quite uneven throughout the country, as shown in Table III.2-1. More than 50% of Mexican states have no technical research institutes at all, according to the directory.

**Table III.2-1 Technical Supporting Institutions
for Manufacturing Industry by Location**

State	Public	Private
Baja California	0	0
Baja California Sur	0	0
Sonora	0	0
Chihuahua	0	0
Coahuila	2	0
Nuevo León	0	1
Tamaulipas	0	0
Sinaloa	0	0
Durango	0	0
Zacatecas	0	0
Nayarit	0	0
Aguascalientes	0	0
San Luis Potosí	0	1
Jalisco	1	0
Guanajuato	2	1
Querétaro	5	0
Hidalgo	0	0
Colima	0	0
Michoacán	0	0
México	2	2
D.F.	20	6
Morelos	1	0
Tlaxcala	0	0
Puebla	0	0
Veracruz	0	1
Guerrero	0	0
Oaxaca	0	0
Tabasco	0	1
Chiapas	0	0
Campeche	0	0
Yucatán	1	1
Quintana Roo	1	0
-	1	1
Total	36	15

Source : Consejo Nacional de la Micro, Pequeña y Mediana Empresa

Among the technical support organizations in Mexico, those which serve to support automotive and electrical/electronic parts suppliers in various ways may be broadly divided into three groups.

- a) Technical support organizations under SEP
- b) Technical support organizations led by private enterprises and industrial associations
- c) Public and private colleges

III.2.2 Visitation Survey on Technical Support Organizations

A visitation survey was conducted to find out the existing state and the activities of technical support organizations which assist automotive and electric/electronic parts suppliers and small/medium-sized manufacturers in Mexico.

(1) Site selection

The directory prepared by the Consejo Nacional de la Micro, Pequeña y Mediana Empresa (mentioned in section III.2.1) and the organization list by SEP-CONACYT were used upon the selection to places to visit under the survey, taking the following matters into account.

- 1) There is a high probability that technical support industries offer technical services to supporting industries (SIs) of automotive and electric/electronic industries. With regard to R&D, this particularly applies to machinery/metals, plastic materials, electric/electronics, industrial standardization, instrumentation/calibration, quality control, quality assurance, etc.
- 2) Support organizations were visited regardless of their status, whether they were SEP-CONACYT, SEP-CONALEP, research centers of private companies, public or private colleges.
- 3) Regions with a high concentration of SIs were visited as much as possible without being regional biased.

(2) Survey findings

The head and the section chief of the selected research institute were

interviewed and questioned regarding preselected issues. The team went round facilities and studied equipment, facilities, and research activities. Table III.2-2 shows the results of the survey on organizations about their services for SIs excluding colleges.

III.2.3 Problems in Technical Support Organizations

- 1) There are virtually no organizations which specialize in services for small/medium-sized manufacturers. State-run technical support organizations and private, non-profitable organizations tend to overspecialize in large and medium enterprises. Services often fail to reach SMEs and micro-enterprises, even though they require various technical services to the greatest extent.
- 2) Technical support organizations, excluding educational institutions such as colleges, are overconcentrated in Mexico City and its suburbs.
- 3) Principal R&D themes tend to cover computer application such as CAD, CAE and CAM, the development of prototypes of production machinery, and other flashy subjects, such that insufficient effort is made in the field of basic processing technology, such as stamping, machine work and plastic molding.
- 4) Many organizations were established in the 1990s, and some are still having management problems (e.g. CAST). In some cases, they are failing to fulfill their purpose and function due to the obsolete facilities in use (e.g. CIDESI).

Table III.2-2 Technical Assistance for Supporting Industries Provided by Major Technical Organizations Visited

Ser. No.	Name of Organization	Authorities Concerned or Status of Organization	Location	Sub-sectors Served or Major Functions	Education/ Training		Technical Assistance							Others	
					1 Seminar/Workshop (Technology, QC,	2 Vocational Training	3 Extension Services	4 Technical Consultation	5 Research & Development	6 Inspection, Testing	7 Calibration	8 Industrial Standardization	9 Consultation for Invest/Management	10 Technical Information	11 Credit
Public Institutions															
1	CIMAV	SEP-CONACYT	Chihuahua, Chih.	Research and Development of materials											
2	CIATEQ	SEP-CONACYT	Querétaro, Qro.	R & D for metallurgical industry											
3	CIDESI	SEP-CONACYT	Querétaro, Qro.	Technical assistance to SMEs											
4	CIQA	SEP-CONACYT	Saltillo, Coah.	Support and promote plastic industries											
5	COMIMSA	SEP-CONACYT	Saltillo, Coah.	R & D and consulting services for energy, metallurgy and mechanical industry											
6	INFOTEC	SEP-CONACYT	D.F.	Technical information services											
7	INAOE	SEP-CONACYT	Puebla, Puebla	Astrophysics, optics and electronics											
8	CAST-CHI	SEP-CONALEP	Cd. Juárez, Chih.	Assist manufacturing industry											
9	CAST-NL	SEP-CONALEP	Guadalupe, NL.	Assist manufacturing industry											
10	CAST-MEX	SEP-CONALEP	Izcalli, México	Assist manufacturing industry											
11	CRODE	SEP	Chihuahua, Chih.	Maintenance and fabrication of laboratory equipment of "Instituto Tecnológico"											
Private organizations															
12	Condumex	Private	Querétaro, Qro.	(Private laboratory)											
13	TREMEC	Private	Querétaro, Qro.	(Private laboratory)											
14	CEMYT	Private	Chihuahua, Chih.	Mold and dies for stamping and plastic injection											
15	CIDCE	Private	Saltillo, Coah	Consulting services on management											
16	UIT	Private	D.F.	Provide technical tools to SMEs											

(Note) O: Services available for SIs. (Source) JICA team's interview survey

IV Technology Level of Supporting Industry

IV.1 Diagnosis Method of Technology and Assessment

In order to survey the technological level of parts/components industries in Mexico, in particular, to clarify technological problems on SMEs, visits to enterprises have been made. Technology experts who have long experience in each processing technology field have visited these enterprises. Relative and quantitative technological diagnosis using the 5 point scoring has been done by five technological experts in the Team.

IV.1.1 Enterprises which Received Technological Diagnosis

The number of enterprises visited and diagnosed samples are as follows. Since the scoring was made for each processing technology, the number of samples is more than the number of enterprises visited for some enterprises which are employing two processing technologies. On the other hand, some enterprises did not disclose the factories.

Table IV.1-1 Number of Companies Visited and Samples Diagnosed

(Unit: Nos. of enterprises)

	Visits	Diagnosis	Duplicated Process	Samples
Autoparts	65	47	2	49
Electparts	60	50	9	59
Others ¹⁾	10	-	-	-
Total	135	97	11	108

Note : 1) "Others" is not included in any analysis in report.

Source : JICA Team Field Survey

IV.1.2 Method for Diagnosis of Technology Levels

(1) Setting of technology level rating items

The Team classified technologies roughly into 2 categories: "production technology" and "quality control technology and assurance". Each of the 2 categories was divided into "hardware" and "software". Thus, a matrix of 4 sub-categories was constructed. The 4 sub-categories are common to all processing technologies.

Table IV.1-2 Four (4) Sub-categories of Technology Diagnosis

	A. Production	B. Quality Control & Assurance
1. Hardware	A-1. Production facilities	B-1. Equipment for quality control/assurance
2. Software	A-2. Production technology	B-2. Quality control/assurance system and its operation

Each of the 4 sub-categories, A-1, A-2, B-1, and B-2, was broken down into 5 to 10 sub-items. Note that a different set of sub-items were established for each processing technology, because evaluation items should differ among technologies.

(2) Rating criteria

The highest score (5 marks) corresponds to the average technology level in industrialized countries with the lowest score (1 mark) corresponding to a cottage industry level.

(5) Assessment of totalized and averaged scores (Ranking)

Since the rating is made by the point reduction system under which a negative point is subtracted from the full mark of 5 points for each sub-item, it is very difficult for a plant to receive the full mark on every item. On the other hand, international competitiveness can be identified on the basis of the range of the average of the scores for all the sub-items. To reflect this, grades were established according to the range of scores, as shown in Table IV.1-3.

Table IV.1-3 Grades for Assessment and Their Meanings

Rank	Range of scores	Level	Quality of products available in a plant ¹⁾
A	4.5 - 5.0	OEM International brand, International market	Products are on the average technology level in industrialized countries, and may be directly and indirectly exported as OEM parts (including sales to Maquiladora).
B	3.8 - 4.4	OEM International brand, Local market	Products are on the upper to top level of technology in the ASEAN area, and may be supplied as OEM parts to J/V companies with foreign capital but only for domestic market.
C	3.0 - 3.7	OEM Local brand Local market	Products are on the average level of technology in the ASEAN area, and may be supplied as OEM parts to companies (which have relatively low quality standards) other than those J/V with foreign capital only for domestic market.
D	2.9 and lower	REM Local market	Products are on the technology level on which they may be only supplied as repair parts to the Mexican after-market.

Note : 1) The range of scores are not set by considering to what markets the enterprises are now supplying their products, but by determining whether or not these plants reach a technological level which generally assures the manufacture of products meeting quality requirements in each market.

IV.2 Analysis of Technology Level Diagnosis Results

Scores in 5 point method are collected and analyzed over the entire samples. Only SMEs for supporting industry promotion are then reviewed. For reference, comparison with the similar survey in Thailand is provided as necessary.

IV.2.1 Technological Diagnosis for the All Samples

(1) Diagnosis by size and shareholder of the enterprise

Table IV.2-1 Summary of Diagnosis for Entire Samples

	Total Samples	Size of Enterprises ¹⁾			Share Holder ²⁾		
		(Small)	(Medium)	(Large)	(Mexico 100%)	(J/V)	(Foreign 100%)
Average score (Grade)	4.2 (B ⁺)	3.8 (B)	4.2 (B ⁺)	4.6 (A)	3.9 (B)	4.6 (A)	4.5 (A)
Nos. of enterprises by grade							
Grade A	48	4	14	28	11	15	19
Grade B	38	16	11	10	24	5	9
Grade C	20	13	7	0	17	0	1
Grade D	2	2	0	0	2	0	0
Total	108	35	32	38	54	20	29

Note : 1) No answer about size of enterprises = 3 enterprises

2) No answer about share holders = 5 enterprises

Source : JICA Team Field Survey

The average score for 108 samples in total is 4.2. The rating is middle to upper (B⁺) position in Grade B. The overall industry is nearly close to internationally competitive level (Grade A level which is acceptable for direct or indirect export as OEM parts). 48 samples (44%) out of 108 are rated Grade A which is internationally competitive. From Figure IV.2-1, there is not much difference in scores for each technological field; production equipment (A-1), production engineering (A-2), quality control equipment (B-1) and quality control engineering (B-2). Balanced development of the technologies has been achieved.

As the size of the enterprise becomes large, the technology level increases accordingly. The average score for small enterprises is 3.8 (B⁻) and for medium enterprises 4.2 (B⁺). This figure is identical to the average score of entire samples, representing an average model in Mexican component industries. The average score for large enterprises is 4.6 (A) which is internationally competitive. Looking at the relationship between the grade and the size of the enterprises, 83% of small enterprises are in Grade B and Grade C, 78% of medium enterprises are in Grade A and Grade B, and 74% of large enterprises are in Grade A. These figures show that the technology level improves as the enterprise size grows.

Technical level by Shareholder of the enterprises is rated as follows. Enterprises with 100% Mexican shareholders are rated 4.0 (B). The technology level is inferior to 4.6 (A) for the joint ventures and 4.5 (A⁻) for the enterprises with 100% foreign shareholders. Although the difference (0.1 point) between two parties is not explainable, it may be reasonable to conclude that the joint ventures and the enterprises with 100% foreign shareholders are on the same level.

(2) Diagnosis by sector

Table IV.2-2 Diagnosis Score by Sector

(Unit : Scores (Full mark = 5.0))

	No. of Sample	Score				Average Score	
		A-1	A-2	B-1	B-2		
Automotive Industry	49	4.6	4.5	4.4	4.3	4.4	
Employee	0 - 100	10	4.2	4.1	3.9	3.8	4.0
	101 - 250	18	4.5	4.5	4.4	4.2	4.4
	251 -	20	4.8	4.6	4.7	4.5	4.6
	N.A.	1					
Ownership	Foreign	10	4.8	4.6	4.6	4.6	4.7
	J/V	16	4.7	4.7	4.7	4.5	4.6
	Mexico	21	4.3	4.3	4.1	3.9	4.1
	N.A.	2					
SME		28	4.4	4.4	4.2	4.1	4.3
Electrical/Electronic	59	4.0	4.1	4.0	4.1	4.0	
Employee	0 - 100	25	3.7	3.8	3.7	3.7	3.7
	101 - 250	14	4.1	4.2	3.9	4.0	4.0
	251 -	18	4.5	4.4	4.5	4.6	4.5
	N.A.	2					
Ownership	Foreign	19	4.3	4.4	4.4	4.5	4.4
	J/V	4	4.4	4.5	4.1	4.0	4.3
	Mexico	33	3.8	3.9	3.7	3.8	3.8
	N.A.	3					
SME		39	3.8	4.0	3.7	3.8	3.8

Source : JICA Team field Survey

The average score of automotive sector is 4.4, which is higher than 4.0 of electrical/electronic sector. Among four sub-categories, the greatest difference is seen in A-1. Since the distributions of the samples in terms of enterprise size and shareholder in each sector are not the same, the comparison of the two sectors by those is necessary.

As to the size of the enterprise, the average scores of all the three different sizes of automotive sector are higher than those of electrical/electronic sector. Only in the case of large enterprises, the score of the latter, 4.5, is close to 4.6 of automotive sector.

As to the shareholder of the enterprise, for foreign, J/V, and Mexico, the technical level of automotive sector is higher than that of electrical/electronic sector by 0.3 points. The highest score of 4.7 is given to the enterprises of 100% foreign capital of automotive sector, followed by 4.6 of J/V of the same

sector. The difference between these two groups is negligible. The lowest average score is 3.8 for Mexican companies of electrical/electronic sector, which is the only group with the scores less than 4.0 for all sub-categories.

IV.2.2 Comparison and analysis of the technology level with Thailand

Figure IV.2-1, Figure IV.2-2 and Figure IV.2-3 show the technology level in Thailand, giving distinct difference. The opinion of the Team for the reason of this difference is described in this section. Thailand is a medium technology level country in ASEAN countries and exporting some electronic components to Mexico.

Figure IV.2-1 shows that the general average score for technology level is 4.2 (B⁺) for Mexico and 3.7 (C⁺) for Thailand. The difference of 0.5 is significant.

Figure IV.2-2 shows that the technology level in terms of enterprise size shows similar trends for both Thailand and Mexico. In general, the technology level in Thailand is lower than that in Mexico. There is no specific feature to be explained for the difference in enterprise size between countries.

Figure IV.2-3 shows the technology level in terms of shareholders. This comparison indicates that the technology level in Thailand is higher by 0.4 point than that in Mexico for the enterprises with 100% foreign shareholders. The number of samples from Thailand is only two and this may not indicate the general figure. However, increased number of samples in Thailand may lead to the same difference. Because electrical and electronic components exported from Thailand to Mexico are produced by the enterprises with 100% foreign shareholders.

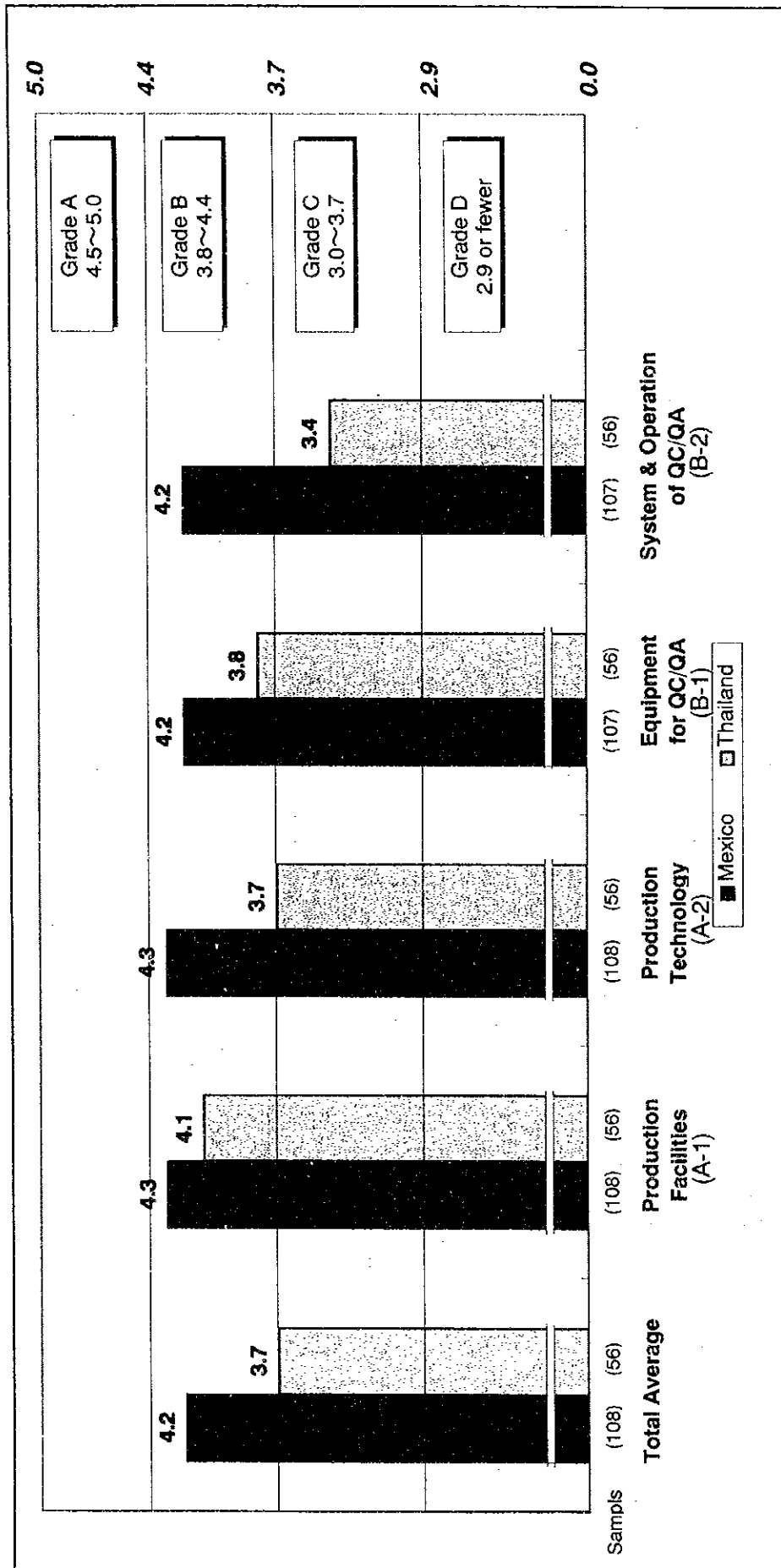


Figure IV.2-1 Averaged Score by Technical Area - Total Samples

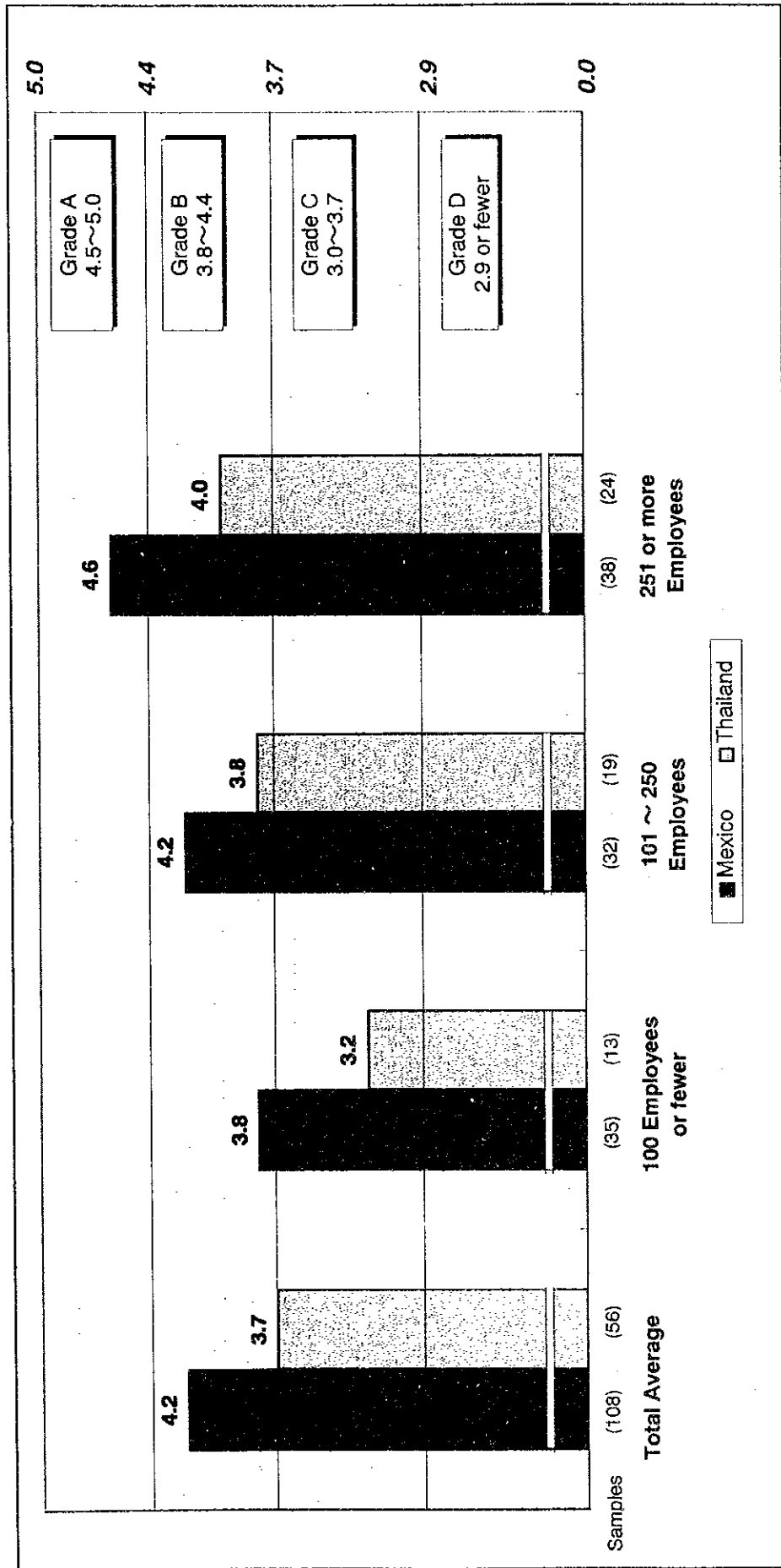


Figure IV.2-2 Averaged Score by Size of Company

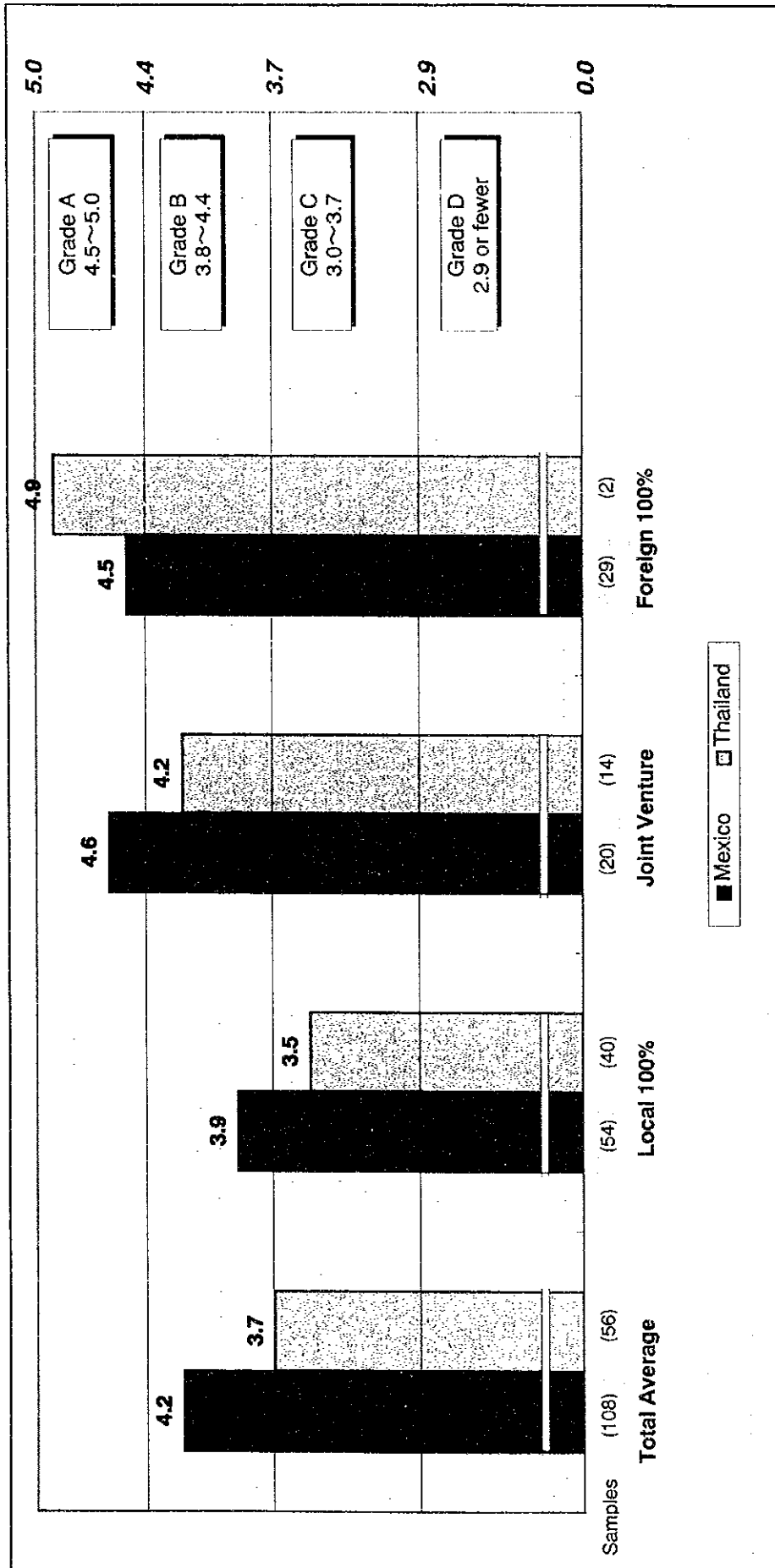


Figure IV.2-3 Averaged Score by Share Holder

IV.2.3 Technology Level of SMEs with Mexican Shareholders

The target group on this survey is SME secondary or subsequent suppliers. Many of them are established by local shareholders. The following table explains the technology level of SMEs by shareholder.

Table IV.2-3 Technology Level of SMEs by Shareholder

Shareholder	(Samples)	Total Average	A. Production		B. Quality Control	
			A-1 Facilities	A-2 Technology	B-1 Facilities	B-2 Technology
Mexico 100%	(42)	3.8	3.9	4.0	3.7	3.8
J/V	(12)	4.4	4.5	4.6	4.4	4.3
Foreign 100%	(10)	4.4	4.4	4.4	4.5	4.4
Average	(67) ¹⁾	4.0	4.1	4.1	4.0	4.0

Note : 1) Includes 3 enterprises for which the shareholder is not available.

Source : JICA Team Field Survey

The average score of SMEs with 100% Mexican shareholders is 3.8 (B). It is significantly less by 0.6 point than the score of joint ventures or the enterprises with 100% foreign shareholders. Scores of SMEs with 100% Mexican shareholders are (A-2; 4.0) for production engineering, (A-1; 3.9) for production equipment, (B-2; 3.8) for quality control engineering and (B-1; 3.7) for quality control equipment, in the order of high scores. In particular, scores of equipment (hardware) in A-1 and B-1 are lower than those of engineering (software) in A-2 and B-2. Renewal of equipment seems to be slow.

V Analysis of the Result of the Questionnaire Survey

V.1 Analysis of the Result of the Questionnaire Survey by Interview

V.1.1 Corporate Profiles

To identify the current state of supporting industries supplying automotive and electrical/electronic parts and components, problems facing them, and their needs, the interview survey was conducted by a local consultant on the basis of a questionnaire prepared by the Team.

Based on responses to the questionnaire, general profiles of 316 enterprises are summarized as follows.

Table V.1-1 Company Size

Company Size	Total		Auto		E/E	
	No. of Companies	(%)	No. of Companies	(%)	No. of Companies	(%)
Micro	47	14.9	18	10.1	29	21.0
Small	197	62.3	114	64.0	83	60.1
Medium	44	13.9	31	17.4	13	9.4
Large	28	8.9	15	8.4	13	9.4
Total	316	100.0	178	100.0	138	100.0

Table V.1-2 Ownership

Ownership	Total		Auto		E/E	
	No. of Companies	(%)	No. of Companies	(%)	No. of Companies	(%)
Foreign 100%	31	9.8	18	10.1	13	9.4
J/V (50%<F<100%)	9	2.8	8	4.5	1	0.7
J/V (50%/50%)	5	1.6	3	1.7	2	1.4
J/V (0%<F<50%)	21	6.6	16	9.0	5	3.6
Mexico 100%	250	79.1	133	74.7	117	84.8
Total	316	100.0	178	100.0	138	100.0

V.1.2 Result of the Questionnaire Survey and Analysis

Responses to the questionnaire and major characteristics observed are summarized as follows.

(1) Local content

The respondents were asked to indicate the local content on a product (parts) net cost basis. The average figure for automotive parts suppliers is 10% higher than that for electrical and electronic parts companies to reflect the presence of local value added requirements for finished cars under the Automobile Decree.

Table V.1-3 Local Content

Local Content	Auto	E/E
	No. of Companies	No. of Companies
80%-100%	90	55
60%-79%	25	20
40%-59%	31	24
20%-39%	16	12
0%-19%	16	27
Total	178	138
Average	68.60%	58.40%

(2) Profiles of managing director

To find out profiles of managing directors of suppliers, their background, expertise, and willingness to participate in the training programs for corporate management were asked.

As for background, the largest percentage of them was promoted within the same company, followed by spin-out from other companies. Note that the percentage is based on the total number of responses (382), because some of the respondents gave two or more answers.

**Table V.1-4 Background of Managing Director
(Total)**

Background	Total		SM & Micro		Large	
	No. of Answers	%	No. of Answers	%	No. of Answers	%
Dispatched from foreign company	33	8.6	26	7.5	7	19.4
By promotion	199	52.1	185	53.5	14	38.9
Succeeded family business	47	12.3	46	13.3	1	2.8
Spin-out from foreign company	33	8.6	28	8.1	5	13.9
Spin-out from domestic company	65	17.0	56	16.2	9	25.0
Spin- out from governmental/public institution	5	1.3	5	1.4	0	0.0
Total	382	100.0	346	100.0	36	100.0

As for the question asking the willingness of participation in training programs for corporate executives, 67.9% of managing directors of large enterprises responded yes, and as much as 81.3% of those at SMEs and MEs.

(3) Technical support

The question was about technical support from public organizations, universities and/or private research institutes and other organizations. The 155 enterprises, 49.1% of total, have received technical support, of which 19 (67.9%) are large enterprises and 136 (47.2%) SMEs and MEs. The percentage of SMEs and MEs is lower than that of large enterprises. The number of enterprises for each type of technical support is indicated in the table below. The number of enterprises who have received support in inspection and testing dominates, followed by education and training, and technical consultation.

Table V.1-5 Objective of Technical Support

Inspection/Testing	101
Education/Training	48
Technical consultation/Clinic services	44
Calibration/Standardization	26
R&D	24
Technical information	17
Marketing	7
Managerial assistance	2

(4) Technology transfer

The question asked about experience in technology transfer from overseas, directly or via foreign companies in Mexico, as well as any plan in future.

The respondents were then asked to cite the content of technology transfer received, and the desirable content for the future, two answers for each. Note that the percentage is based on the total number of enterprises (316).

Table V.1-6 Contents of Technology Transfer from Overseas

Technology Transfer	Now		Future	
	No. of Answers	%	No. of Answers	%
Seminar for new/modern technologies	50	15.8	83	26.3
Workshop for production and QC technologies	32	10.1	85	26.9
Training of key personnel in overseas	29	9.2	40	12.7
Training of key personnel in training centers of Mexico	26	8.2	56	17.7
Extension advisory services	12	3.8	20	6.3
Permanent advisory services or in-house consultant	5	1.6	5	1.6
Advisory services as temporarily required	24	7.6	46	14.6
Licensing and know-how for production	17	5.4	31	9.8
Technological information supply	19	6.0	37	11.7
Total No. of Companies	316		316	

(5) OEM production

The question asked about major problems related to the increase or start of production of OEM parts to be incorporated by assemblers into their final products.

Table V.1-7 Problems in OEM Production

Problems in OEM Production	No. of Answers	%
They have already established a business group, so that penetration is not easy.	108	34.2
Lack of companies information on potential customers	95	30.1
Insufficient production capacity to cope with big amount of orders	57	18.0
We don't know how to contact with the potential customers.	43	13.6
Lack of customers liquidity (cashflow)	36	11.4
Customers have low purchasing ability	36	11.4
Lack of competitiveness of our products in terms of quality, cost and delivery	30	9.5
Lack of capability in sales activities	26	8.2
Total No. of Companies	316	

(6) Urgent problems

Finally, the respondents were asked to identify the problems which must be solved most urgently from the overall management point of view.

By this question the comparative seriousness of the following nine (9) problems was asked..

- 1) Finance
- 2) Modernization of equipment
- 3) Export promotion
- 4) Subcontracting
- 5) Quality control
- 6) Technology transfer
- 7) Staff training
- 8) Training program for managers
- 9) Technical support organizations

Each respondent was allowed to choose two from the listed. The percentage is based on the total number of respondents.

Table V.1-8 Urgent Problems to Solve

Urgent Problems to Solve	Total		SM&Micro		Large	
	No. of Answers	%	No. of Answers	%	No. of Answers	%
Financial Support by institutional credit facilities	138	43.7	130	45.1	8	28.6
Modernization of machinery and equipment	123	38.9	110	38.2	13	46.4
Promotion of direct export of parts/components	115	36.4	102	35.4	13	46.4
Promotion of match-making and subcontracting business	84	26.6	78	27.1	6	21.4
Up-grading of quality control Technology	46	14.6	41	14.2	5	17.9
Transfer and modernization of production technology	45	14.2	41	14.2	4	14.3
Up-grading of capabilities of manpower	44	13.9	42	14.6	2	7.1
Education of management/entrepreneurs	15	4.7	13	4.5	2	7.1
Strengthening of various technical institutions	8	2.5	7	2.4	1	3.6
Total No. of Companies	316		288		28	

For SMEs and MEs, "Finance" and "Modernization of equipment" come in the first and second places. The problem of the modernization of equipment in most cases is caused by lack of financial support for SMEs. These two are strongly related. Both "Export promotion" and "Subcontracting" in the third and fourth places imply the need of new market of the products.

V.2 Analysis of the Result of the Questionnaire Survey for Maquiladora Companies

V.2.1 Purpose and Methodology of the Questionnaire Survey

Maquiladora companies represent a huge potential market for supporting industries in Mexico. The questionnaire survey was conducted to identify the current state and future policy of Maquiladora companies concerning procurement of raw materials and parts from local sources.

As the interview survey in V.1 covered the supplier side, namely enterprises belonging to the supporting industry, the questionnaire survey to be discussed

in this section is complementary by focusing on major potential buyers for SIs.

(1) Survey items

The questionnaire principally contained the following questions:

- Market for Maquiladora companies
- Expecting ratio to increase local procurement
- Intention to increase procurement from Non-Maquiladora companies (domestic market)
- For companies who have intention to increase local procurement
 - Currently desired parts and components
 - Major reason for present low percentage of local procurement
 - Parts and components to be procured in future
- Reasons for no local procurement (companies who have no intention to increase local procurement)

(2) Methodology

Of 3,133 companies registered in SECOFI's Maquiladora database, 432 companies in electrical and electronics fields (Rama 53, 54) were selected for the survey. Having excluded 206 companies whose address is not known and 56 companies which were unable to contact due to insufficient data, 170 companies were selected in the final list and request was made. The questionnaire was sent and the response was recovered by facsimile. There were 78 responses, of which 73 responses were considered as valid.

V.2.2 The Result of the Questionnaire Survey and its Analysis

(1) Market for Maquiladora products

Table V.2-1 Market of Maquiladora

Sales Market	No. of Companies				Total	Average
	0%	1 - 49%	50 - 99%	100%		
Export	1	2	12	54	69	93.7%
Other Maquiladora	60	7	1	1	69	3.9%
Domestic Market	62	6	1	0	69	2.4%
					Total	100.0%

54 out of 69 companies (78.3%) export all of their products. As for sales to other Maquiladoras, only one company cites 100% (inter-Maquiladora) while 60 companies do not sell to other Maquiladoras, accounting for 3.9% on average. While Maquiladoras are originally intended to import raw materials and parts in a bonded area, without selling products locally, they are increasingly accessible to the domestic market partly in consequence of NAFTA. In the questionnaire survey, an average 2.4% of respondents sells their products to the domestic market.

(2) Procurement sources of parts and components

Table V.2-2 Procurement of Parts/Components

Procurement Source	%
By Import	90.9%
By In-house Production	3.0%
From Other Maquiladora	3.1%
From Domestic Market	3.0%
Total	100.0%

Since Maquiladoras are located within a bonded processing zone, they primarily rely on import for procurement of parts and components. This is reflected in the responses to the question. While 28 out of 69 respondents (40.6%) make local procurement, the remaining 41 companies do not, resulting in an overall average rate of 3.0%. An average percentage of local procurement among the 28 companies is 7.4%. On the other hand, imports account for 90.9% of total, so that the remaining 9.1%, including in-house production, is locally procured.

(3) Intention of local procurement

The respondents were asked if "they have intention to increase procurement from the domestic market". The result is summarized in Table V.2-3. Note that the present percentage of local procurement is shown next to the respective group. The number of valid responses was 73.

Table V.2-3 Intention to Increase Procurement from Domestic Market

	No. of Companies	%	Present % of Procurement from Domestic Market
Yes	47	64.4	4.1%
No	23	31.5	0.8%
No Idea	3	4.1	
Total	73	100.0	

The average rate of local procurement obtained from the responses to the above (2) is 3.0% (69 valid responses), while the rate among the 47 companies which have intention to increase local procurement is 4.1%. The rate among the 26 companies with the negative response is 0.8%. In other words, many of enterprises who make local procurement at present intend to boost it further, whereas those who have no intention to increase local purchase are procuring few local parts and components at present. In fact, 24 out of 28 companies who are currently making local procurement, as shown in (2), intend to increase procurement from the domestic market.

As for the future level of local procurement indicated by the 47 companies with intention to increase it, an average among 44 companies (3 companies did not respond the target number of percentage) is 25.4%. If the 44 companies boost local procurement to the target level while other 29 companies remain unchanged, the average rate of local procurement among the 73 companies will become 15.5%.

(4) Parts and components desired for local procurement

Top three product groups cited by Maquiladoras are as follows:

- Assemblies
- Stamping parts
- Plastic parts

(5) Major problems related to local procurement

The 47 companies who had intention to increase local procurement were asked to select three reasons from thirteen (13) reasons listed to identify why their present local procurement is small. And the 23 companies with no intention to increase local procurement were asked to select three reasons

from the same.

Top five reasons cited are shown in Table V.2-4.

Table V.2-4 Reasons of Present Low Percentage of Local Procurement despite of Intention of Increase

Reasons	%
1) local suppliers of parts and components we need	63.3%
2) Unreliable delivery	46.9%
3) High price of local products	40.8%
4) Low quality of local products	32.7%
5) Lack of information about local suppliers	30.6%
No. of Companies	47

The objective of the question is to identify the reason why they do not or are not able to purchase local parts and components even though they wish to.

Among reasons, "no local suppliers" is most frequently cited, followed by delivery (D), cost (C), and quality (Q). Presumably, "lack of information about local suppliers," ranked fifth, is one of reasons behind "no local supplier."

Next, companies having no interest in increasing local procurement were asked for reasons, which are summarized in Table V.2-5.

Table V.2-5 Reasons of No Interest in Increasing Local Procurement

Reasons	%
1) Customer's requirement or parent company's instruction to use imports instead of local products	52.2%
2) No local suppliers of parts and components we need	47.8%
3) Our procurement network is already established based on long-term contracts	34.8%
4) High price of local products	34.8%
5) With the procurement policy of so called "Single sourcing", we prefer less number of suppliers for simple transaction of procurement.	17.4%
6) Insufficient production capacity of local suppliers to meet our order in volume	17.4%
7) We prefer in-house production because of a better flexibility and controllability of volume and quality of products.	17.4%
No. of Companies	23

The most frequent answer is "customer's requirement or parent company's instruction to use imports instead of local products". This is the peculiar reason of Maquiladora when they do not show interest in local procurement, unlike other reasons such as "procurement network is already established," "procurement policy of single sourcing," and "preference for in-house production."

VI Selection of Priority Technology Areas

VI.1 Considerations for Selecting Priority Technology Areas

(1) Needs of Parts Manufacturers

The Team collected needs of parts industries during the visiting survey, as to which processing technologies should be promoted in Mexico. Each enterprise was asked to select three processing technologies and rate them in order of priority (assigning three points to the first rank, two points to the second rank, and one point to the third rank), which were accumulated to obtain overall rating. Responses were obtained from 93 enterprises, from which 7 enterprises not in the automotive parts or electrical/electronic parts business were excluded.

(2) Import Substitution Effect

The primary purpose of promoting supporting industries is to promote localization of parts and components and contribute saving in foreign currency through import substitution. To measure the import substitution effect of each processing technology, costs for finished automobiles and electrical/electronic equipment are broken down to elements for each processing technology. Note that these data are not officially available, so that the Team made rough estimation. One item with the highest production volume in Mexico was selected from audio and visual equipment (color TV) and household appliances (refrigerator).

(3) Summary of points to each processing technology

Overall evaluation is conducted by using evaluation results on supply and demand situation and technological level as criteria, which were obtained from the visiting survey by the Team, for selection of priority processing technologies/parts groups. Prior to selection, top five technologies based on the needs of the industries and those based on import substitution effect are compiled in the list (Table VI.1-1). In preparing the list, the following adjustments are made to convert parts name included in the import substitution effect into processing technologies:

- 1) SMT is included in components assembly.
- 2) Mold and die and cutting are included in machining.
- 3) Painting is included in surface treatment.

**Table V.1-1 Summary of Priority Ranking of Processing Technology
(Top Five)**

(Unit : Rank of Priority)

	Needs of Private Sector		Effective to Import Substitution			Total Points ¹⁾
	Autoparts	Electparts	Autoparts	CTV	Refrigerator	
1. Stamping	1	2	1	3	2	21
2. Plastic processing	4	1	3	2	1	19
3. Machining	2	3		4		9
4. Components assembly		5		1	3	9
5. Die-casting		4	2			6
6. Ferrous casting	5		5		4	4
7. Forging	3					3
8. Non-ferrous metal processing			4			2
9. Rubber processing	5					1
10. Plating	5					1
11. Surface treatment					5	1

Note : 1) Total points are computed giving the 1st ranking 5 points, the 2nd rank 4 points, and so on.
Source : JICA Team Field Survey

VI.2 Overall Evaluation and Conclusion

VI.2.1 Overall Evaluation

(1) Ferrous casting and aluminum die-casting

For ferrous castings and aluminum die-casting the localization has almost been completed. And their technology levels have reached world class, so that no technology transfer is needed.

Ferrous castings are rarely used in electrical and electronic products, while ferrous castings are used in household appliances, compressor for refrigerator and air conditioners. Those for compressors are imported for new products, and two joint ventures will reportedly enter the market in the near future. Aluminum die-casting parts are used in irons, with limited applications in audio/visual equipment, such as radiator plates of TVs (fins). Die-casting parts for irons have been fully localized. As viewed from the electrical and electronic industry as a whole, application of die-casting seems

to be limited to air-conditioners and refrigerators. Considering that localization of die-casting for automotive parts has been completed, as well as given small economic impacts, there is no strong reason to select aluminum die-casting as a priority processing technology.

(2) Forging

Because the percentage share of forgings in parts cost per automobile is estimated at around 5% at maximum, and import substitution does not require many factories, thus creating relatively small technical and economic impacts, forging is rated as the processing technology with second priority. Note that few forgings is used in electrical and electronic equipment.

(3) Stamping (press work)

Stamping parts for automobiles are manufactured or purchased by three types of companies: 1) those making them internally, 2) those purchasing from secondary suppliers within the same group, and 3) independent enterprises relying on import and local procurement. Among them, priority should be given to substitution for imported parts in 3). Production of small stamping parts requires moderate investment affordable by SMEs and involves a large number of enterprises, it is recommended to select it as processing technology with the highest rank.

Stamping for electrical and electronic parts accounts for 25%-26% of parts costs for TVs and refrigerators, and precision and high speed stamping parts are mainly imported. In consideration to transportation cost, suppliers need to be located near assemblers, and promotion of stamping manufacturers for Maquiladora companies along the U.S. border should be given of highest priority.

(4) Plastic processing

Plastic processing parts for automobiles are mostly localized; very large parts are manufactured by assemblers, and large parts are subcontracted to primary suppliers. They are located near assemblers to reduce transportation costs and avoid damage during transportation. Small- and medium-sized products are also locally available. On the other hand, precision small parts (e.g.,

hooks, meter pointers, gears) are imported. As automobile production increases, small plastic parts and precision parts will be increasingly ordered to secondary suppliers, making this processing technology with the highest priority.

Large plastic parts for electrical and electronic equipment are manufactured internally, or procured locally or imported, depending on each company's procurement strategy. Small and precision molded parts are mostly imported. Plastic processed parts are the largest cost element accounting for around 30% of the total parts cost for electrical and electronic equipment. In conclusion, plastic processing for electrical and electronic parts, regardless of size, is processing technology with the highest priority to target Maquiladora companies.

(5) Machining

It has small economic impacts from the interest of upgrading processing technologies in Mexico, and there is no strong reason to select it as a priority area for the master plan. It is rated as processing technology with the second priority.

(6) Mold and die making

Mold and die making is classified into the machining process so far as its manufacturing technology is concerned. However, unlike general machining, die making involves sophisticated design technology which is eligible for separate consideration.

In Mexico, several companies have reached design and manufacturing levels of metal stamping die for small, simple-shaped parts. Plastic mold making is lagged behind in both production and design. Since die/mold making is one of key elements to upgrade stamping and plastic processing technologies, it should be selected as processing technology with the highest priority for strategic reasons to ensure the overall improvement of parts manufacturing technology as a whole.

(7) Heat treatment, surface treatment, plating

The economic and technical impacts of these technologies are limited in terms of positioning in the supporting industry as a whole. They should be rated as processing technologies with the second priority.

(8) PCB surface mounting technology (SMT)

Lamination of the copper plate to the insulating board is largely carried out in several countries worldwide, from which other countries import high-grade laminated sheets. In addition, production of multi-layer boards is specialty of the plastics industry to require large amounts of investment for new entry. Clearly, this deviates the objective of promoting supporting industries. At present, logic circuit design is performed by assemblers, and subsequent processes of "production of wiring boards" and "surface mounting" are carried out in Mexico. Given large demand, this area should be rated as processing technology with the highest priority.

VI.2.2 Conclusion

In conclusion, the following processing technologies and parts should be promoted with priority as supporting industries:

- 1) Stamping
Small stamping for automotive parts, small and precision stamping for electrical and electronic parts
- 2) Plastic processing
Small and precision stamping for electrical and electronic parts, targeting Maquiladora companies
- 3) Die/mold maintenance and making
Maintenance and manufacture of mold and die for 1) and 2) above; the need for learning design theory and machining technology; strategically promoted area in a long run
- 4) Surface mounting technology (SMT)
Technology for mounting electronic devices into PCBs; large import substitution effect

VII Conclusion, Recommendations, and Master Plan

This study used the PCM (project cycle management) technique. With this technique, a series of workshops was held with the participation of the related parties including the Team to design a project in accordance with specific procedures. The "project" related to this study is "the promotion of supporting industries." During the field survey, a total of four workshops were held; the participants included representatives of SECOFI and of the related organizations and associations, and the Team members. At the workshops, the participants identified major issues related to the "project" and discussed and agreed upon a general framework for solving problems. Also, critical issues identified by the Team, such as "the selection of priority promotion areas," were presented by the Team and agreed upon after discussion.

Based on the results of the PCM workshops, this chapter presents the conclusions drawn from the study, proposes projects, and develops a master plan for implementation.

VII.1 Basic Framework of the Study

The basic framework of the study is presented below. It was agreed upon at the workshops through discussions among the participants and based upon proposals by the Team.

VII.1.1 Target Group and Core Problem Identified

(1) Target group

The target group is SMEs (Small- and Medium-scale enterprises) that manufacture OEM (Original Equipment Manufacturing) parts and components for automotive and electrical/electronic products and that are further classified as secondary-tier suppliers or lower, especially companies with Mexican ownership. It should be noted, however, that primary suppliers, large enterprises, foreign-affiliated enterprises, and after-market parts suppliers are not necessarily to be excluded from the target group.

(2) Core problem facing the target group

The core problem for the target group is the difficulty in selling parts and components manufactured by itself. In particular, the target group is unable

to gain access to Maquiladora companies, which are largely electrical and electronic manufacturers, resulting in a low localization rate of 2-3%.

(3) Direct causes of core problem

- 1) Communication between buyers and suppliers is inadequate.
- 2) Suppliers' production capacity does not match the volume of orders.
- 3) Suppliers' production costs are high.
- 4) Suppliers' products are inferior in quality.
- 5) Suppliers' product-delivery are unstable.

(4) Overall goal of the master plan

Solving the above problems is expected to produce the following results, which are the overall goal of the master plan:

- 1) Increase local contents of parts and components in the automotive and electrical/electronic industries in Mexico.
- 2) Enable parts-supplying SMEs to establish a firm management foundation, increasing the parts sales of Mexico's supporting industries.

VII.1.2 Priority Promotion Areas

(1) Metal stamping

Metal stamping of small automotive parts, as well as small/precision metal stamping of electrical and electronic parts.

(2) Plastics processing

Small electrical/electronic parts and precision parts. The target market is Maquiladora companies, although plastics processing for automotive parts is not necessarily excluded.

(3) Maintenance and making of metal molds and dies

Maintenance and manufacture of metal molds and dies for (1) and (2) above. There is a need for SMEs to learn design theory and machining techniques. This area should be promoted under a long-term strategy.

(4) Surface mounting technology (SMT)

This is technology for mounting electronic components on printed circuit boards (PCBs). Its potential as a substitute for imported products is great.

VII.1.3 Basic Guidelines of Master Plan Development

The Team develops the master plan and its implementation plan on the basis of alternative approaches agreed at the PCM workshops and presents them in the following sections. In developing the master plan, the Team set the following basic guidelines.

- 1) Take into account the current trend toward economic liberalization, particularly NAFTA.
- 2) Propose a viable and effective plan taking local conditions into consideration.
- 3) Propose feasible projects under the master plan based on the results of the study; avoid abstract and overly inclusive proposals.
- 4) Develop a promotion plan which will produce measurable results within a five-year period.

VII.2 Basic Strategy for Promotion of Supporting Industries

Based on the agreement at the PCM workshop, the Team has set the following strategies for formulating a master plan:

Strategy 1: Technology upgrading

Strategy 2: Subcontracting promotion

Strategy 3: Entrepreneurship development

Strategy 4: Manpower development

Strategy 5: Improvement of financial support

Strategy 6: Laying the foundation of SMEs promotion

VII.3 Conclusion and Project Proposal

This section presents the study's conclusion about each of the six strategies for promoting supporting industries in Mexico, together with specific projects for achieving the strategies. The rationales for the projects are presented below. The strategies and projects are enumerated in Table VII.3-1.

Table VII.3-1 Strategies and Projects

Strategy-1 : Technology Upgrading

- Project 1-1 Technology transfer through extension services
- Project 1-2 Development of SIs technical centers
- Project 1-3 Strengthening of institutions for testing and certification

Strategy-2 : Subcontracting Promotion

- Project 2-1 Enhancement of match-making activities
- Project 2-2 Assistance for relocation of SIs near to the market
- Project 2-3 Introduction of certification system for local consultants

Strategy-3 : Entrepreneurship Development

- Project 3-1 Entrepreneur re-education
- Project 3-2 Entrepreneur incubation

Strategy-4 : Manpower Development

- Project 4-1 A master plan study for manpower development

Strategy-5 : Strengthening of Financial Support

- Project 5-1 Improvement of financial guarantee system

Strategy-6 : Laying the Foundation for SMEs' Promotion

- Project 6-1 Formulation of a master plan for industrial standardization
 - Project 6-2 Preparation of industrial statistics
-

VII.3.1 (Strategy 1) Technology Upgrading

[Conclusion about technological issues]

In Mexican automotive industry, 78.1% of all cars sold are exported as assembled cars (as of early 1996). In the electrical and electronic industry, only small quantities of parts and components are supplied to Maquiladora companies, major exporting manufacturers with a local procurement rate of only 2-3%. This low rate results from the fact that secondary materials, such as packing materials, copper wire and chemicals, are what is mainly supplied locally. Thus, Mexican supporting industries must supply parts and components of exportable quality for increasing the local contents.

The current level of technology of the target group - SMEs and locally owned companies - was rated on a five-point scale as follows:

(Unit : Scores (Full mark = 5.0))

	Ownership (Mexico 100%)	Company size (Nos. of employces)	
		1 - 100	101 - 250
Autoparts	4.1	4.0	4.4
E/E parts	3.8	3.7	4.0
Average	3.9	3.8	4.2

Source : JICA Team field survey

In this scale; a rating of 4.5 or higher is considered rank A; a level of technology sufficient to manufacture products of exportable quality. Thus, the target group is not up to this level. Moreover, the electrical and electronic parts industry is father from it than the autoparts industry. Based on this analysis, the Team believes that technology upgrading is the most important issue to be dealt with in order to improve the prevailing difficulties that Mexico's supporting industries are having with selling their products.

The measures that public organizations and trade associations can take to support upgrading the technology of SMEs are basically as follows:

- 1) Transfer of modern technology from advanced countries
- 2) Improvement of technical guidance ad consultation services
- 3) Strengthening of technical support institutions
- 4) Management education (to change awareness and mind-set)

- 5) Worker education and training
- 6) Equipment modernization
- 7) Technical information service

To achieve approach 1), Strategy 1 proposes Project 1-1 "Technology transfer through extension services"; and for approach 3), it proposes Project 1-2 "Development of SIs centers" and Project 1-3 "Strengthening of institutions for testing and certification".

Approach 2) will mainly be accomplished through the above three projects, and be partially through Project 2-3 "Introduction of certificate system for local consultants" being proposed in Strategy-2. Approaches 4) and 5) will be discussed by Strategies 3 and 4. Approach 6), equipment modernization, is essentially a financial issue and thus falls under Strategy 6. Finally, technical information services, approach 7), has only an indirect effect on technology upgrading; it thus has low priority and is not included in the master plan.

VII.3.2 (Strategy 2) Subcontracting Promotion

[Conclusion about major issues related to subcontracting]

In Mexico, supporting industries (mainly SMEs) and buyers (mainly large enterprises) seem to operate in two mutually-exclusive worlds. Neither has knowledge and information about what the other thinks and wants. This lack of knowledge and communication result in dissatisfaction and distrust between the two sides, preventing promotion of the subcontracting business.

The Team concluded that the fundamental problem is "A lack of effort by suppliers to meet the demands of buyers." Suppliers still seem to rely on the business practices of the old protectionist economy, where they could be contented with suppliers' market. In particular, unstable delivery forces buyers to turn to imported parts. Procurement from a supplier who does not meet delivery dates can cause just-in-time inventory control to be impractical and can even stop assembly lines. In fact, several buyers visited by the Team have switched to imported parts due to delay in deliveries of domestic parts. This strategy's basic approach to promoting subcontracting is "to make things easy for buyers to purchase local parts." While promotional measures are often discussed from the supplier's perspective, the Team believes that subcontracting promotion should be addressed from the buyer's perspective.

The results of the questionnaire survey of 316 enterprises show that 83% of companies want to increase their OEM parts production or newly enter subcontracting business. As for the reasons of difficulties to promote subcontracting by themselves, the main one, given by 34% of the companies, was "the difficulty of entering into existing subcontracting networks." Second, with 30%, was "A lack of information on buyers", and the third, with 18%, was "An inability to meet buyers' order requirements due to small production capacity".

On the other hand, 73 Maquiladora companies were surveyed to discern buyers' needs. According to the results, 67% of respondents would like to increase their amount of local procurement. Maquiladora companies also answered a question about a desirable ratio of local procurement in the future. If this were achieved, the localization rate would rise, from the present 3.0% to 15.5% in the future. Clearly, the market has potential. The survey asked the reasons (multiple choice) why the Maquiladora

companies weren't enthusiastic about local procurement. The most common reason given by 54% of the companies, was that they could not choose their suppliers, which were instead chosen for them by the customer or the U.S. parent company. The second most common reason (50%) was that no suppliers, in Mexico, are producing the parts and components they need. Nevertheless, it is highly likely that Maquiladora companies and their U.S. parents would change to local suppliers if they could obtain quality parts near the production base, since local procurement would significantly facilitate delivery control, technical assistance, and modification of design and specifications.

Generally speaking, the following approaches can be employed for promoting subcontracting:

- 1) Collection and dissemination of information on both buyers and suppliers
- 2) Strengthening of match-making activities
- 3) Relocation of supporting industries near to the market
- 4) Improving of suppliers' competitiveness and technology;
- 5) Changing management's attitude from protectionist to customer-oriented
- 6) Expansion of production/supply capacity.

Approach 2) is addressed in Project 2-1 "Enhancement of match-making activities" and Project 2-3 "Introduction of certificate system for local consultants." Approach 3) is followed in Project 2-2 "Assistance for relocation of SIs near to the market."

As for approach 1), no project has been proposed because the results from the national subcontracting promotion system (Sistema Nacional de Promoción para la Subcontratación), which has been just launched by SECOFI, are first being awaited. In addition, a project for match-making based on the existing Bolsa de Subcontratación of CANACINTRA is going to begin recently, so that it is necessary to watch the performance of those projects rather than introduction of another new project. Approach 4) was dealt with in Strategy 1, and approach 5) in Strategy 3. Approach 6), which is related to financial issues will be discussed in Strategy 5. As an alternative way to increase the supply capacity, joint production by SMEs is discussed below under Project 2-1.

VII.3.3

(Strategy 3) Entrepreneurship development

[Conclusion about entrepreneurs and SMEs owners]

As pointed out in Strategy 2, many SMEs owners seem to still use the management style developed under the old protectionist economic system, or supplier's market. The approach commonly employed in market economies, "to manage one's company according to the buyer's requirement," has yet to take firm root in Mexico. Until the SMEs owners who follow this competitive approach grow in number and until they form the majority of the business community, buyers probably will not procure locally made parts and components, and the localization rate will thus remain low.

The results of the questionnaire survey indicate four reasons why buyers don't use of local parts, namely cost, quality, delivery, and production capacity. These reasons were also cited in the questionnaire survey of Maquiladora companies, although the reasons most frequently given by Maquiladora companies that there were no companies in Mexico who produced the desired parts. On the other hand, the interview survey suggested the presence of a fundamental reason that was not appeared in the responses on the questionnaire surveys; a wide-spread sense of distrust among Maquiladora companies regarding the management of SMEs suppliers. Some Maquiladora companies have lost interest in buying parts from local suppliers, who often fail to make deliveries on time and do not care about the consequences; the stoppage of the buyer's line. Most Maquiladora companies seem to feel that there is no need to actively buy domestic parts if it's going to mean taking a risk.

Nevertheless, some new local suppliers are emerging and succeeding in the subcontracting business. These are companies that have studied buyers' requirements carefully, and shifted their operations and improved their management to meet these requirements. They include such companies as KOKOPELLI, EUROTEC, Cía General de Electrónica, and PHOENIX International. They clearly demonstrate that local companies have the potential to grow significantly, even in the troubled economy and under high interest rates, if management adopts to the market.

To increase entrepreneurs capable of managing their companies in response to market needs, the following approaches are available:

- 1) Education of young managers and owners of existing enterprises in supporting industries (including people who have inherited management of a company)
- 2) Support for potential entrepreneurs who intend to spin off from large enterprises and start their own companies (people who know skills of modern management but do not have financial backup)
- 3) Education of new entrants into OEM production from other industries or from the after-market parts industry
- 4) Attraction of foreign investment .

Approaches, 1) and 3) are addressed in Project 3-1 "Entrepreneur re-education"; and approach 2), in Project 3-2 "Entrepreneur incubation."

Approach 4) is considered to be outside the scope of the study and who not discussed at the PCM workshops. Thus, it is not included in the master plan.

VII.3.4 (Strategy 4) Manpower Development

[Conclusion about manpower development]

According to the results of the questionnaire survey of 316 enterprises, a relatively small number of SMEs including micro-enterprises consider developing the skills of their employees a matter of urgent importance. This item ranked seventh (14.9%) out of the nine choices on the survey. In the interview survey to non-Maquiladora companies, employee skills ranked again seventh (15.4%) among nine choices. These results suggest that supporting industries in Mexico be generally satisfied with the technical levels of their employees. And, technical experts of the Team rated the technical levels of the enterprises they visited remarkably higher than those in, say, the ASEAN countries.

On the other hand, at the PCM workshops it was repeatedly pointed by Mexican participants that one reason that technical levels of Mexico's supporting industries failed to reach international levels is that the workers and technicians are inadequate in terms of both their quality and quantity. The Team thus concluded that the technical levels of the Mexico's supporting industries should be given a B ranking, which is higher than those in the ASEAN countries (C ranking). But, the potential market of Mexico demands exportable grade products with an A ranking. This means workers and technicians must upgrade their skills by one rank. The supporting industries' relatively high evaluation of their employees indicates that they are content with current technical levels, or a B ranking.

For manpower development as regards technology and technical skills, the following approaches are generally taken:

- 1) Producing of engineers by high education such as technical colleges
- 2) Fostering of technicians at technical high schools, technical junior colleges, and vocational schools
- 3) Re-training of workers at vocational training centers
- 4) Education of technical instructors
- 5) Provision of incentives to companies for vocational training
- 6) Provision of incentives to individuals by a skill standard certification

Approaches 1) and 2) are outside the scope of this study and will be left to other studies.

Approach 3) is being effectively undertaken by CIMO and CAST, with extensive assistance from the World Bank, under the Ministry of Education and the Ministry of Labor. With a view towards reducing unemployment and eradicating poverty, the World Bank considers manpower development an important part of its support for Mexico's SMEs. Approach 4) is addressed in a new initiative for re-educating teachers of technical high school, that is being jointly promoted by JICA and DGETI under the auspices of Ministry of Education. Approach 5) is provided by CIMO, which is attempting to reduce the financial burdens of enterprises and individuals by using World Bank's funds. For approach 6), a pilot certification program for the skill standard has been initiated by CNCCL with assistance from the World Bank.

It is still too early to evaluate the various projects and programs, and thus the time has not yet come to propose any measures for improving or strengthening them. Nevertheless, believing that an overall review and drawing up a master plan are necessary for technically-related manpower development, Project 4-1 "A Master plan study for manpower development" is proposed.

VII.3.5 (Strategy 5) Improvement of Financial Support

[Conclusion about the financial issues]

Financial support is considered complementary to the various projects proposed in this report for promotion of supporting industries. A financial support is one the most important tools for promoting SMEs like the woof of fabric, if the proposed projects were the warp of the promotion fabric. At present, SMEs financing in Mexico is not necessarily going well. The SMEs loan program is managed by the national development bank, NAFIN. However, 90% of NAFIN's SMEs loans are executed through commercial banks, which thus have actual control over the loan program, including the evaluation of loan applications. NAFIN argues that "although sufficient funds are available, commercial banks are reluctant to issue SMEs loans because of high risks". The Team believes that the root cause of the loan program's problems is that the unclear role of government, particularly as regards institutional credit facilities and credit guarantee, has not been made clear.

The Mexican government expects the promotion of SMEs to produce national benefits to create employment, reduce income and regional disparity, improve the trade balance, increase national income, and enable the effective use of resources. On the other hand, a consensus has not yet been reached on sharing of the costs spent for creating the benefits. Clearly, the government should bear the costs by means of financing and taxation. The extent of the costs undertaken by the government will be the main factor determining whether SMEs become invigorated or lose in their competition with imported products.

According to the questionnaire survey of 316 enterprises, the most urgent issue facing SMEs including micro-enterprises is "financial assistance through institutional financing" (45.1%), next is "equipment modernization" (38.2%). This second issue is in fact also a financial issue, as the inability to invest in equipment modernization is caused by a lack of access to loans, or even if it can be secured, the high interest rates will burden company operations. The plant diagnoses made in the field surveys revealed that equipment owned by SMEs is generally outdated. Thus, the current situation is that SMEs have an enormous need for capital, but it is not being satisfied due to their lack of access to financial services.

Generally, there are three means of providing SMEs with financial assistance:

- 1) Institutional credit facilities
- 2) Venture capital
- 3) Credit guarantee

There are currently no institutional credit facilities, exclusively applied to SMEs in the country. There are two reasons for this: 1) historically, official support for SMEs has not been part of the government's policy; and 2) IMF/IBRD, which has a considerable influence over the Mexican financial institutions, opposes preferential loans of other than market interest rates. Given this situation, there has occasionally been talk about creating institutional credit facilities for SMEs. However, with the economy beset by an unstable currency, financial and budget crises, and a high inflation rate, the prospects for introduction of such facilities are not bright.

Meanwhile, a new SMEs loan program will be started in January 1997 by using a \$250 million loan provided by the Japan Export Bank to NAFIN. This program's loan will be long-term, but they will not be low-interest. For the time being, it will be time to watch how the new program develops. This report, therefore, does not propose another new institutional credit facilities for SMEs to avoid duplication. Nevertheless, the introduction of institutional credit facilities should be seriously studied in the near future.

As for venture capital, there is a system under which NAFIN can provide less than 24.5% of an investment by itself or up to 49% in cooperation a commercial bank. The Team sees no need for proposing a new project in this area.

Finally, NAFIN guarantees up to 50% of the total amount of a loan, with the remaining risk being borne by the lending institution, namely the commercial bank. However, the current guarantee system requires some improvements, which are proposed in Project 5-1 "Improvement of financial guarantee system."

VII.3.6

(Strategy 6) Laying the Foundation for SMEs Promotion

[Conclusion about this issue]

Since the inauguration of the Zedillo administration on December 1, 1994, a series of economic development and industrial policies have been announced, including the Emergency Economic Plan (AUSEE, January 1995), and an implementation plan for it (March 1995), the National Development Plan (PND, May 1995), and the Confederation for Economic Recovery (APRE, October 1995). Each touches upon the promotion of SMEs, but only part of the whole issue or a future framework is discussed. A well-defined policy framework, however, was proposed by National Council on Micro-enterprises and SMEs which was established by government decree on May 23, 1995. The Council is composed of members of the public and private sectors, and its executive offices are located SECOFI's Directorate General for SMEs and Regional Promotion.

The Council consists of the following eight work groups by subject. These eight subjects for SMEs promotion well reflect the overall framework usually undertaken as government's policy and institutional support:

- 1) Finance
- 2) Taxation
- 3) Savings and investment
- 4) Technology
- 5) Training
- 6) Deregulation
- 7) Quality assurance
- 8) Government procurement

This study has, more or less, been conducted in line with this framework in developing the master plan for promoting SMEs. Moreover, future SMEs promotion should be conducted within this framework and with reference to this report.

SECOFI, the body that implements SMEs promotion, is a government agency responsible for planning and coordination for the public and private sectors. To a certain extent, NAFIN, BANCOMEXT, etc. are in charge of actual policy

implementation except for financing. The centers of SMEs promotional activity in the private sector are the various state chambers of commerce and industry.

The following are two projects that would serve the purpose of laying the foundation for SMEs promotion and that complement the projects in Strategies 1 through 5.

- Project 6-1 Formulation of a master plan for industrial standardization
- Project 6-2 Preparation of industrial statistics

VII.4 Master Plan

VII.4.1 Composition of Master Plan

(1) Enumeration and positioning of strategies and projects

Table VII.4-1 presents a summary of proposed projects in this study. Note that some projects have two or more executing bodies, which will be finalized with the progress of the projects.

Figure VII.4-1 illustrates how each strategy is positioned within the framework of an overall plan or a master plan. As seen in the figure, Strategies 1, 3, and 4 are designed to directly support "suppliers" who are the target group identified in this study. These strategies are supported by Strategy-6 as the institutional foundation serving as industrial infrastructure. Finally, Strategy-2 is concerned with both buyers and suppliers for the purpose of subcontracting promotion.

(2) Relations among projects

A project produces several outputs related to two or more strategies, and thus cannot always be categorized only in a particular strategy. Figure VII.4-2 shows relation between projects and strategies as to which project has close relationship with any strategy(-ies) other than the strategy the project is originally assigned to. In the figure, symbol of "●" represents a strategy to which a given project is assigned, while a symbol of "○" represents other strategy(-ies) which is closely related with the project.

The figure depicts the multi-faceted effect of each project. For instance, if Project 1-1 "Technology transfer through extension services" would be materialized, it supports and supplements those three strategies, from Strategy-2 through Strategy-4. There might be some projects which can be reasonably assigned to the other strategy than original one due to its relationship (e.g., Project 2-3 to Strategy-1). Reading the figure vertically indicates how each strategy is supported by individual projects in the proposed master plan. For instance, Strategy-1 "Technology Upgrading" is driven by five projects, adding to three projects marked by "●", two projects marked by "○", namely Projects 2-3 and 6-1.

Table VII.4-1 Summary of the Proposed Projects ¹⁾

Project Name (i.e. Project Purpose)	Target Group	Main Output	Main Activity	Main Executing Body
Strategy-1 : Technology Upgrading				
Project 1-1 Technology transfer through extension services	SMEs ²⁾ of SIs ³⁾	Clinic services are given to the model firms (40 firms/3 year).	Hire foreign consultants for the clinic services.	SECOFI, SEP-CONACYT
Project 1-2 Development of SIs technical centers	The existing technical institutions	A SIs network center is established.	Strengthen facilities and train staff of the existing centers.	SECOFI, SEP-CONACYT
Project 1-3 Strengthening of institutions for testing and certification	Technical institutions and laboratories to be accredited.	A network of accredited institutions and laboratories is composed.	Promptly accredit institutions and laboratories and construct new ones.	SECOFI - DGN, CENAM
Strategy-2 : Subcontracting Promotion				
Project 2-1 Enhancement of match-making activities	Potential suppliers and buyers	Potential suppliers get full support for subcontracting.	Intermediate potential suppliers/buyers individually.	SECOFI (NAFIN, BANCOMEXT, Cámara)
Project 2-2 Assistance for relocation of SIs near to the market	SMEs of SIs	Relocation is supported by information and finance.	Supply information useful for relocation and finance long-term loans with a grace period.	SECOFI (NAFIN, BANCOMEXT, Maquiladora associations)
Project 2-3 Introduction of certification system for local consultants	Local consultants	Local consultants are certified by grade.	Evaluate and examine local consultants.	SECOFI
Strategy-3 : Entrepreneurship Development				
Project 3-1 Entrepreneur re-education	Entrepreneurs of the operating SMEs of SIs	Entrepreneurs become aware of manners in subcontracting business.	Give on-the-job training and class-room-type lectures.	SEP, STPS
Project 3-2 Entrepreneur incubation	New players who join SIs	New players are supported for setting up in OEM business.	Reduce burdens of initial capital costs for starting business.	SECOFI (NAFIN, BANCOMEXT)
Strategy-4 : Manpower Development				
Project 4-1 A master plan study for manpower development	Workers for the manufacturing sector	A 10-year action plan for manpower development is formulated.	Forecast supply/demand of manpower in quality and quantity.	SEP, STPS
Strategy-5 : Strengthening of Financial Support				
Project 5-1 Improvement of financial guarantee system	SMEs	The financial guarantee system works well.	Determine financial sources/funds for guarantee.	SHCP (NAFIN, BANCOMEXT, Commercial banks)
Strategy-6 : Laying the Foundation of SMEs Promotion				
Project 6-1 Formulation of a master plan for industrial standardization	All industries	A goal of standardization is set.	Clarify necessity of additional software and hardware.	SECOFI (DGN, CENAM)
Project 6-2 Preparation of industrial statistics	Government	Procedures of data collection and processing are established.	Determine responsible institutions by subsectors.	INEGI (SECOFI)

Note : 1) This is just a one-line summary. Refer to the main report for details.

2) SMEs : Small- and Medium-sized Enterprises.

3) SIs : Supporting Industry



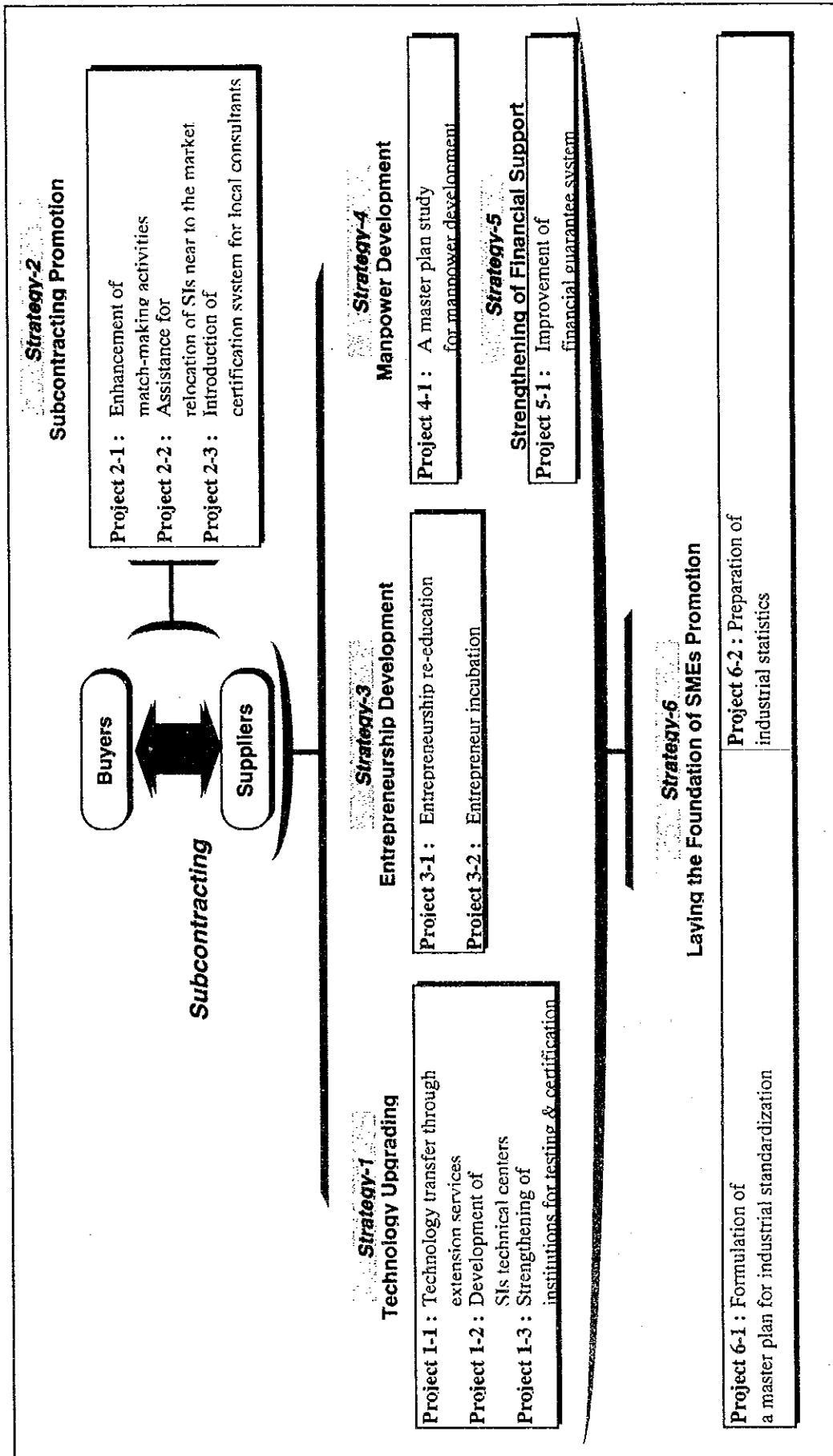


Figure VII.4-1 Schematic Diagram of the Proposed Master Plan

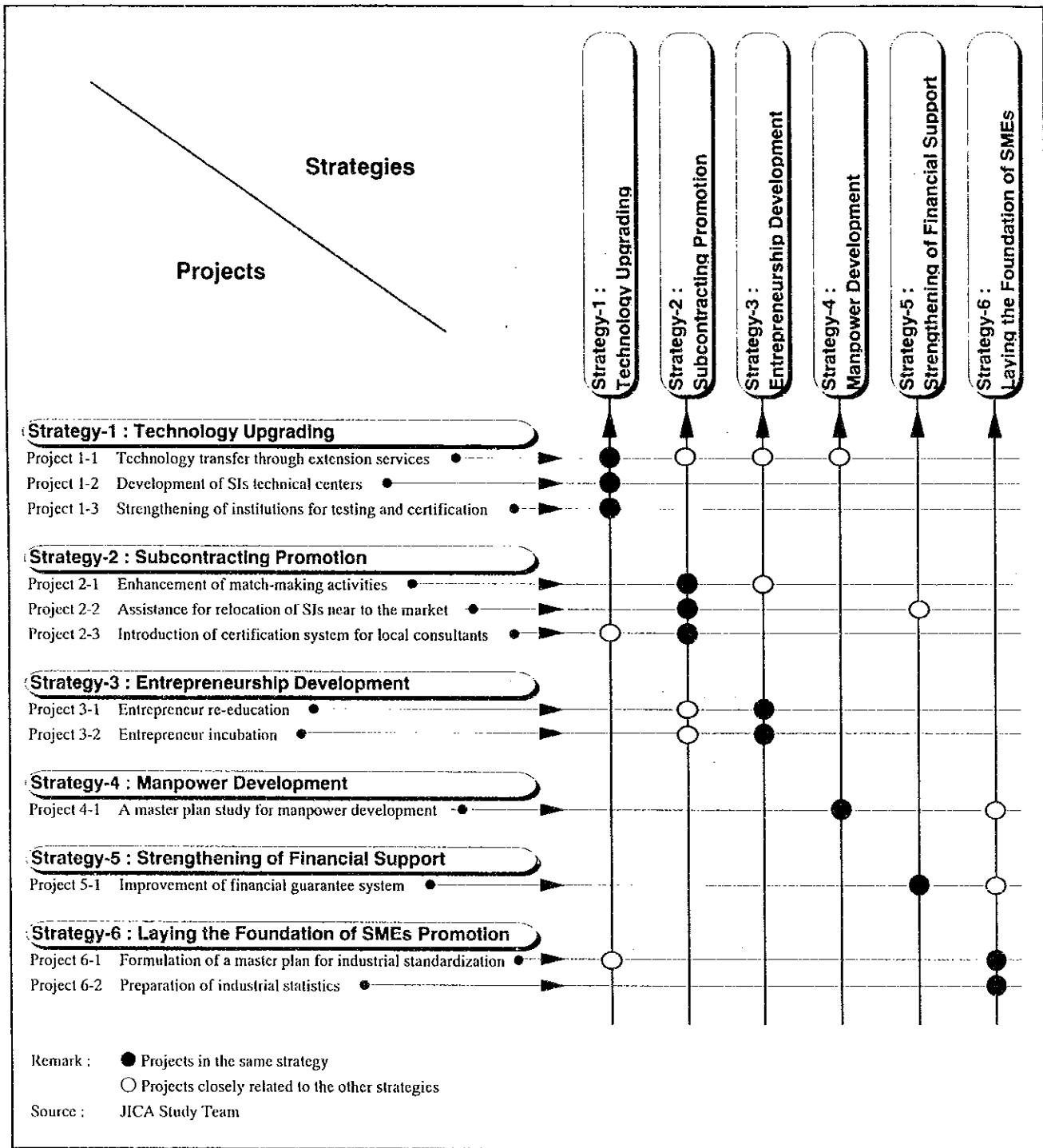


Figure VII.4-2 Interrelation between Proposed Projects and Strategies

VII.4.2 Priority of Projects for Implementation

(1) Contribution to solution for the core problem

In the PCM objective tree, Strategies-1 and -2 are positioned nearest to the core objective, Strategies-3 and -4 in the second tier and Strategies-5 and -6 in the third tier. In other words, Strategies-1 and -2 can contribute most directly for achieving the core objective. In this report, it is assumed that the closer strategies to the core objective in the tree would be able to contribute more for the achievement of the core objective. Therefore those projects assigned to a strategy that is positioned closer to the core objective are to have higher contribution rate.

Note: It may actually happen that a project in a lower tier has higher contribution rate than one in a higher tier. In this regards, there is no quantitative criteria to measure contribution rate. In this report, however, it is assumed that a strategy or projects closer to the core objective in the tree would generally have higher contribution rate.

(2) Viability of projects

Another factor to determine the project priority is easiness to start and implement a project. Projects that require the government's budget allocation, require legislation or policy change, or involve large amounts of resources (manpower, funds, materials) are considered to take some time and big effort.

The proposed projects can be classified into three groups in order of big effort required for implementation, as follows.

- 1) Projects which require considerable time and effort for implementation
 - Project 2-2 Assistance in relocation of SIs near to the market
 - Project 3-2 Entrepreneur incubation
 - Project 5-1 Improvement of financial guarantee system

- 2) Projects which require fair amount of time and effort for implementation
 - Project 1-1 Technology transfer through extension services
 - Project 1-2 Development of SIs technical centers
 - Project 1-3 Strengthening of institutions for testing and certification

Project 6-2 Preparation of industrial statistics

3) Projects which can be easily implemented

Project 2-1 Enhancement of match-making activities

Project 2-3 Introduction of certificate system for local consultants

Project 3-1 Entrepreneur re-education

Project 4-1 A master plan study for manpower development

Project 6-1 Formation of a master plan for industrial standardization

(3) Overall evaluation

In setting priority for the proposed projects, "contribution" should be considered as the primary factor, and "viability" as a secondary factor. Each project was rated by weighting the two factors by 1.0 and 0.5, respectively, as follows:

Contribution		Viability	
Level 1	10 points	Easy	5 points
Level 2	8	Intermediate	4
Level 3	6	Difficult	3

In order of the overall score, the proposed projects were divided into three groups, Priority-1, Priority-2, and Priority-3. The result is shown in Table VII.4-2. The range of the overall score assigned to each group is as follows:

First priority : 14 - 15 points

Second priority : 11 - 13 points

Third priority : 10 points or less

Table VII.4-2 Priority of the Projects for Implementation

Projects	Priority
Strategy-1 : Technology Upgrading	
Project 1-1 Technology transfer through extension services	■■■■■
Project 1-2 Development of SIs technical centers	■■■■■
Project 1-3 Strengthening of institutions for testing and certification	■■■■■
Strategy-2 : Subcontracting Promotion	
Project 2-1 Enhancement of match-making activities	■■■■■
Project 2-2 Assistance for relocation of SIs near to the market	■■■
Project 2-3 Introduction of certification system for local consultants	■■■■■
Strategy-3 : Entrepreneurship Development	
Project 3-1 Entrepreneur re-education	■■■
Project 3-2 Entrepreneur incubation	■■■
Strategy-4 : Manpower Development	
Project 4-1 A master plan study for manpower development	■■■
Strategy-5 : Strengthening of Financial Support	
Project 5-1 Improvement of financial guarantee system	■
Strategy-6 : Laying the Foundation of SMEs Promotion	
Project 6-1 Formulation of a master plan for industrial standardization	■■■
Project 6-2 Preparation of industrial statistics	■

Note : ■■■■■ : the first priority
 ■■■ : the second priority
 ■ : the third priority

Source : JICA Study Team

VII.4.3 Five-year Plan and Time Schedule

The implementation schedule for the twelve (12) projects contained in the proposed master plan is shown in Figure VII.4-3. The basic concept adopted for preparation of the schedule and important considerations are described below. Note that the figure also lists the outputs which are obtainable over five years of the master plan period. It also indicates a key for implementation for each project.

(1) Continuity after the five-year plan

Needless to say, efforts to promote supporting industries or SMEs need to be maintained for a fairly long period of time beyond the five-year period. Projects proposed under the study are assumed to continue in any of the following three ways (see "Onwards" column in Figure VII.4-3):

Projects marked by \triangle :

Continued on a regular basis after the implementation plan is established (example; Project 2-1 "Enhancement of match-making activities")

Projects marked by \blacktriangleright :

Continued repeatedly with a project as batches (example: Project 1-1 "Technology transfer through extension services")

Projects marked by \blacksquare :

Completed within five years, provided that the proposed project is followed by new projects or activities on the basis of the output of the proposed project (example: Project 4-1 "A master plan study for manpower development")

(2) Sequentiality

There are projects which constitute sequential activities, as shown below.

Preceding project		Subsequent project	
Project 5-1	Improvement of financial guarantee system	Project 2-2	Assistance in relocation of SIs near to the market
Project 6-1	Formation of a master plan for industrial standardization	Project 1-3	Strengthening of institutions for testing and certification

The sequentiality suggests that the above projects produce better results if they are implemented after an institutional setup or master plan is established. Nevertheless, it does not indicate that a preceding project constitutes killer assumption, i.e., there is not so strong sequentiality that the subsequent project cannot be started until the preceding project is completed. Rather, the subsequent project alone can produce some outputs, so that the presence of sequentiality does not preclude the commencement of all the projects at the same time. Since a preceding project may not be implemented at all, sequentiality should not be overemphasized in the implementation plan.

(3) Relationship between priority and implementation schedule

Undoubtedly, it is desirable to start a priority project as early as possible. On the other hand, questions remain about a project with low priority, e.g., whether it can be started late, and if so, how long it can be delayed.

So far as the master plan is designed to present a schedule as a target, unless there is a killer assumption for a preceding project (sequentiality), it is not necessary to delay commencement of any project. This can be explained from the viewpoint of two criteria to determine priority, "contribution" and "viability."

Contribution

Under this study, a project which contributes indirectly to a solution for the core problem is assumed to have low priority. Therefore, projects related to policy and institutional setup are naturally given the lowest priority. However, projects in this category have broad impact on industries as a whole other than the target groups of the study. From the standpoint of contribution to the national economy, the low level of contribution to a solution for the core problem does not justify the delaying of these projects.

Viability

Priority setting based on viability represents the level of difficulty in implementation. While there are projects which may be delayed or are likely foregone eventually, it is not justified to assume "delay" in the schedule of a master plan. Actually, if the government selectively would use resources to such projects with lower viability, no delay occurs. It might be, however,

reasonable to provide those project with a longer preparation period in scheduling the master plan.

(4) Conclusion

Based on the viewpoints in (1) through (3), Figure VII.4-3 assumes all the projects to start simultaneously at the beginning of the initial year. Actual start time will be varied according to how "key for implementation" is solved for each project and how resources are allocated.

(5) Other considerations

The proposed projects can be divided into two types, those newly introduced in the country, and those representing the addition or improving of ongoing projects. In the latter case, the proposed projects do not conflict with ongoing projects, nor trade-off relationship. Either can be merged with its counterpart or both can be implemented concurrently.

Some projects can be consolidated into a single project. This is deliberately avoided in this report since the consolidation results in a comprehensive and big size project and can make implementation more difficult due to confusion caused by the involvement of several executing bodies or the increase in resource requirements. Projects which can be consolidated are shown below:

Group 1

- Project 1-1 Technology transfer through extension services
- Project 1-2 Development of SIs technical centers
- Project 2-1 Enhancement of match-making activities

Group 2

- Project 1-2 Development of SIs technical centers
- Project 1-3 Strengthening of institutions for testing and certification
- Project 6-1 Formation of a master plan for industrial standardization

	1st Year/1997	2nd Year/1998	3rd Year/1999	4th Year/2000	5th Year/2001	Onwards	Outputs in 5 years	Key for Implementation
Strategy-1 : Technology Upgrading								
Project 1-1 Technology transfer through extension services	Preparation	1st batch clinic	2nd batch clinic	3rd batch clinic		▶	60 beneficiaries	Possibility of foreign T/A
Project 1-2 Development of SIs technical centers	Identification	Action plan	Strengthening of facilities / staff			▽	A SIs center each in 10 cities	Possibility of foreign T/A & F/A
Project 1-3 Strengthening of institutions for testing and certification	Survey present status	Masterplan	Strengthening of facilities / staff / accreditation			▽	Distribution to 10 cities	Possibility of foreign T/A & F/A
Strategy-2 : Subcontracting Promotion								
Project 2-1 Enhancement of match-making activities	Review the past	Method of	Event / Follow-up / Consultation			▽	Effective events	Leadership of the project organizer
Project 2-2 Assistance for relocation of SIs near to the market	Information supply Sys.	Supporting sys.	Support for relocation			▽	Better circumstances for relocation	Introduction of financial incentives
Project 2-3 Introduction of certification system for local consultants	Study	Methodology	Testing and certification once a year			▽	4 times test & certification	Methodology for testing
Strategy-3 : Entrepreneurship Development								
Project 3-1 Entrepreneur re-education	Project design	8 batches of the re-education courses				▶	80 re-educated entrepreneurs	Cooperation of potential buyers
Project 3-2 Entrepreneur incubation	Preparation	Land / Buildings	1st batch incubation for 3 years			▶	10 new players	Leadership of the project organizer
Strategy-4 : Manpower Development								
Project 4-1 A master plan study for manpower development	Preparation	Masterplan study				■	Action plan for 10 years	Possibility of foreign T/A
Strategy-5 : Strengthening of Financial Support								
Project 5-1 Improvement of financial guarantee system	Study / Discussion	Organization building-up				■	Workable system	Source of funds
Strategy-6 : Laying the Foundation of SMEs Promotion								
Project 6-1 Formulation of a master plan for industrial standardization						■	Action plan for 10 years	Possibility of foreign T/A
Project 6-2 Preparation of industrial statistics	Preparation	System building-up		Trial run	Follow-up sys.	■	Workable system	Possibility of foreign T/A
(Remarks)	T/A : Technical Assistance		▽ : The project shall routinely continue after the 5th year.					
	F/A : Financial Assistance		▶ : The project shall repeatedly continue in batches.					
	Sys. : System		■ : The scope of the project will be completed within 5 years though the project should be followed by succeeding activities.					

Figure VII.4-3 Time Table for Implementation of the Proposed Master Plan in 5 Years

100

100

100



JICA