19.4 Development of Innovative Industries- A Case Study for Salmon Farming Related Industries

19.4.1 Introduction

The development of innovative industries is essential in order that Chile has sustainable exports in the long run. It is not realistic or practical to look for such potential in areas that are not related to those where Chile has a competitive advantage, speaking specifically of its natural resources. This section will focus on the salmon farming industry since it is one of the strongest natural-resource-based industries in the South Zone. In so doing, the development of innovative industries in that particular area will be contemplated.

Currently, Chile's natural-resource-based industry is facing numerous environmental problems, while the salmon farming industry is no exception. Therefore, in this section, the development of innovative industries is studied in hopes of lessening such environmental problems.

19.4.2 The Salmon Cluster in the South Zone

(1) General view

Chile's salmon industry is recognized worldwide as being one of the largest following Norway. It is said that the existing salmon cluster in the South Zone is one of the greatest and strongest in Chile. This industry is the most successful export oriented industry in Chile due to significant increases in exports. Currently most of these exports come from the tenth region, accounting for US$414 million in 1998; however, exports from the eleventh region are now expanding.

The salmon farming industry consists basically of two stages: salmon farming and the industrial process. Salmon farming itself is defined as a process that includes only fresh and salt-water activities, and comprises the entire salmon life cycle, beginning from the initial birth lasting until the time of harvest. The industrial process, in turn, is defined as beginning when a harvested salmon enters an industrial plant to be processed and ends when the product is ready to be purchased by importers, domestic consumers or even intermediaries. It should be noted that the phrase "salmon industry" does not refer to the processing but rather to the complete business, defined as including all those companies engaged in the same field or economic activity, ranging from farming and processing until the final stage of export.

The size of the cluster in Chile is shown in Figure 19.4.1, including indirect actors that really support the salmon farming industry such as financial institutions, research and development institutions and universities, as well as suppliers of materials such as medicaments and plastic products. The flourishing of service industries is a remarkable characteristic of this particular cluster.

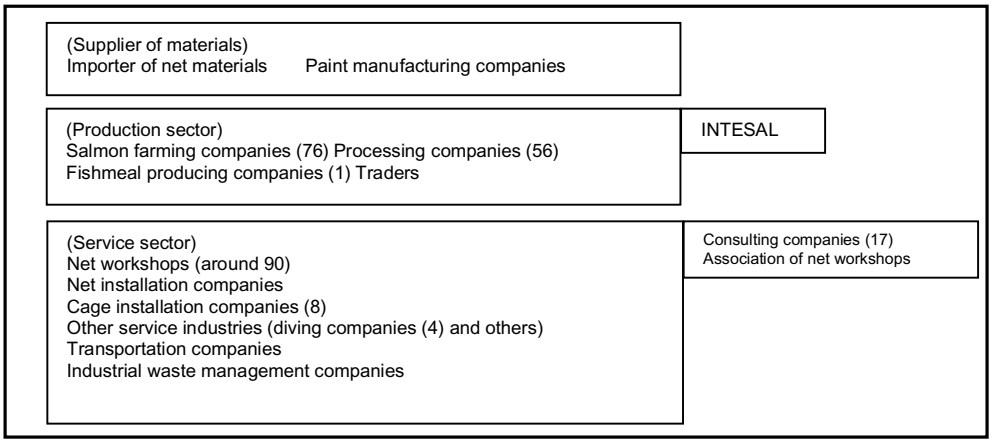


Figure 19.4.1 Salmon Cluster in the South Zone

Source: JICA Study Team.
Note: The following companies overlaps almon farming, processing, and traders and consulting.

(2) Major actors

There are several major actors in this cluster. Table 19.4.1 lists major salmon farming companies in the South Zone. The number of companies is 76 and they are categorized as the following three types: salmon farming as such, those concerned with farming and industrial activity, and finally companies that are engaged in a full line of business including export. Table 19.4.2 lists the major 51 salmon industrial plants, while a list of major exporters is exemplified in Table 19.4.3.

Table 19.4.1 Salmon Farming Companies

N	NAME	N	NAME	N	NAME
1	Acuicultura Chalhuaco S.A.	27	Marine Harvest Chile S.A.	53	Salmones Chiloé S.A.
2	Acuimag Ltda.	28	Nisa	54	Salmones Colbún
3	Aguas Claras S.A.	29	Ocean Horizons Chile S.A.	55	Salmones de Los Andes S.A.
4	Aqua Service Ltda.	30	Octavio Abarca Castelli	56	Salmones Friosur
5	Aquachile S.A.	31	Patagonia Salmon Farming S.A.	57	Salmones Huillinco S.A.
6	Aquagen S.A.	32	Pesca Chile S.A.	58	Salmones Ice-Val Ltda.
7	Aquandino	33	Pesquera Best Salmon Ltda.	59	Salmones Llanquihue S.A.
8	Asesoría Acuícola S.A.	34	Pesquera Eicosal Ltda.	60	Salmones Mainstream S.A.
9	Australis S.A.	35	Pesquera Los Fiordos S.A.	61	Salmones Multiexport S.A.
10	Chile Cultivos S.A.	36	Pesquera Palacios S.A.	62	Salmones Pacific Star S.A.
11	Comercial Mirasol S.A.	37	Pesquera y Comercial Río Peulla	63	Salmones Pacífico Sur S.A.
12	Compañía Pesquera Camanchaca S.A.	38	Piscicultura del Río Bueno S.A.	64	Salmones Ranco Sur S.A.
13	Compañía Salmonífera Dalcahue Ltda.	39	Piscicultura Garo	65	Salmones Tecmar S.A.
14	Cultivos Cabo de Hornos S.A.	40	Piscicultura Río Picaflor	66	Salmones Unimarc S.A.
15	Cultivos Marinos Chiloé	41	Piscicultura Santa Margarita	67	Sea Farmers S.A.
16	Cultivos Yadrán S.A.	42	Polo-Austral	68	Sea Salmon Ltda.
17	Fiordo Blanco S.A.	43	Productos del Sur Ltda.	69	Seafine
18	Ganamar S.A.	44	Prosmolt S.A.	70	Seamag S.A.
19	Gran Mar S.A.	45	Quetro S.A.	71	Skyring Salmon S.A.
20	Granja Marina Tornagaleones S.A.	46	River Salmon S.A.	72	Skysal
21	I.F.O.P.	47	Robinson Crusoe y Cía Ltda.	73	Trusal S.A.
22	Industrias Relkon	48	Salmoamérica	74	U. de Chile. Piscicult. Experimental Chiloé
23	Invertec Pesquera Mar de Chiloé S.A.	49	Salmolicán	75	U. de Los Lagos
24	Landcatch Chile	50	Salmones Andes S.A.	76	Ventisqueros S.A.
25	Manantiales S.A.	51	Salmones Antártica S.A.		
26	Marine Farms Chile S.A.	52	Salmones Australes S.A.		

Source: Aquanoticias, 2001. Acuicultura y Pesca: Compendio y Directorio, Chile

Table 19.4.2 Salmon Industrial Companies

N°	NAME	N°	NAME	N°	NAME
1	Agroindustrial Santa Cruz S.A.	18	Industrias Relkon	35	Pesquera Transantartic Ltda.
2	Agromar Ltda.	19	Invertec Seafood S.A.	36	Pesquera Unichile S.A.
3	Aguas Claras S.A.	20	Landcatch Chile	37	Prosal S.A.
4	Alimentos Campomar Ltda.	21	Lo de von-Fach	38	Robinson Crusoe y Cía Ltda.
5	Chisal S.A.	22	Maintec S.A.	39	Salmoamérica
6	Codalsa	23	Marine Harvest Chile S.A.	40	Salmones Antártica S.A.
7	Comercial Comtesa S.A.	24	Open Pacific S.A.	41	Salmones Chiloé S.A.
8	Comercial e Industrial del Sur S.A.	25	Patagonia Salmon Farming S.A.	42	Salmones Mainstream S.A.
9	Compañía Pesquera Camanchaca S.A.	26	Pesca Chile S.A.	43	Salmones Multiexport Ltda.
10	Conservas Multiexport S.A.	27	Pesquera Best Salmon Ltda.	44	Salmones Pacífico Sur S.A.
11	Conservera Sacramento	28	Pesquera Edén Ltda..	45	Salmones Tecmar S.A.
12	Cultivos Marinos Chiloé	29	Pesquera Eicosal Ltda.	46	Salmones Unimarc S.A.
13	Cultivos Marinos Flamenco S.A.	30	Pesquera Friosur S.A.	47	Salpac S.A.
14	Cultivos Yadrán S.A.	31	Pesquera Lacks	48	St. Andrews Smoky Delicatecies S.A.
15	Expomagro Talcahuano S.A.	32	Pesquera Los Elefantes S.A.	49	Skyring Salmon S.A.
16	Fitz Roy S.A.	33	Pesquera Palacios S.A.	50	Uni Sea Food
17	Frionatur Ltda.	34	Pesquera Ralún	51	Ventisqueros S.A.

Source: Aquanoticias, 2001. Acuicultura y Pesca: Compendio y Directorio Chile 2001. Santiago

Table 19.4.3 Major Salmon Exporting Companies

NAME	EXPORTATION AMOUNT (US$)
Marine Harvest Chile S.A.	71.760.733
Compañía Pesquera Camanchaca S.A.	47.699.017
Salmones Multiexport Ltda.	44.169.943
Salmones Tecmar S.A.	41.718.185
Salmones Pacífico Sur S.A.	39.115.323
Invertec Pesquera Mar de Chiloé S.A.	31.710.371
Pesca Chile S.A.	27.961.644
Pesquera Mares Australes Ltda.	26.696.296
Salmones Pacific Star Ltda.	22.093.781
Cultivo de Salmones Linao Ltda.	21.710.404
Aguas Claras S.A.	21.445.661
Pesquera Eicosal Ltda.	20.303.335
Fiordo Blanco S.A.	20.264.212

Note: Cultivo de Salmones Linao and Pesquera Mares Australes have a legal structure for export, but they are part of Marine Harvest Chile.

Source: Compilation elaborated on the basis of Aquanoticias, 2001. Acuicultura y Pesca: Compendio y Directorio, Chile 2001, Santiago.

Other production sectors, such as salmon food and fishmeal companies should also be mentioned, though the number of these companies is small. In addition to such production sectors, service sectors must also be considered. Among them, consulting and net repairing companies are of greatest importance. Consulting companies, for example, render various kinds of consulting services to the salmon industry. A list of major consulting companies is provided in Table 19.4.4.

Table 19.4.4 Salmon Production Consulting Company

Name	Location
Acevet Ltda.	Rengifo 946 of.2. Puerto Montt
AGA S.A.	Paseo Presidente Errázuriz Echaurren 2369 3rd and 4th fl. Santiago
AKVA Ltda.	Pacheco Altamirano 2525. Puerto Montt
Aqua Service Net Ltda.	Ruta 5 Sur km.1029. Puerto Montt
CERAM-U. Austral de Chile	Los Pinos s/n, Balneario Pelluco. Puerto Montt
CETECSAL S.A.	Ruta 5 Sur km.1170. Castro
CREAS Ltda.	Quillota 167 of.203. Puerto Montt
HEFESA Ltda.	Pedro Montt 65 of.506. Puerto Montt
INDURA	Polpaico esq/Pilpilco s/n. Puerto Montt
NISA	Andina 106. Puerto Montt
Pesquera Fríosur S.A.	José María Caro 300. Puerto Chacabuco
Productos del Sur Ltda.	Camino Lago Chapo km.14. Puerto Montt
Pronaves Ltda.	Mc Iver 544 6th fl. Of.K Santiago
Redes E.B.H	Bima 53, Barrio Industrial. Puerto Montt
Salmochile	Coyhaique 858. Puerto Montt
Salmofood S.A.	Ruta 5 Sur km.1170. Castro
Superior Systems Chile	Pacheco Altamirano 2525. Puerto Montt

Source: Aquanoticias, 2001. Acuicultura y Pesca: Compendio y Directorio, Chile 2001. Santiago.

Net repairing workshops are also very important. The number of these workshops is estimated at approximately 90, however the exact number is not known due to additional illegal businesses. These illegal businesses do not have legal permission to operate, and they do not pay taxes or social benefits to their workers. Among the legal 90 companies, there are 35 major workshops, located mainly in the Puerto Montt and Chiloé areas, as shown in Table 19.4.5.

Table 19.4.5 Net Repairing and Maintenance Companies

N°	NAME	Location	Treatment plant (US$M)
1	Adelmo Cárdenas G.	Curaco de Vélez	IP(0.05) a)
2	Alejandra Binimelis	Puerto Montt	
3	Aquachiloé Ltda. (Miguel Rojas)	Chonchi	A(0.58)
4	Aqua Service Net Ltda. (Alejandro Araya)	Puerto Montt	
5	Chilred (Alexis Aguilar)	Chonchi	
6	Domkenet (Orlando Domke)	Puerto Varas	: a)
7	Eduardo Arnoldo Gatica Méndez	Puerto Montt	
8	FISA Chile S.A. (Raúl Balbontín)	Puerto Montt	
9	Francisca Alarcón Mansilla	Curaco de Vélez	IP(0.04)
10	Francisco Sabugo Hernández	Calbuco	IP(0.01)
11	Helen Beatriz Varas	Puerto Montt	
12	Jovita Uribe	Puerto Montt	
13	Kurt Heim Schlicht	Puerto Montt	
14	Marcelo Calderón Pérez	Castro	A(0.14)
15	Marcos Morales	Puerto Montt	a)
16	Master Nets (Francisco Oteíza)	Puerto Montt	A(0.33) a)
17	Newnets (Tatiana Balbontín)	Puerto Varas	a)
18	Nelly Alarcón Mansilla	Curaco de Vélez	IP(0.07)
19	Nisa Redes (Luis Andrade)	Puerto Montt	a)
20	R.C. Técnicos (Juan Carlos Vergara)	Puerto Montt	a)
21	Redes & Nets Ltda. (Cristán Contardo)	Puerto Montt	a)
22	Redes E.B.H. (Elba Briceño)	Puerto Montt	A(0.07) a)
23	Redes Juan Carlos Vera Ojeda	Quellón	A(0.95) a)
24	Redes Piscis (Ramón Bahamóndez)	Castro	IP(0.07)
25	Redes Polincay	Puerto Montt	a)
26	Salmochile S.A. (Alfredo Bahamóndez)	Puerto Montt	IP(0.05)
27	Salmored Ltda.	Puerto Montt	a)
28	Servimar Ltda. (Cristhian Petermann)	Puerto Montt	a)
29	Simar Nets Ltda. (Gonzalo Cea)	Puerto Montt	
30	Skyring Salmon S.A.	Castro	
31	Sociedad C. Rexin		
32	Sociedad Mar-Mau Ltda. (Nicolás Calderón)	Castro	
33	Taller de Redes Chinquihue	Puerto Montt	
34	Taller de Redes Ltda.	Puerto Montt	A(0.04)
35	Tecsemar Ltda. (Mario Cepeda)	Puerto Montt	

Note: A: Own a treatment plant approved by CONAMA (Comisión Nacional del Medio Ambiente: National Commission for the Environment) through an Environmental Impact Declaration.
IP: CONAMA is processing the approval of the project to build a treatment plant
No description: Does not have a treatment plant
a): Member of the Asociación de Talleres de Redes (the net workshop association)

Source: Compilation made on the basis of Aquanoticias, 2001. Acuicultura y Pesca: Compendio y Directorio, Chile 2001. Santiago. Mauricio Salas, Executive of SERCOTEC (Servicio de Cooperación Técnica – Technical Cooperation Service), Puerto Montt.

Some of the companies mentioned above have formed an association. Those that are included in such associations own washing machines and render cleaning services for used nets; however, those that function independently do not have washing machines and focus their business on repairs and painting. These companies order other workshops, which have access to washing machines, to clean their nets under sub-contract. Therefore, environmental problems are faced by those rather larger-sized workshops that own expensive washing machines, since it is the cleaning process that accounts for environmental contamination. Among net workshops, major companies that would be included in this category are Redes EBH, NISA, Redes and Nets, and Master Nets.

(3) Industrial structure

Structural characteristics of the industry are summarized as follows.

Vertical integration

The structure of the salmon cluster reveals a vertical integration, in which the “spine" is constituted by three major components: Farming centers, processing plants, and export companies. Each one of the large companies presents this kind of integration, even though the structure differs by company including any of the following: as one single company (e.g. Marine Harvest, Compañía Pesquera Camanchaca S.A.); as part of a business holding (e.g. Invertec Pesquera Mar de Chiloé S.A.); as a farming company (e.g. Invertec Seafood S.A.); or finally, as an industrial processing company (e.g. Invertec Pesquera Mar de Chiloé S.A. as an exporter). Generally speaking, major exporters own farming and industrial plants, though it is unusual that an exporter concentrates exclusively in that business as is clearly shown in Table 19.4.6.

Table 19.4.6 Salmon Related Company’s Business Line

Name	Farming center	Processing plant	Exporter
Marine Harvest Chile S.A.	YES	YES	YES
Compañía Pesquera Camanchaca S.A.	YES	YES	YES
Salmones Multiexport Ltda.	YES	YES	YES
Salmones Tecmar S.A.	YES	YES	YES
Salmones Pacífico Sur S.A.	YES	YES	YES
Invertec Pesquera Mar de Chiloé S.A.	YES	YES*	YES
Pesca Chile S.A.	YES	YES	YES
Pesquera Mares Australes Ltda.	NO	NO	YES
Salmones Pacific Star Ltda.	YES	NO	YES
Cultivo de Salmones Linao Ltda.	NO	NO	YES
Aguas Claras S.A.	YES	YES	YES
Pesquera Eicosal Ltda.	YES	YES	YES
Fiordo Blanco S.A.	YES	NO	YES

Note: Invertec Pesquera Mar de Chiloé S.A. has a processing plant, but uses the name of Invertec Seafood, S.A.

Source: JICA Study Team based on conducted interviews.

Horizontal integration

The salmon industry has begun to demonstrate a process of concentration. Larger companies have acquired smaller ones while they have also formed strategic alliances, generating horizontal integration. The Nutreco Holding and Fjord Seafood companies may be cited as relevant examples. The former conglomerate has grown as the owner of Marine Harvest, Mares Australes, Cultivos Linao, while the latter is now the owner of Tecmar, a group that holds Salmones Quellón, Salmones Huillinco and Maintec.

Technology generation

There exist many services and consulting firms, which provide that particular industry with state-of-the-art technology. Even though some technologies have been introduced from abroad, generally Chile relies on its own technology, developed in the country. In this area, Fundación Chile, the Universidad Austral, Intesal (Instituto Tecnológico del Salmón - Institute of salmon technologies), and many international and national chemical, equipment and feeding companies have contributed significantly to conduct necessary research. In many ways, they have succeeded to introduce new technologies and adjust foreign ones to local requirements. In addition, the government has extended some support to the net workshop industry, providing funds through FONTEC, FONDEF, FDI and FIP.

Mechanisation and out-sourcing of services

In order to enhance international competitiveness, mechanical operation has been implemented in such farming and production activities as feeding, harvesting, skinning, filleting, packaging and weight management. Out-sourcing of some services has been done for the same purpose during the last 5 to 6 years. The most typical case of out-sourcing is to hire the services provided by net workshops, which include repairing and maintenance of nets. The out-sourcing system has allowed salmon companies to reduce production costs and to transfer the solution of pollution problems generated by this activity to the net workshops. In rendering net repairing and maintenance services, some of the workshops, mainly the large ones, form a long-term contract - for 3 to 5 years – with the net businesses. Salmon farmers hold one or two exclusive net workshops as customers, while workshops maintain several ones.

The approach regarding the use of medicine is changing. The trend is to decrease the use of antibiotics and to increase the use of vaccination. For example, Laks Service Ltda. has already begun to provide vaccination services to salmon farming companies with Norwegian technology introduced by Trio Fish Machinery.

(4) Export performance

Export statistics reveal several characteristics regarding its structure. First, it demonstrates that the export of processed salmon is far greater than farmed or fresh salmon. This implies that the salmon industry is a large manufacturing industry. Second, total added value is not as high as originally believed. For example, facts reveal that the export value of canned salmon and other salmon preparations is only US$10 million, that is to say, around 2.5 percent of the total value of salmon export. Third, many exporters compete with each other while the degree of concentration is not very high, even though there exist some very influential exporters such as Marine Harvest Chile, Salmones Multiexport, and Salmones Tecmar. This fact allows one to determine the size, strength and general character of the salmon cluster.

(5) Future prospect

Salmon production is expected to increase three times by the year 2010. However, in order to reach this figure, farmers have estimated that they would require approximately 700 new maritime concessions. This implies an extension of the current farming center location towards Regions XI and XII. Such an expansion has already been initiated, as is shown in data regarding investments made by several companies in the past years: Los Fiordos, US$20 million; Invertec Pesquera Mar de Chiloé, US$35 million; Fjord Chile US$300 million; and Pacífico Sur, US$68.8 million.

Finally, it is important to add that new investments, accounting to US$5 million, is planned to be directed towards the El Tepual Airport (Puerto Montt) and in other near airports in order to improve infrastructure and facilitate the shipment of fresh salmon from Region X to foreign destinations. Currently only 5% of the product from the region is directly delivered to foreign countries, while the rest is exported via Santiago.

A future issue to be considered is the necessary link between the salmon farming and tourism industries, through such examples as a sea aquarium, a demonstration center with guided visits, the development of a salmon-based gastronomy, restaurants, etc. Additionally, the production of organic salmon should also be considered in the future; an idea that is only recently being introduced. However, it is first necessary to solve

environmental problems related to this industry before further developments are initiated.

19.4.3 Environmental Problems Faced by the Salmon Industry

(1) Production process of the industry

The production process of the industry is summarized in Table 19.4.7 together with waste material and waste management processes. This is based on information provided by the Asociación de Productores de Salmón y Trucha (the Salmon and Trout Producers Association), the Instituto Tecnológico del Salmón S.A. (Technological Institute of Salmon), the Servicio de Cooperación Técnica - SERCOTEC, Region X (the Technical Cooperation Service), and CORFO, Region X.

Table 19.4.7 Waste Materials and Its Management by Process

Process stage	Waste materials	Waste management
(Fresh water)		
Mature individuals	(1) Not consumed food (2) Plastic bags (3) Dead fish	(1)-(3) Delivery to a dumping place
Spawning	(1) Dead fish (2) Bloody water (3) Liquid wastes with high DBO5	Delivery to dumping place
Fertilization		
Incubation		
Alevins stage	(1) Not consumed food (2) Plastic bags (3) Dead fish	(1)-(3) Delivery to a dumping place
Small stage	(1) Not consumed food (2) Plastic bags (3) Dead fish	(1)-(3) Delivery to a dumping place
(Salt water)		
Fattening	(1) Not consumed food (2) Plastic bags (3) Dead fish	(1)-(3) Delivery to a dumping place
(Industrial process)		
Raw material reception		
Storage in cool		
Weight control		
Cutting/Eviscerating/Cleaning	(1) Solid fish wastes (head, viscera, etc) (2) Liquid wastes	Convert to fish meal Liquid waste physic-chemical treatment plant
Classification/Calibration		
Cooling/Freezing		
Head cutting	(1) Solid fish wastes (2) Liquid wastes	Convert to fish meal Liquid waste physic-chemical treatment plant
Glazed		
Packaging		
Refrigerated storage		
Frozen stage		
Loading		
(Annexed of overall activities)		
Plant cleaning	(1) Liquid wastes with high values of detergents, fats, oils, DBO5, and suspended solids (2) Solid fish wastes (3) Plastic bags	Liquid waste physic-chemical treatment plant Convert to fish meal Delivery to a dumping place
Eggs import		
Net pens and annexed infrastructure setting		
Use of medicaments		
Net repair and maintenance	(1) Organic materials such as seaweed (2) Copper oxide	Liquid waste treatment plant Industrial waste treatment plant

Source: JICA Study Team based on conducted interviews.

(2) Two major problems

Environmental problems in two areas must be considered: processing plants and net workshops. Both are important, since in addition to the local environmental damage they generate, they could be recognized as “ecological dumping”, causing a huge economic

and social detriment.

As a reply to these disquiets, the private as well as public sectors have initiated some actions in order to solve such problems through Clean Production Agreements, financed by the instrument FDI of CORFO.

Salmon Processing Plants

The major problem in this area is the discharge of industrial liquid wastes, due to the high content of organic materials (mainly blood). However, processing plants are currently confronting this problem, while most of them have a treatment plant. Furthermore, a clean production process is being established in order to solve the problem by directly attacking the cause, thus leaving the solution of water treatment as the last link in the production process. In addition, the salmon farming companies are becoming more serious and planning to apply for the ISO 14000 certificate. In this sense, even though the problem is serious, actions for a solution are in process.

Net Workshops

While salmon farming companies try to tackle their environmental problems - and some have already shown remarkable results – it is much more difficult for net workshops to do the same. One could say that the environmental issues faced by such workshops are the "weak point" of the Chilean salmon farming industry. Most net workshops are small companies, with no real background regarding environmental issues. The greatest problems arise due to the use of antifouling paint for the nets, and organic products, such as seaweed and shells, that become attached to the nets. Organic products are washed out in the net cleaning process and become a source of environmental fouling. The workshops that do not have special treatment plants simply spread the resulting liquid on the soil. In addition, these organic materials cause bad smells due to their putrefaction.

One of the greatest difficulties in solving such environmental issues lies in the structure of the workshop industry, ranging from very small workshops to very large companies. Such a variety prevents the conformity of abiding regulations at the national level.

(3) Core problems in the net workshop business

1) Identification of the problems

During the salmon farming process, nets are installed to prevent sea lions from entering the cage and killing the salmons, while also preventing the salmons from leaving the cage. However, organic products such as seaweed and shells become attached to the nets, causing the salmons to experience a shortage of oxygen. Therefore, it is necessary to periodically clean the organic products from the nets, a process that is required in Chile once every two weeks during the summer season when seaweed grows most rapidly.

Salmon farming began in Chile around the year 1981. At that time, the nets were not so large, thus making it rather easy to handle and change them frequently. With the development of the industry, however, the nets became larger and it became more difficult to handle and change them. In addition, when the nets are changed, the stress level of the salmons increase and their intake of food decreases, resulting in a slower growth process. Furthermore, by changing the nets, the salmons are browsed making them more vulnerable to infections and various diseases. As a means to cope with such problems and lessen the frequency of the net changes, antifouling paint was introduced. By covering the nets with antifouling paint, organic products do not attach as easily. Antifouling paint is produced with raw materials such as solvent, copper oxide, resin and

metal oxide. Among them copper oxide is problematic as it is still difficult to recover it from the waste, and it is discharged without proper treatment. The annual consumption of antifouling paint for nets in the South Zone accounts to 2 million liters.

The effect of antifouling paint is really great, as shown in the dramatic decrease of the conversion factor. This factor is measured as the amount of feed required to obtain a certain amount of meat and is determined by the mortality rate and rate of growth of the salmons. In the case of painted nets used in the summer season, the factor is only approximately one tenth that of unpainted nets. The mortality rate is around 30% in the case of unpainted nets, while it is 6-7% in the case of painted ones. As is apparent, the use of antifouling paint is very convenient economically speaking since it increases the efficiency of salmon farming. However, from an environmental perspective, it brings with it many problems.

Table 19.4.8 History of the Introduction of Nets with Antifouling Paint

Year	Size of net (length x width x depth) (meters)	Use of paint in salt water
1981	7 x 7 x 7	No
1987	10 x 10 x 10	No
1991	15 x 15x 15	Trial period
1993-95	20 x 20 x 20	80%
Today	32 x 32 x 20	100%

Source: JICA Study Team, based on interview with Mr. Marcos Morales

Table 19.4.9 Comparison of Efficiency: Net with and without Antifouling Paint

(Case during summer months)

	Paint	No paint
Change of nets		Once every 15 days
Stress on salmons	None	Great
Mortality	Decreases	Increases
Growth	Fast	Not so fast
Conversion factor (feed/meat)	Low	High

Source: JICA Study Team, based on interview with Mr. Marcos Morales

2) Generation of the problems

Antifouling paint is effective for a maximum of four to five months. Following this period, it should be replaced and cleansed, a process recognized as including serious problems.

The following chart demonstrates how the cleansing of used and dirty nets generates problems. Firstly, nets with antifouling paint are cleaned using the washing machines. The resulting wastes are divided into three elements. The first is solid waste, which contains copper oxide in a negligible amount. The solid waste is transported to industrial waste treatment plants or landfills. The second element is water containing copper oxide of 800mg-1900mg/lt. Such water is treated in a water treatment plant until the level of copper oxide contained reaches less than 3mg/lt. The treated water flows to the public sewage in cities through pipelines, rivers, the sea or simply to the soil. The third waste is the residual, which is derived in the course of the water treatment. Such residual is pressed to become sludge bricks still containing copper oxide and then is transported to industrial waste plants.

It is necessary to emphasize that, today, only six companies own a water treatment plant, while seven others are waiting for an evaluation issued by CONAMA. The companies that do not have a treatment plant may allow solid and liquid wastes to enter the sea, rivers or even the soil, though it is forbidden to do so. This situation is quite feasible since the current regulation was passed in 1997 and most of the net workshops started their business prior to this date. In addition, the solid waste and sludge generated after

the water treatment process still contain copper oxide due to the fact that the available treatment is not correct. Such solids are not always transported to industrial waste plants; many times they are simply left where they are washed out. Even in the cases when they are transported to industrial waste plants, the necessary facilities are not always suitable to treat them in an environmentally friendly way.

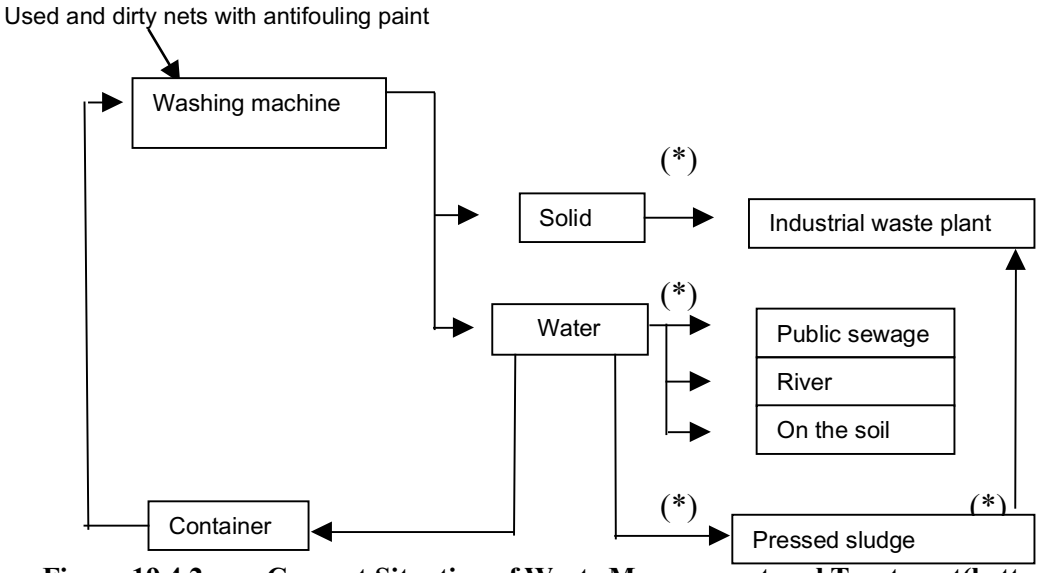


Figure 19.4.2 Current Situation of Waste Management and Treatment(better case)

Note:(*) Source of environmental problems
Source: JICA Study Team

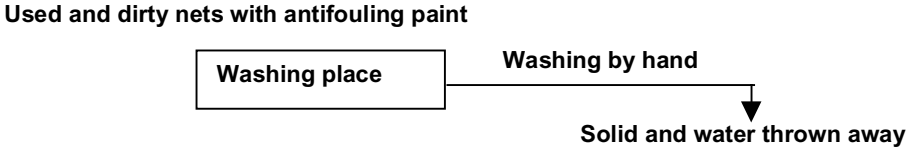


Figure 19.4.3 Current Situation of Waste Management and Treatment (worst case)

Source: JICA Study Team

The more serious problem, however, is the difficulty in recovering copper oxide from liquid waste sludge, considering the technology that is available today. Table 19.4.10 summarizes such existing problems.

Table 19.4.10 Core Environmental Problems

	Problem 1	Problem 2	Problem 3
Net without paint	Treatment of water used for the net cleaning process	Treatment of sludge containing organic products generated in the course of the cleaning process	
Net with paint	Treatment of water used for the net cleaning process	Treatment of sludge containing organic products generated in the course of the cleaning process	Recovery of copper oxide

Source: JICA Study Team

3) Options for a solution

Table 19.4.11 compares possible options that may be used to confront the existing problems. Among them, Option 1 is not practical for the reasons described in the chart

above. Option 3 is more feasible while recently a company expressed interest in the development of such a net. However, this has been noted as being rather difficult considering the speed of the current in the Pacific Ocean. With this in mind, the development of a metal mesh net is an area to be further researched in the future. Therefore, it is necessary to select either Option 2 or Option 4.

In the case of Option 2, it is necessary to develop a way to recover copper from the waste. It is worth mentioning that a project already exists to develop such technologies. Fundación Chile and the University of Concepción have launched a research and study of application with the financial support of CORFO. Since Fundación Chile has already succeeded at the experimental level, it is expected to reach the commercialization level. The core technology utilized first separates water with copper from sludge, and later, directly separates copper from water with copper, instead of separating copper from sludge containing copper. Option 4 is considered worth the challenge, though the type of fish farming between Chile and Japan is different, for example, Japanese farmers often use other types of antifouling paint instead of copper oxide-based ones.

Table 19.4.11 Comparing Table for Each Option

Option	Advantages	Disadvantages
1. Frequent change of nets without antifouling paint	Less environmental problems	(1) High manual labor cost (2) Stress on salmon (3)Conversion factor becomes high
2. Still use of antifouling paint under strict water treatment and recovery of copper	(1) No need to change net frequently (once every four to five months) (2) Cost factor is low	(1) Serious environmental problems (2) Initial cost for antifouling paint (3) Recovery cost of metals
3. Use of metal mesh net	(1) Less environmental problems (2) Easy to clean in the sea (3) No need to use double nets	(1) Difficulties in handling (2) High cost for cleaning due to difficulties in handling (3) Chilean geographical condition: speed of current
4. Develop a new type of antifouling paint without copper	Less environmental problem	Much time is necessary to receivedata on safety and effectiveness

Source: JICA Study Team

(4) Strategies for a solution

Option 2 is considered a practical solution to solve the problem momentarily. It is therefore urgent to permit each workshop access to a water and solid waste treatment plant - including sludge - at adequate industrial waste treatment places, though this is far from satisfactory as a comprehensive system. The point is that it is expensive to implement such a solution and therefore becomes difficult for every workshop to implement this option. Certain strategies are necessary so that each net workshop can eventually build such kind of facilities. In formulating such strategies, we have tried to discover who the actors in the net workshop business are, and how they are conducting business in relation to other actors.

1) Relevant actors

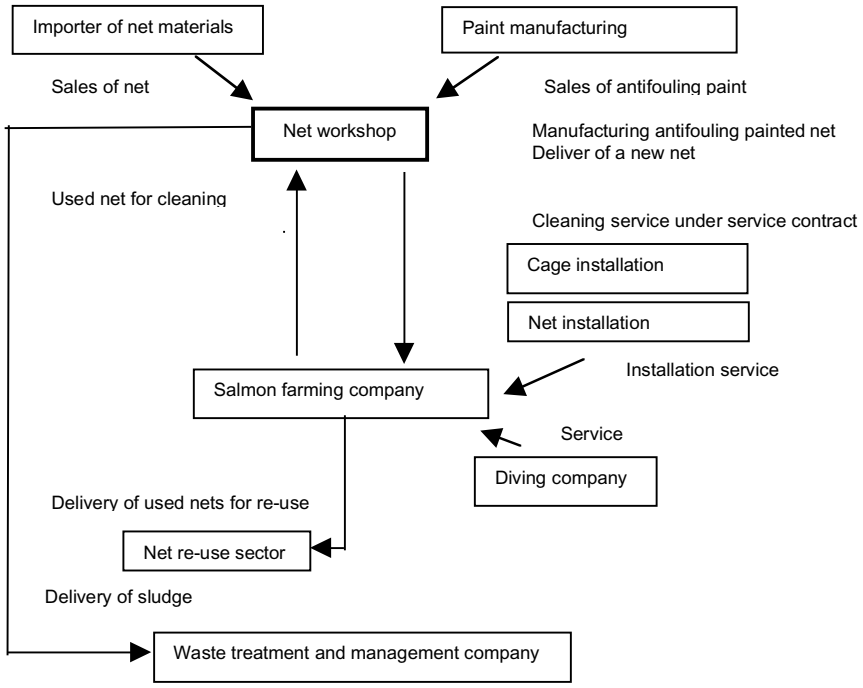


Figure 19.4.4 Actors Related to Waste Management

Source: JICA Study Team

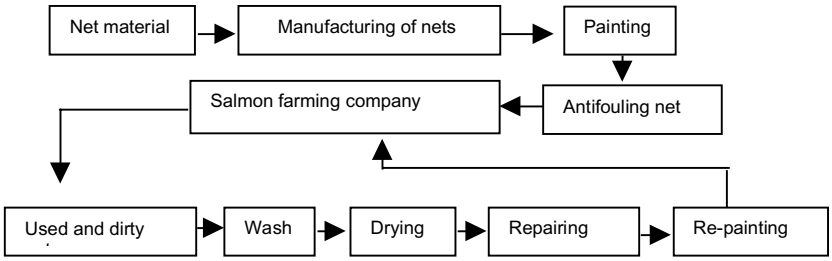


Figure 19.4.5 Flow of Operation by Net Workshops

Source: JICA Study Team

The activities or responsibilities of each actor are summarized as follows.

Importer of net materials

A domestic supplier of farming net material does not exist in Chile. It is therefore imported from Taiwan, Italy, Peru and other countries. The reason being that imported materials are less expensive than domestically manufactured ones. The imported nets are cut into the appropriate size and knotted for salmon farming nets by net workshops. These workshops obtain necessary materials directly from the importers or the salmon farming companies they work for. Smaller workshops select the latter case because their financial resources are too limited to buy prime material.

Supplier of antifouling paint

One of the major suppliers of antifouling paint is Cerecita, a company that manufactures

the paint under a license from a Norwegian company. The company holds approximately 50% of the total share of the antifouling paint market in Chile. It supplies the antifouling paint directly to the net workshops or through salmon farming companies. Recognizing the serious environmental issues caused by antifouling paint containing copper oxide, the company has tried to reduce the percentage of copper oxide used by developing new technology. However, they have not yet achieved a new type of paint to replace the existing antifouling paint. It is noted that it is not so difficult to develop a new type of antifouling paint, though it is important to take into account the cost and duration when analyzing the feasibility of such a project.

Net workshop

Information regarding the operation of a net workshop is derived from visits to twelve workshops. The functions of a net workshop are the following three. First, the nets for salmon farming are manufactured with imported materials, principally nylon or polyester fiber. Second, the nets are coated with an antifouling paint and delivered to salmon farmers. Finally, the nets must be cleaned, repaired and repainted for the use of their customers. Though the frequency of this process varies pending climatic conditions and the customers' policy, it normally takes place every four to five months, while the nets themselves last around three to four years. Every net workshop maintains a record of the repairing and repainting demanded by each customer and marketing and sales activities are later conducted from these results.

Process for cleaning is as follows.

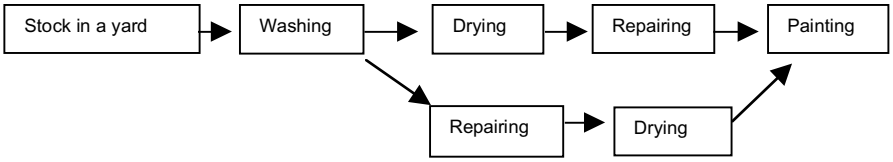


Figure 19.4.6 Process for Cleaning Net

Source: JICA Study Team

The nets that require cleaning are transported by transportation companies hired by the salmon farming companies to a stockyard in the workshop. If washing machines are available, the nets are washed for 40 to 60 minutes. The usual size of the machines is either $5m^3$ or $15m^3$. After the washing process, the nets are dried and repaired, according to the traditional way of operation. The repairing process demands approximately 12 to 240 man-hours, depending on the degree of the reparation required. When workers are not available in all stages of the process, repairs are finished prior to the drying. The painting process is done with chemical solvent or water solvent. The latter is less harmful for workers, though it requires wider rooms for ventilation. In Chile, chemical-based solvents for painting accounts for 95% of total solvents, while in Norway it only accounts for 20%. Though the transportation process is not shown in the above chart, its function is important. One reason being that dirty nets are in fact much more heavy than clean nets and therefore requires special machinery to handle them. Standard new nets weigh around 600 kg, while dirty nets weigh from 4,000 to 10,000 kg, including seaweed and shellfish.

Table 19.4.12 A List of Net Workshops Visited

Company	No. of employees	No. of regular customers	Established year
A	180~200	3	1994
B	130	3	1996
C	40~60	3	1996
D	80	7	1994
E*)	20	0	1998
F	120	10	1995
G	50	2	1993
H*)	30	3	1999
I *)	10~15	2	1997
J *)	21	3	1994
K*)	30~40	10	1992
L	75	10	1989

Note: Company with additional *) implies that it does not have a washing process.

While the main workshops operate the entire process mentioned above, some smaller ones operate only part of the process under a contract with other workshops, or with an order from a salmon farming company to complete part of the work as shown below. The difference is because they do not have a washing machine or a water treatment facility. However, these companies have expressed their desire to operate the full line of a workshop business. Due to strict regulations by CONAMA and lack of financial resources to install a plant that complies with such regulations, the companies cannot meet the expectations today. The cost of a new facility, including a washing machine and a water treatment plant ranges from US$100,000 to US$150,000

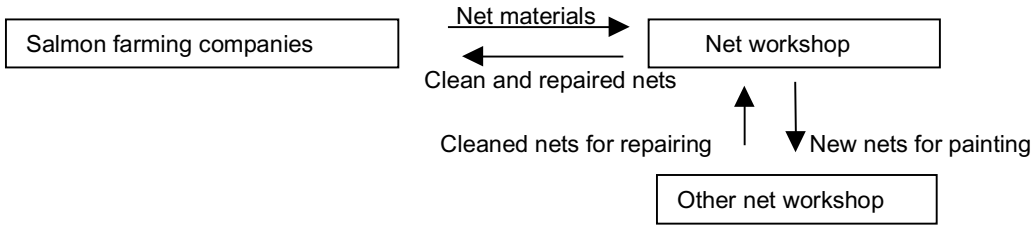


Figure 19.4. 7 Flow of Small Net Workshops

Source: JICA Study Team

Other service companies

In addition, there exist other service companies related to the net workshops business including cage and net installation companies, diving companies and guard service companies. Most of them were born due to salmon farming companies` out-sourcing policy. There are four diving companies that employ 300 divers. One of the net installation companies holds 170 people, and among them 60 people are divers. The company is also engaged in transportation services, handles new, dirty and used nets, and provides port and net installation services. Taking full advantage of an existing direct relation with seven salmon farming companies and net workshops, this particular company is considering the development of a new business to intermediate both, farming companies and net workshops. It can be said that the service industry is one of the fastest growing industries in Puerto Montt.

Waste treatment and management company.

Solid wastes that contain organic elements, together with sludge that contains copper oxide, are categorized as industrial wastes. While there exist several companies able to treat and manage specific industrial wastes generated at industrial plants, such as cement and paper, only one company in Chile, HIDRONOR, is officially authorized to treat and

manage any kind of industrial waste including hazardous industrial waste. HIDRONOR is a Belgian company located in the outskirts of Santiago. It is noted that since the year of operation in 1998, they have not officially received wastes from any salmon farming related business. The company is, however, ready to handle this kind of waste and eventually invest in a treatment plant in the South Zone, if it proves profitable.

Besides this company, there exist some landfills in the area of Puerto Montt that treat and manage sludge containing copper oxide in bricks. One of them handles solid waste and sludge of 12 trucks and 100 containers from four of its customers. Since the company handles any kind of industrial waste, the percentage of waste from workshops today only accounts for 8%. Large workshops are the only customers of the landfill company. This company dispatches its containers to the large workshops and brings the waste back to the landfills, where solid waste and sludge are stored in one place. There are estimates of the collection of approximately 36m^3 of sludge per month from one net workshop. This company feels that it is necessary to handle these wastes in a safer way since they contain heavy metals and could be the cause of diseases, such as cancer, in the long run. In this regard, there exist two options. The first is to build a special tank covered with a shelter, close to the landfill, as a place to store the residues. The second option is to build a deposit, or a kind of transit place, also close to the landfill and later transport the wastes to the industrial waste management company in Santiago as mentioned above.

Salmon farming companies

Salmon farming companies share the concern regarding environmental problems faced by net workshops. Some of them even conclude to contracts with only those net workshops that own a water treatment facility. Some salmon farming companies would like to use antifouling painted nets for longer periods, but considering the current situation, or the lack of workshops that comply with CONAMA's regulation, they still must use unpainted nets. The above mentioned selection policy for net workshops on the part of salmon farming companies will accelerate the restructuring of the net workshop business. It is actually expected to take place in the framework of a market mechanism.

2) Mechanism for SMEs' access to technology and business opportunities

The most important strategy to be formulated is the development of a mechanism to make it possible, not only for large but also for small and medium-sized workshops, to install rather expensive water treatment facilities that would include cleaning processes that comply with CONAMA's regulations.

Environmental conservation is to be given highest priority, while CONAMA is also expected to impose strict regulations in this area. When such a situation occurs, market forces will demand those net workshops that are not able to comply with CONAMA's regulations, to go out of the business. Such market mechanisms are important, encouraging industries to enhance their competitiveness. However on the other hand, considering that the net workshops are central actors in the salmon cluster and that they also create many jobs, it will be necessary to make arrangements to secure the continuous business of net workshops, which are actually SMEs. This is especially necessary for those that have potential, but do not have the financial means to invest in a water treatment facility.

Let us consider further the impact of CONAMA's regulation on the net workshops. When the regulation is imposed, some will be compelled to go out of business, otherwise known as a case of "disappearance". Others will become part of the "merger and acquisition" strategy by their competitors (Option 1). The remaining workshops will have a chance to survive by joining others under the umbrella of a big workshop (Option 2). These two cases will take place naturally as a result of market mechanisms. However, there may exist workshops that are not willing to disappear, nor loose their independence. In such a scenario, it is necessary to have other options available. This option may be an "association or alliance". Consequently, there exist two cases under "association or alliance" (Options 2 and 3). The outline of each option is as follows:

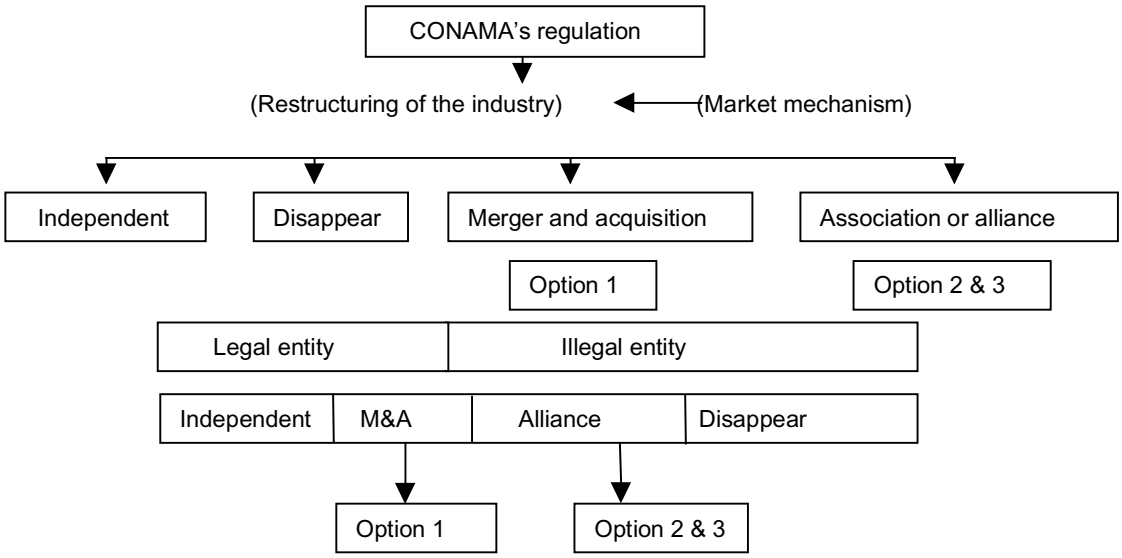


Figure 19.4.8 Impact of CONAMA's regulation

Source: JICA Study Team

(Option 1) Joining under the umbrella of a central workshop

This option is characterized as being a sort of industrial reorganization. Tier 2 workshops that do not own a water treatment plant would join under the umbrella of Tier 1, a central workshop owning a plant. Smaller workshops, or those in Tier 3, would transfer some of their operations to Tier 1 or Tier 2 and operate only parts of the workshop, those areas not related to the cleaning process. In order to accelerate such a process, it will be necessary to arrange special financial schemes, such as leveraged buy-out. Since this movement would help to enhance the competitiveness of the net workshop business as a whole, public financing could help to foster such options. However, such a financial scheme should be extended only to those workshops that are sure to enhance their competitiveness. In the situation whereby ties between the workshops in Tier 1 and the salmon farming companies appear to be strong, long term service contracts agreed upon together could be used as a kind of collateral for the finance.

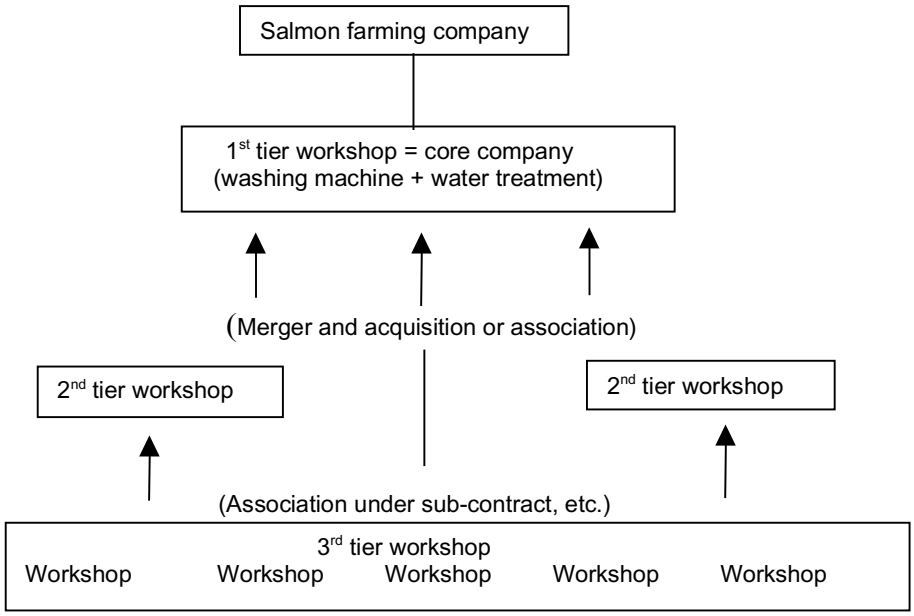


Figure 19.4.9 Option 1: Central Workshop

Source: JICA Study Team

(Option 2) Facility owned and used jointly by the net workshops

This option proposes that the workshops would gather together to form a special purpose company (SPC). Those involved would invest a large amount in a washing machine and a water treatment plant, allowing each workshop to share and make use of the plant. Likewise, each would have shares that should be transferable and the plant would be "a common plant". All workshops would bring the dirty nets to the plant, clean them and later return them to their own maintenance workshop, where the process of drying, repairing and repainting would take place. Since the transportation distance of cargo will differ by net workshop, it will become necessary to equalize the transportation cost through some special measures. This may be done by, for example, pooling the transportation cost and distributing the total cost equally among the participants by transported weight. Another possibility may be for the participants to establish a special private transportation company whereby they would share the profits. It may also be a possibility to include the transportation service in addition to the washing and water treatment as a function of the SPC.

There may be two ways to integrate the net workshops. One option may be to integrate them by size, while the other is to integrate them by location. Both have advantages as well as disadvantages, however, it appears that the latter is more efficient.

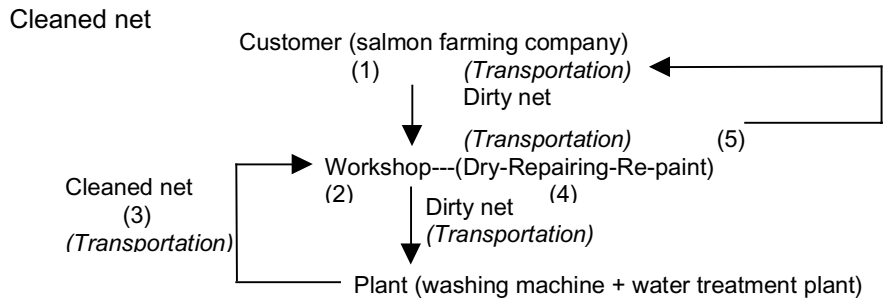


Figure 19.4.10 Flow of Operation in Case a Common Plant is implemented

Source: JICA Study Team

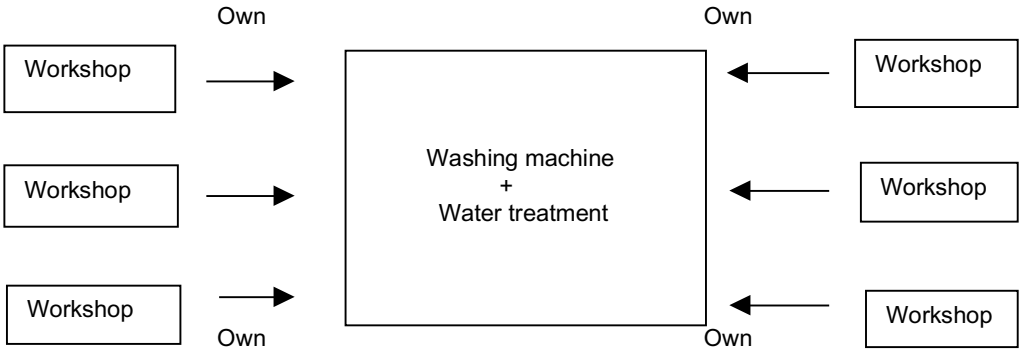


Figure 19.4.11 Option 2: Special Purpose Company (SPC)

Source: JICA Study Team

Since it appears that the workshops included in the SPC, as mentioned above, lack necessary economic resources to implement the idea, it is necessary to design a special financial scheme - with financial engineering - in order to realize its implementation. The following chart demonstrates such an example. The scheme works as follows. First, a special purpose company would be established among the workshops, the public sector and other parties concerned. The workshops would contribute initial capital by paying cash, or by injecting assets including, for example, a long-term service contract concluded between the workshops and different salmon farming companies. Regarding the public sector, it does not seem likely that it would participate with an ordinary share of that business or extend a loan to the SPC. The principal reason being that the SPC would issue redeemable preferred stock (RPS) and a public sector body would underwrite the stocks. Therefore, the SPC would borrow money from financial institutions with the workshops' shares as collateral. It would then invest in equipment for the commercialization of the technology especially developed for that purpose using the money and proceeds of the issuance of RPS. The public sector is expected to join the project since it is characterized as being a kind of infrastructure project.

It is also possible that salmon farming companies, paint manufacturers and suppliers of equipment could join the project as shareholders. Nevertheless, salmon farming companies will not be interested in joining the project if their customers, that is workshops, are not equipped with water treatment plants. Later, if there exists the possibility that the shares are transferable, they would obtain them from their new customers as a demonstration of their interest in such an investment. The suppliers of net

materials and transportation companies could also eventually show an interest in joining this scheme because their participation would provide them a new business opportunity.

The advantage of such a scheme lies in the fact that every workshop, regardless of its size, would have a right to use the equipment as a shareholder of that SPC, while also maintaining its independence.

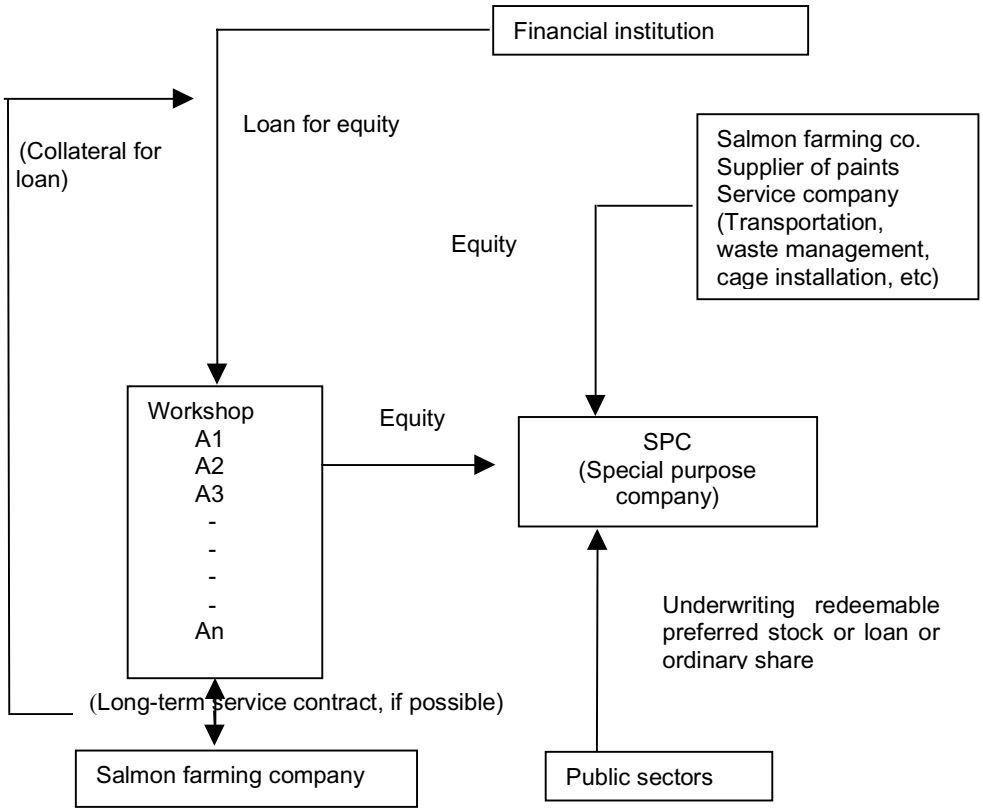


Figure 19.4.12 Financial Engineering for Option 2

Source: JICA Study Team

(Option 3) "A coin laundry" system

This option suggests that an investor would provide the necessary finances to build a large plant that relies on washing machines and a water treatment plant. The workshops, which do not own a plant that includes those facilities just mentioned, would have access to such a "coin laundry" plant by paying a tariff. However, the major concern for the implementation of such a scheme is the presence of an investor. In order to secure necessary investments, it will be necessary to provide potential investors a "status" of "regional monopoly". On the other hand, it will also be necessary to establish a public utility committee and ensure that this body regulates the tariffs in a fair manner. In this sense, such an option would be referred to as the "privatization of a water treatment plant". Possible investors for this option are as follows:

(1) Salmon farming companies
(2) Net workshops
(3) Net material suppliers
(4) Transportation companies
(5) Other service companies such as net installation companies

Salmon farming companies historically conducted the business on their own. With this in mind, they will likely be interested in this option, though realizing that such a business today is to be enforced by others. For example, an independent affiliated company, though separate from the parent company, may be a likely candidate. Transportation companies will also likely show interest because the business often involves transportation functions. Additionally, a net installation company has already announced that it would like to participate in this type of business. Waste management companies may also have an interest in participating, since this provides them an opportunity to handle solid waste and sludge.

Since investors would provide necessary financial arrangements independently, public sector financial involvement would be minimized. However, considering that the facility is a kind of public infrastructure, it is necessary that the public sector provide some finance for a portion of the investment.

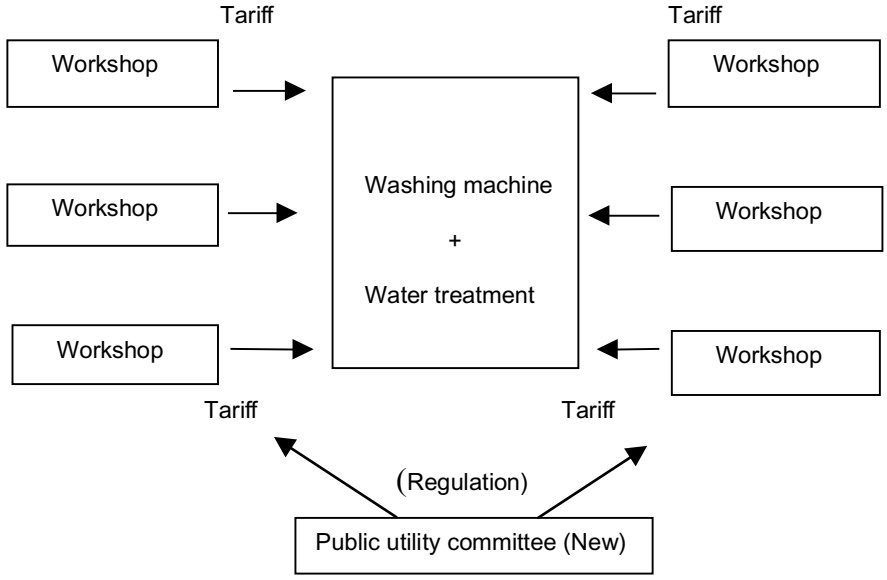


Figure 19.4.13 Option 3: "Coin Laundry" System

Source: JICA Study Team

The following compares each option taking various viewpoints into account. Among the three, number 3 appears to be more advantageous.

Table 19.4.13 Comparative Table for Each Option

	Option 1	Option 2	Option 3
Spirit of partnership	+	+++	++
Enhancement of competitiveness	+++	+	++
Financial burden on public sector	++	+	+++
Easiness of implementation	+	++	+++

Note: +: Higher quantity implies that the option is more advantageous
Source: JICA Study Team

3) Development of a new technology for water treatment

Fundación Chile and the University of Concepción have begun research to develop technology to recover copper oxide from liquid waste. The Fundación estimates that they will finalize the laboratorial-level development, as well as preparation for its

commercialization within two years. The selection of any of the three options mentioned above would be affected, to some extent, by the results of this development. This is especially true because the kind of water treatment system selected would be directly related to the outcomes of the research. However, regardless of the kind of technology that is developed, it is necessary that the government ensure a mechanism by which SMEs can access the new technology. In addition, SMEs must have access to new business opportunities related to the net workshops. It is not practical to assume that each workshop will eventually install its own water treatment facility with state-of-art technology. There is no doubt that some SMEs will require access to a common plant, represented by options 2 or 3. In this sense, the discussion regarding possible options to be taken will still prove meaningful.

19.4.4. Development of Innovative Industries

There are several potential areas for the development of innovative industries associated with a solution to the above-mentioned environmental problems, since the salmon cluster is very strong and continues to grow vigorously. It is desirable to allow SMEs to become deeply involved in the development of such new industries. In this way, CORFO in Region X has identified various suitable strategic projects and has organized several consortiums of SMEs to implement them. These projects are not limited, however, to SMEs located in the South Zone; they also include some small and medium companies from Concepción and other areas. Regarding the development of the machinery industry, the participation of SMEs in Concepción who work in related areas would be particularly important. If necessary, foreign partners should also be invited to contribute to the projects. If necessary, foreign partners should be invited to contribute to these projects.

(1) A new type of antifouling paint containing less toxic materials

A new type of antifouling paint containing less toxicant has already been developed and used in Japan, known as silicon-based antifouling paint. However, there is a cost disadvantage accounting to almost double the cost of a traditional antifouling paint based on copper oxide. Therefore, it is necessary to reduce the production cost as well as develop a new, but less expensive paint.

In Japan, 16 companies manufacture 31 types of antifouling paints for the fish farming industry. If one separates the raw materials, while including the still widely used inorganic copper-based paints, it is clear that the largest item is organic nitrogen sulfur-based paints. This is demonstrated in the Table below.

Table 19.4.14 Use of Antifouling Paint in Japan

Type of product	No. of item
Organic nitrogen–sulfur-based	16
Copper-based	7
Organic nitrogen-based	7
Other	1

Source: Paint association of Japan, October 1998

(2) A new type of metal mesh nets

It is necessary to develop metal mesh nets that are strong, but light, as well as easy to

handle and resistant due to the special conditions of the Chilean sea. It has been noted that an Australian company is attempting to develop such a net.

(3) A waste treatment and management company

Waste treatment and management services will probably be some of the fastest growing industries in this area. Since efficiency is key for such a business, it is necessary to develop a strategy that would integrate various peripheral services, such as transportation, into the core business.

(4) Machinery related to environment conservation

Some examples of machinery related to the conservation of the environment are washing machines and water treatment equipment. If, for example, a washing machine is to be installed as part of a common water treatment plant, it is especially necessary that it is large and efficient. Though tower-type dryers are widely used, it appears that the tunnel-type styles are more efficient.

(5) Machinery and equipment related to salmon farming

The salmon industry must accomplish several tasks in the future related to under-sea work. In order to do so efficiently, robots will be needed to analyze the situation in the water. Currently, the robots used in this industry are imported. It would be possible, however, to develop them in Chile since the market is near and there exist engineering capability. Another potential area is the manufacturing of special transportation equipment including boats and trucks, as well as heavy cranes that can handle wet and heavy nets.

(6) Others

1) The development of a pigment should be achieved in order to obtain the demanded skin color of salmons from alternative sources such as seaweed or yeast. Currently, a Swiss company supplies 100% of the market demand for such a pigment. The local market pays approximately US$70 million per year to that company.

2) A guard system should be established that utilizes high-technology equipment to prevent the theft of salmons. The cost suffered from such theft is estimated at US$25 million per year.

19.5 Action Plans

19.5.1 Case Study of Valdivia

(1) Establish overall coordinating body for Eco-region strategy

Location	Valdivia - Provincial level
Time to be Implemented	2001-
Persons Responsible	Overall coordinator selected by the Municipalities and the private sector
Participating Entities	Co-ordinators of all the mechanisms and action plans* for Eco-region
Objectives:	Overall co-ordination of entire strategy and action plans for Eco-region
Content of Projects and Concrete Actions to be Taken	1. Municipality will create overall strategy for provincial development with consultation of local private sector. 2. Municipality, with consent of private sector, will assign the overall co-ordinator. 3. The co-ordinator will organize a meeting every 1 or 2 months. 4. The results of the meeting will be distributed to the provincial and regional governments.
Possible Sources of Financing	Subdere, Municipalities (Fondo), Private sector

*The mechanisms and action plans for the Eco-region are as follows: (1) Create a marketing strategy for "Eco-baskets", (2) Create a coordinating mechanism, or committee, for the development of eco-tourism, (3) Establish a center of innovation for new products, processes and tourist services through an alliance among the university-private-public sectors, (4) Create an incubator mechanism for the strengthening of micro and small enterprises under the Eco-region concept. This does not include the two additional committees that were mentioned in the concept. The lack of these committees in this action plan is strictly due to the time constraints.

Possible tasks of this committee:

-Co-ordination of events organized by the municipalities and among various entities, including timing, promotion, etc.
-Co-ordination of the creation of promotional documents and information for tourists.
-Co-ordination and the creation of a common image for tourism in Valdivia.
-Co-ordination of investment made by the private and public sectors.
-Co-ordination of human resource development incorporating the needs of the private sector.
-Co-ordination of the development of tourist attractions by academic, private and public sectors.

(2) Create marketing strategy for eco-basket

Location	Valdivia – Provincial level
Time to be Implemented	2001-2002 (information) 2002- (operation)
Institutions Responsible	Municipalities and CODEPROVAL, SERNATUR Valdivia
Participating Entities	ProChile, Cámara de Comercio, Hotelga, CORFO, FOSIS, INDAP, NGOs
Objectives:	Co-ordinate the formulation and implementation of a marketing strategy for an eco-basket including products and services.
Content of Projects and Concrete Actions to be Taken	A. Information and co-ordination 1. Revision and co-ordination of promotional materials produced by each related entity. 2. Hold meeting with related departments of the Municipalities to explain and obtain consensus regarding eco-products and the eco-basket concept. 3. Hold meeting with producers, consultants and specialists in the related field to diffuse the idea. 4. Decide on the tasks to be performed by each organization (includes slight adjustment of work, incorporating the Eco-region concept). B. Operation 1. Creation and revision of common promotional materials (Eco-region map) 2. Review and assess the effect of the Eco-region map. 3. Sales promotion of Eco-baskets (i.e. organizing an exposition in Santiago as well as other areas such as Argentina).
Possible Sources of Financing	Municipalities (FOND), Private sector and CORFO (PROFO, FAT, FONTEC, FDI), ProChile (export promotion scheme and provide market information), CODEPROVAL, SERNATUR (FODETUR).

(3) Create coordinating mechanism, or committee, for the development of eco-tourism

Location	Valdivia - Municipality level
Time to be Implemented	2001-2002 (creation) 2002- (operation)
Responsible for Implementation	Coordinator selected by municipality of Valdivia and approved by other participating actors. It is necessary that the co-ordinator work full-time only for this committee.
Participating Entities	Those people who are in the position of decision making at the technical level. Related Municipalities (such as Corral), SERNATUR, Austral University, CODEPROVAL, Chamber of Commerce, Hotelga, INDAP, CONAF, Chile's Navy, FOSIS, SERCOTEC, CORFO and related NGOs.
Objectives	-To co-ordinate actions made by each entity and to create one continuous policy for the development of eco-tourism at the municipality level. To tackle short-term tasks based on medium to long-term perspectives to accomplish the long-term goal. -To bring decisions into the operation stage. (lobbying)
Content of Projects and Concrete Actions to be Taken	A. Creation of Committee 1. Each actor agrees to create the committee and agrees on those tasks assigned to the committee. 2. The head of each participating body signs agreement of co-operation. 3.Assignment of members of the committee by each participating entity. 4.Municipality will creates a job description for the coordinator. 5.Municipality submits the short list of possible candidates to committee to select a coordinator. 6.Selected coordinator develops action plans based on individual interviews with committee members and creates a proposal for eco-tourism development strategy. This includes short, medium and long-term perspectives. 7.Once the committee accepts the proposal, it will meet every 1 to 2 months to discuss the progress of the action plans and emerging issues. B. Operation of Committee 1. The coordinator will do the following: - If political decision is required to implement the plan, he/she will speak with necessary persons. - If financial resources are required to implement the plan, he/she will find possible sources of finance. - If particular assistance is necessary from the members of the committee, he/she will contact them directly. - If problems exist and decisions cannot be implemented, he/she may call an emergency meeting to report the situation to members. - Call a regular committee meeting to be assisted by the

	members. 2. At the end of each year, committee members evaluate the performance of the coordinator. 3. Based on the evaluation and action plans, the coordinator makes proposal plans for the next year based on information collected during interviews and field research.
Possible Sources of Financing	● SUBDERE (for association of Municipalities and private sector): 50% of operation cost, i.e. for coordinator and office. ● 50% is shared by participating entities. ● Municipalities (Municipality fund) for improve municipal tourist infrastructure. ● Municipalities (FNDR) for projects that are fundamental for the development of eco-tourism, i.e. infrastructure. ● SERNATUR (FODETUR) for those areas that are identified as one of the 15 tourist destinations ● CORFO (FDI, FONTEC, FAT, PROFO) utilizing the existing schemes accordingly. ● INDAP, FOSIS (from existing mechanism).

(4) Establish a center for the innovation of new products, processes and tourist services through an alliance between private and public sectors and the university

Location	Valdivia – Provincial level
Time for implementation	2001-2002 (creation) 2002- (operation)
Institutions Responsible	"Centre for Applied and Innovative Management" by the University of Austral, Faculty of Economic and Administration Science
Participation Entities	Faculties from other areas such as agronomy, medicine, veterinarian, engineering, etc. Private sector (CODEPROVAL, Chamber of Industry and Commerce, Hotelga), Ministry of Education, Municipality and Provincial governments, ProChile, CORFO, SERNATUR
Objectives	-To apply existing knowledge from the University to regional realities, thus promoting sustainable development of the regional economy. -To develop a training program for students to apply their knowledge to regional realities.
Possible areas of co-operation	-Industrial design to give identity to Valdivia (packaging, new products, etc.) -Data bank for natural materials with valuable effects (bio-diversity research), better and more efficient use of materials, develop new products to improve process. -Creation of new products with natural resources (niche market, niche product). -Marketing, diagnosis for better performance, technological support, etc. -Training
Content of Projects and Concrete Actions to be Taken	A. Creation of entity 1. The tasks of each participating entity are defined and agreed. 2. The head of each entity will sign the agreement for their contribution in this scheme (Rector, Mayor, Governor). 3. The Rector will select the people to create a working team within the University. 4. The working team will organize the work plan, together with other Eco-region committees, including design of the office and decision of necessary infrastructure. 5. Workshop at the University to explain the project to the head of related faculties and institutions. 6. Obtain co-operation agreements (convenios) from various universities, research institutions and education centres. 7. Familiarize all involved with existing financial mechanisms in the public sector. 8. Establish data bank infrastructure and diffuse information regarding its existence. B. Operation 1. Accept the consultation from private sector. 2. Formulate the working team through selecting necessary persons within and outside of the University.

	3. If spending is too large to be managed by the private sector itself, the team will present the project to obtain the most pertinent financial source. The team would also assist in formulating necessary documents for submission. However, basically the University will provide expertise and human resources (students), and the private company will provide necessary finance. 4. Input all data that is obtained from the university and private sector to create the data bank of possible project and new products.
Possible Sources of Financing	Regional Government (FNDR), Private sector, CORFO (FDI, FAT, FONTEC, FONDEF), ProChile (in terms of market information and its scheme to promote marketing for export), INDAP (loan scheme for small agriculturist), FOSIS (for project), Ministry of Education (Concyt), University (in terms of kind and human resources), SERNATUR (FODETUR) for the part related to the program.

(5) Create an incubator mechanism to strengthen micro and small enterprises under Eco-region concept

Location	Valdivia - Municipality level
Time of Implementation	2001-2002 (creation) 2002- (operation)
Institutions Responsible	Municipality (perhaps the new Departamento de Fomento de Producción or Department for the Foster of Production)
Participating Entity	SERCOTEC, CORFO, Private sector, (CODEPROVAL, Chamber of Industry and Commerce, Hotelga), State Bank, University (Center of Applied and Innovation Management), INDAP
Objectives	Strengthen micro producers of natural and ecological products to diversify products and multiply the number of producers. Create more employment in the region related to the tourism industrial cluster. Encourage the use of clean process during production.
Content of Projects and Concrete Actions to be Taken	A. Creation 1. Municipality selects consultant to identify micro and small enterprises according to requirement attached below. 2. Municipality or other entity provides infrastructure for incubation. 3. Create agreement with the University, or the Center for Applied and Innovative Management, to provide technical assistance and promote facilities. B. Operation 1. The consultant, with his/her experiences obtained from the field, selects the micro enterprises. 2. The consultant also obtains the "request or possible areas to be developed" list from the private sector, such as CODEPROVAL, Chamber of Industry and Commerce, Hotelga, etc., and incorporates contents into the selection process of the enterprise. 3. Once the micro enterprises (community or Profo) are selected, consultants will formulate a project and find a financial source pertinent to the level of development and needs of the enterprise. 4. The selected enterprise may utilize the facility provided by the municipality for a specific number of years (e.g. 5 years). 5. The enterprises improve its performance and products with technical assistance from the University. 6. Eventually, the products produced by the enterprises will enter the market. Marketing promotion will be assisted by ProChile as well as the consultant would find a way to establish links between these micro enterprises and larger or already established stores (especially those that express the need).
Possible Sources of Financing	Regional Government (FNDR), Private sector and CORFO (FDI, FONTEC, FAT, Profo), ProChile (export promotion fund for small producers and international market information) University (human resource and expertise in kind)

Note
-Research possibilities to apply the loan scheme to micro enterprises in a more flexible manner.

Profile and basic conditions for the consultant (example):
(1) Field experience of working with micro and small scale enterprises.
(2) Experience in private sector.
(3) Wide knowledge of financial instruments provided by public sector such as CORFO, FOSIS, INDAP, PROCHILE, etc.
(4) Good communication and negotiation skills.
(5) Wide knowledge regarding the functioning of the municipality, provincial and regional governments.
(6) Experience of living abroad or conducting business abroad.
(7) Ability of lobbying.
(8) Wide knowledge of different sectors and areas of works.
(9) Possessing sufficient academic links.

19.5.2 Sub-action Plans

The following demonstrates the various sub-action plans. The action plans for the South and Austral zone focus on establishing a functional "system" to implement the Eco-region development strategy. The sub-action plans are possible projects that may be implemented under the system established in the action plans.

It must be noted that these sub-action plans have not been fully developed together with the relevant actors in the region. Hence, such plans do not yet possess public consensus. However, they are presented here for future reference, to be utilized as pertains to potential projects that may emerge resulting from the action plans mentioned above.

(1) Sub-action plan 1: Environmental Charter Project

Location	Eco-region as a whole
Time to be Implemented	2001 – 2002 (creation of macro charter) 2002- (creation of action plan at provincial level) 2003- (creation of action plan at municipality level)
Implementation Agencies	Regional government and COREMA
Objectives:	To create a common regional environmental understanding towards Eco-region.
Content of Projects/Concrete Actions to be Taken	Create a draft charter by regional government with the collaboration of COREMA. Present and discuss among representatives from the provincial governments and municipalities. Finalise the Draft and publicise for 30 days for comments. Draft is accepted. Each provincial government and Municipalities ratify the charter Diffusion of the charter to the general public (e.g., inauguration of sign board at the entrance of the region, distribute to other organisation such as SERNATUR to incorporate in their pamphlets)
Possible Financing Agencies	Regional government (FNDR)

(2) Sub-action plan 2: Eco-regional Mark Project

Location	Valdivia Province
Time to be Implemented	2001 - 2003
Implementation Agencies	CORFO, ProChile, CONAMA
Objectives:	To create a common mark that guarantees and registers the product quality, its process and origin.
Content of Projects/Concrete Actions to be Taken	1. CORFO and ProChile select the possible product for such mark and make proposals. The criteria would represent: -Regional characteristics -Ecological aspects -Good quality -Good process (labour condition, eco-process) 2. Discuss the proposal with private sector. 3. Investigate the possible legal procedures for registration. 4. Define the special characteristics of a product. 5. Set up the guideline. 6. Create logo or mark to be used. 7. This example can be applied to other regions.
Possible Financing Agency	CORFO, FNDR(regional government)

(3) Sub-action plan 3: Tourism Complex Development at the Antonio Samoré Passage

Location	Antonio Samoré Passage
Time to be Implemented	2001 - 2003
Implementation Agencies	SERNATUR with participation of private sector, Regional government.
Objectives:	To provide infrastructure to sell a "baskets" of products typical of the zone in an associative manner, whileand promoting the city as a tourist destination.
Content of Projects/Concrete Actions to be Taken	1. Research potential eco-products. 2. Call participation of possible providers of producers and services. 3. Utilise SERNATUR's statistical information to estimate possible consumers. 4. Create entity between private-public sector. 5. Investigation of potential development site and design for complex. 6. Open complex (gift shop, restaurants, etc) at Antonio Samoré Passage. (Use this example to open similar locales in other prime tourist routes possibly along route 215 and others stops)
Possible Financing Agencies	Private sector with possible assistance from CORFO, Regional government (FONDO)

(4) Sub-action plan 4: Building awareness through education of children and youth

a. Creation of regional sub-text

Location	Eco-region as a whole
Time to be Implemented	2001 - 2003
Institutions Responsible for Implementation	Ministry of Education, Regional Government
Objectives:	To familiarize children and youth about the nature, culture and tradition of the region so that they can understand and implement the Eco-region concept.
Content of Projects	Investigate regional resources and elaborate a sub-text for school children to use in the school curriculum.
Possible Financing Body	CONAMA, CONADI, Regional Government

b. Natural site visit as school event

Location	Eco-region as a whole
Time to be Implemented	2001 - 2003
Institutions Responsible	Ministry of Education, Regional Government
Objectives:	To familiarize children and youth about nature, culture and tradition of the region so that they can understand and implement the Eco-region concept.
Content of Projects	Investigate regional resources and incorporate visiting these sites into the school curriculum.
Possible Financing Body	CONAMA, CONADI, Regional Government

c. Preferential offer of national park facilities for the use of school children

Location	Eco-region as a whole
Time to be Implemented	2001 - 2005
Institutions Responsible for Implementation	Ministry of Education, Regional Government, CONAF and Ministry of National Goods.
Objectives:	To familiarize children and youth about the nature, culture and tradition of the region so that they can understand and implement the Eco-region concept.
Content of Projects/Concrete Actions to be Taken	Introduce the establishment of facilities or open operating facilities for the use during thetourism low season of tourism as a part of condition of the concession.
Possible Financing Body	CONAMA, Regional Government, private sector through concession with Ministry of National Goods.

19.5.3 Action Plans for Case of Puerto Montt

(1) Action Plan 1: A comprehensive study on the present situation of net workshops

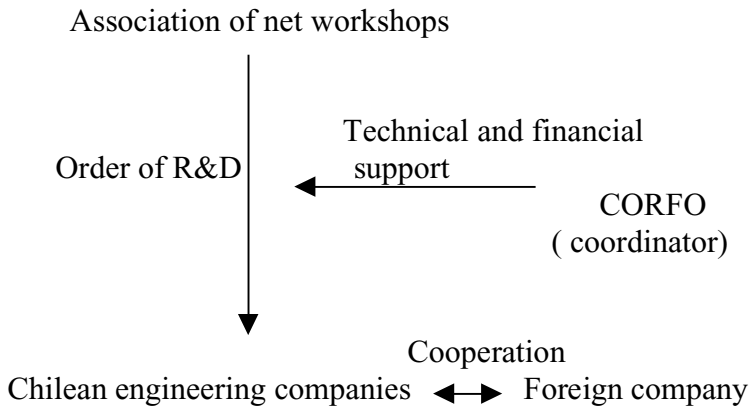
Location	Puerto Montt, Region X
Time to be implemented	2001 - 2004
Institutions responsible for the implementation	SERCOTEC in cooperation with CORFO and CONAMA
Background	1. Insufficient water treatment in net workshops is a cause of serious environmental problems in the salmon cluster. 2. Considering expensive investment cost for a water treatment facility, it is not so easy for every workshop, especially small-sized workshop, to install the facility. 3. There are two options for solving the problem . One is to install a common facility which is jointly owned and used by workshops and the other is to install a facility which is owned by the private sector but jointly used by workshops which pay a tariff. The latter is a kind of "Coin laundry" system. 4. Regardless of the type of option selected, it is necessary to decide where this facility should be installed.
Objectives	To do a linear programming for the determination of the type of a common water treatment facility needed and of the number of facilities needed, their size, and their location.
Contents of projects / Concrete actions to be taken	Study items are as follows. 1. Present situation of the net workshop operation 1) Location of each net workshop 2) Number of each net workshop's customer and handling volume 3) Location of each net workshop's customers 4) Present transportation mode and distance between each workshop and their customers 5) Number and capacity of washing machines owned by each net workshop 6) Operating rate of washing machines at each workshop by month 7) Present situation of water treatment 8) Financial status 9)Terms and conditions of receivables and payable 2. Investment cost 1) Number of plants to be built 2) Their size 3) Their location 4) Total investment cost for washing machines and water treatment plants

	3. Management company 1) Type of management company 2) Business line of the management company 3) Structure of the management company 4) Relation with the net workshops 4. Finance scheme for investment 1) Cash flow analysis 2) Payment schedule 5. Each workshop's intention on participation in an alliance scheme

(2) Action Plan 2: Acceleration of restructuring net workshop business through financial incentive

Location	Puerto Montt, Region X
Time to be implemented	2002 – 2004
Institutions responsible for the implementation	CORFO
Objectives	To give net workshops a chance to enhance their competitiveness through mergers and acquisition and strategic alliance with their competitors
Contents of projects / Concrete actions to be taken	1. Special and preferential finance is given only to net workshops which are sure to enhance their competitiveness through mergers and acquisition and strategic alliance with their competitors 2. Financial scheme in private equity finance such as LBO (Leveraged Buy-Out) 3. CORFO would be the third tier agent, while a private equity finance institution would be the second tier lender

(3) Action Plan 3: Basic research and development in the fields related to net workshop business

Location	Puerto Montt, Region X
Time to be Implemented	2001 - 2004
Institutions Responsible for Implementation	CORFO in cooperation with Fundacion Chile, universities and private sectors
Objectives	To strengthen further the salmon cluster in Chile
Contents of Projects / Concrete Actions to be Taken	Potential fields are as follows 1. A new type of antifouling paint 2. A new type of metal mesh nets 3. A new washing machine 4. A new type of water treatment facility 5. A new type of drying machine 6. A new type of transportation equipment such as special boats, special trucks and special cranes 7. A new type of waste management and treatment company 

(4) Action Plan 4: Investment promotion seminar in Japan

Location	Puerto Montt, Region X
Time to be Implemented	2002
Institutions Responsible for Implementation	CORFO in cooperation with ProChile
Objectives	To publicize the investment opportunity in salmon cluster
Contents of Projects / Concrete Actions to be Taken	1. The strength and growth potential of salmon cluster should be stressed as well as the investment opportunity for strengthening its industrial infrastructure 2. The potential areas to be addressed are the following: (1) Development and supply of pigment derived from new resources which is necessary to generate artificial color on salmon (2) Development and supply of new detective system using robots (3) Development and supply of inexpensive water treatment facility (4) Development and supply of various special transportation equipment such as special boats, special trucks and special cranes (5) Development and supply of a new type of antifouling paint (6) Development and supply of efficient washing machines and dryer for net cleaning (7) Development and supply of metal mesh nets (8) Development and supply of integrated waste treatment and management know-how (9) Development of a technique of replacing nets without making salmon feel stress

19.5.4 Proposed Time Schedule

As it is stated above, the kind of water treatment and residual waste management facility to be installed depends on the result of R&D by Fundación Chile and University of Concepción. However, if the research on the net workshop business starts after the result is obtained, the completion of the project will be four years from now. Then, it is advisable to start the research on the present situation of the net workshop business as soon as possible, and to be ready to incorporate the results of the R&D into the formulation of strategies.

Table 19.5.1 Proposed Time Table (M: months from the start)

	3M	6M	9M	12M	15M	18M	21M	24M
CONAMA's declaration on the dead line to comply with the regulation	-							
Research on the net workshop industry by SERCOTEC	------	------						
Discussion on the type of facility needed among the parties concerned	------	------	------	------				
Decision on the type of facility					--			
Restructuring the net workshop business initiated, sponsored by CORFO and SERCOTEC			------	------	------			
Investment planning for common facilities by CORFO						------		------
Preparation for the investment							------	------
Investment promotion seminar by CORFO				-				
R&D by Fundación Chile and University of Concepción	------	------	------	------	------	------	------	------

Note: ⟶ Flow of information

19.5.5 Application to Other Projects

The above-mentioned mechanism for securing SMEs' access to technology and business opportunities could be applied to the following projects. One kind of projects that could be benefited directly is related to the enhancement of SMEs' competitiveness. The acceleration of merger and acquisition through financial incentive will enhance the competitiveness of the industries concerned. The other kind of projects to be eventually benefited is related to the construction of a common infrastructure needed for SMEs. The small and medium companies involved need various types of infrastructure - hard and soft - for their business operation, but they cannot construct it all by themselves. In such a case, the concept of common discussed above will provide a solution.

20 SOLUTION-ORIENTED MANUFACTURING

20.1 Introduction

20.1.1 Purpose of the Study

Chile holds strong competitive advantage in the export of natural-resource based-products. Owing to this competitiveness, Chile has enjoyed a remarkable export expansion in the past decade. However, in order to achieve a sustainable export growth in the next decade, it is necessary for Chile to diversify its exports.

There are three strategic options for the diversification of Chilean exports. The first option is to expand more value-added natural-resource-based products. Chile has been successful in this type of diversification, even though there is still room for enhancing added value. The second option is to expand service exports such as tourism and educational services. Service exports have begun to attract people's attention, especially in the tourism sector. The third option is to expand the export of solution-oriented type of manufacturing products defined in Section 20.1.2.

The recent drive in the export of machinery and chemical products in Chile reveals that it is possible to expand the export of solution-oriented manufacturing products so long as suitable strategies are followed. The purposes of this study are to find out the keys to export promotion in this sector and to formulate strategies, including those to expand investments and to realize the keys.

20.1.2 Definition

Solution-oriented manufacturing products are defined as products that are specifically designed and produced to solve customers' problems and whose competitiveness is attributed to a technological and/or engineering factor rather than a natural resource factor. According to the standard industrial classification, machinery is categorized as such products. Machinery for processing natural resources, such as fishmeal-processing machines, is included, though some part of the competitiveness is based on natural resources. Chemical products should also be included unless their competitiveness is principally based on the availability of the raw materials necessary for their production. However, it should be noted that this definition is only a matter of convenience. While special attention is paid to "manufacturing products" in this study, engineering services are also included as long as they are related to manufacturing activity.

20.1.3 Analytical Method

(1) Statistical Analysis

First, statistical analysis was conducted on the recent export performance of solution-oriented manufacturing, by focusing on "machinery and equipment" (SITC 7) (hereinafter called machinery) and "chemicals" (SITC 5). Data was obtained from the Economic Commission for Latin America and the Caribbean (ECLAC).

(2) Company Survey

Secondly, an extensive company survey was conducted by interviewing executives of

successful companies in the export of solution-oriented manufacturing products. About fifty companies were visited. The main purpose of the visit was to understand the current performance of their export, their keys to success, and critical sources of their competitive advantage. The sources cover not only the product and manufacturing concepts of their exported products but also their corporate philosophy, business concept, and business strategy.

Major interview items are as follows.

- Outline of the company: dates of establishment, business lines, company sizes
- Export performance: Products, destinations, and percentages of the total sales
- Core elements of "solution-oriented" manufacturing products
- Critical sources of competitive advantage
- Corporate philosophy
- Business concept and business strategy
- Product and manufacturing concepts
- Managerial conditions necessary to survive in Chile
- Training of managers
- Use of information technology

(3) Generalization of the Sources of Competitive Advantage

Thirdly, the sources of competitive advantage of the successful companies were generalized for the formulation of export promotion strategies. Critical sources of competitive advantage may be different from company to company. However, these companies may share common characteristics, especially in the areas of their business style, business strategy, their product and manufacturing concepts, and core elements of "solution-oriented" products. The objective of the generalization is not to find "which industry" can hold competitiveness but rather to learn "how successful companies have been exporting".

The following are some examples of the sources of competitive advantage.

1) Strategic location
   - Establish a supply base for the South Coast and central areas of South America.
2) Product concept strategy
   - Become an exporter as a "problem solver".
   - Establish a product image of high quality with a reasonable price to compete with cheaper products imported from developing countries.
   - Target a niche market rather than a mass market, e.g., Build to Order (BTO).
3) Manufacturing concept strategy
   - Take full advantage of trade liberalization.
   - Utilize information technology for "one to one marketing", flexible product development, supply chain management, and reduction of transaction costs.

20.2 Companies and Associations Visited

Table 20.2.1 is a list of the companies visited for the survey. The list includes three companies visited during the Phase I Study. The companies were selected through the following procedure. One of Chile's prominent consulting firms in Santiago, Corporacion De Desarrollo Technologico De Bienes De Capital (CBC), listed around

100 companies that are successful in the export of solution-oriented manufacturing products in cooperation with ProChile, ASEXMA, and ASIMET. CBC arranged the meetings with companies that had agreed to be interviewed by the JICA Study Team.

Table 20.2.1 Companies Visited

No.	Name of Company	Line of Business	Location
1	ASMAR	Shipbuilding and repairing	Concepción
2	Argos	Plastic products and goods for parties	Santiago
3	Armat	Metal base for coins	Valparaíso
4	Bellavista Oveja	Textile	Concepción
5	CESMEC	Quality certificate services	Santiago
6	CIMM	Services for mining	Santiago
7	COCESA	Cable wires	Santiago
8	CTI	Home electrical appliances	Santiago
9	Comercial e Industrial ISESA	Abrasives	Santiago
10	Dos en Uno	Confectionery	Santiago
11	Drillco Tools	Machine tools	Santiago
12	Ducasse Industrial	Drawer slide and ball bearings	Santiago
13	EDYCE	Metal structures	Concepción
14	ENAER	Air craft, its parts and maintenance service	Santiago
15	Editorial Trineo	Graphic industry	Santiago
16	Elecmetal	Equipment for mining	Santiago
17	Envases Flexibles	Plastic packaging	Santiago
18	Esmital	Metal structures for fish meal	Concepción
19	Etiquetas Toprint	Package printing	Santiago
20	Fosko	Plastic package	Santiago
21	Genera	Control system products	Santiago
22	Harting Aromas	Raw materials for flavor	Santiago
23	ILKO	Kitchen utensils	Santiago
24	Indec	Engineering services	Santiago
25	Indugas	Instant water heaters	Santiago
26	Indura	Welding electric rod and gases	Santiago
27	Industrias Ambrosoli	Candies and chocolates	Valparaíso
28	Laboratorio Chile	Medications	Santiago
29	Linktronic	High-tech products	Santiago
30	MADECO	Cable wires	Santiago
31	Maestranza Arica	Metal structure for mining	Arica
32	Maestranza Fernandez	Metal structure for mining industry	Arica
33	Moly-Cop Chile	Grinding balls	Concepción
34	NIBSA	Water and gas system networks	Santiago
35	Occidental Chemical-Chile	Inorganic chemical products	Santiago
36	Oppici S.A	Medical and kitchen equipment	Santiago
37	Petroquim	Petrochemical	Concepción
38	Primex	Nautical business	Santiago
39	Rhona	Electrical equipment	Valparaíso
40	SIGU	Repairing service and metal fabrication	Concepción
41	SOMELA	Electrical household appliances	Santiago
42	SOPRODI	Trading for commodities	Arica
43	Salo	Character album	Santiago
44	Schaffner	Electric appliances for industry	Santiago
45	Sindelen	Electric home appliances	Santiago
46	Sociedad Minera Macarena	Electrical-chemical products	Arica
47	Socometal	Metal structures	Santiago
48	Sonda	Information technology, software	Santiago
49	Transformadores Tusan	Electrical equipment	Santiago
50	Typack	Plastic packages	Santiago
51	Vidrios Lirquén	Glass	Concepción
52	Vitroquímica	Inorganic chemical products	Santiago

Table 20.2.2 is a summary of the profile of the companies visited. The profile covers type of industry, location, size (the number of employees), and export activity. The "others" in the industrial type includes various industries ranging from packaging and food processing to software industries. "Multinational" in the business type means a

company that has its head office outside of Chile and develops its business all over the world. With respect to export markets, "World including Asia" means a company that exports its products all over the world including Asian countries. In terms of the number of employees, around half of them are categorized as SMEs.

It should be noted that the companies categorized into those with competitiveness in the world market including Asia do not always export to the Asian market. This is because they are currently focusing on nearer export markets such as South America and North America and the Asian market is not given high priority in their export activities. The assessment of competitiveness is more or less subjective because it was done only by interviews with the executives and factory visits. An objective analysis on cost structure was not done since it was difficult to obtain necessary data.

Table 20.2.2 Profile of Companies Visited

(1) Industrial Type and Location

	Santiago	Concepción	Valparaíso	Arica	Total
Chemical	3	2	0	0	5
Machinery	23	5	1	2	31
Others	11	1	2	2	16
Total	37	8	3	4	52

Note: Concepción includes Talcahuano and Tomé and Valparaíso includes Viña del Mar.

(2) Size

Number of employees	Number of companies
- 49	6
50 - 99	7
100 - 199	14
200 - 299	9
300 - 399	2
400 - 499	0
500 -	14
Total	52

(3) Business Type

Type of company	Number of companies
Multinationals	4
Alliance with multinationals	12
Others	36
Total	52

(4) Export Ratio

Export ratio (%)	Number
- 9	9
10 - 19	7
20 - 29	12
30 - 39	6
40 -	16
Unknown (difficult to count)	2
Total	52

(5) Export Market

Export market	Number
World including Asia	7
USA and EU	14
South America	31
Total	52

(6) Competitiveness

Competitiveness	Number
World including Asia	12
USA and EU	8
South America	25
Difficult to judge	7
Total	52

Note: Percentage of total sales.

Source: Information gathered through interviews by the JICA Study Team.

In addition to the companies shown in Table 20.2.1, the following organizations were visited in order to supplement the information obtained by the company survey and to improve the quality of the information.

1) Pontificia Universidad Católica de Chile
2) Universidad de Concepción
3) Asociación de Industrias Metalúrgicas y Metalmecánicas, A.G. (ASIMET)
4) Asociación de Exportadores de Manufacturas Chile, A.G. (ASEXMA)
5) Asociacion Gremial de Industrialed de la Quinta Region (ASIVA)

20.3 Recent Performance of Export of Machinery and Chemical Products

In the following statistical analysis, only products whose exports exceeded US$100,000 in 1998 were selected.

20.3.1 Machinery

By product category, the exports of general industrial machinery (Code No. 74) and machinery specialized for particular industries (Code No. 72) recorded the biggest expansion for the period of 1990-1998, i.e., increased 19 and 18 times, respectively (Table 20.3.1). Their export value also reached a substantial level. The product category whose exports are the largest is road vehicles (Code No. 78), whose exports amounted to US$180.5 million in 1998, having grown ten times since 1990. It should be noted that machinery production was stagnant in 1998 (Table 20.3.2) but its exports expanded significantly. This may show that the machinery industry is becoming export-oriented. Another feature is that machinery exports can be seen across product categories and there is no concentration on specific groups. This may indicate that Chile's machinery exports are not directed to a mass market but to a niche market.

The total exports of the top ten machinery products were US$268.5 million in 1998, while they were only US$19.0 million in 1990. However, products with high growth potential in the world market, such as electronics, are not seen in the top-ten list.

Table 20.3.1 Exports of Machinery by Product Category (US$ millions)

Code No. 71: Power-generating machinery and equipment

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
71392	Parts for the internal combustion, piston, engine	0.4	2.2	0.7	1.5	1.5	1.5	2.0	2.2	2.6
71323	Compression-ignition engine	0.4	0.2	0.2	0.1	0.5	0.4	0.5	0.6	1.4
71111	Steam or other vapor-generating boilers	--	--	--	0.3	1.4	0.3	0.9	1.2	1.3
71631	AC motors	--	0.1	--	0.1	0.2	0.3	0.3	0.8	1.1
	Above total	0.8	2.5	0.9	2.0	3.6	2.5	3.7	4.8	6.4

Code No. 72: Machinery specialized for particular industries

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
72839	Parts of the industry	0.7	0.9	1.6	1.2	2.6	2.1	2.6	6.4	9.4
72399	Other parts of the machinery	0.1	0.3	0.6	0.3	0.5	0.3	1.0	1.1	5.1
72393	Parts for boring or sinking machinery	0.4	0.4	0.5	8.9	1.3	1.2	40.4	38.0	3.9
72849	Machinery having individual functions	0.2	1.6	0.3	0.9	1.0	1.2	1.3	3.2	3.9
72831	Machinery for sorting, screening	--	--	--	--	0.2	0.3	1.7	0.7	2.6
72337	Other boring or sinking machinery	0.1	0.7	0.9	0.5	0.4	1.2	0.2	0.4	1.9
72322	Mechanical shovels, excavators	--	--	--	--	0.1	--	--	--	1.8
72722	Machinery for the food processing	0.4	0.3	1.7	1.9	1.7	2.1	4.1	2.3	1.7
72812	Machine tools	--	--	0.3	0.1	0.7	0.3	1.0	0.7	1.4
72321	Front-end shovel-loaders	0.1	--	0.9	0.7	0.5	1.9	0.9	1.7	1.3
72451	Weaving machines	--	--	--	0.2	0.1	--	--	0.5	1.2
72311	Bulldozers and angledozers	--	0.1	0.1	0.2	0.2	2.5	0.1	0.1	1.2
	Above total	2.0	4.3	6.9	14.9	9.3	13.1	53.3	55.1	35.4

Code No. 74: General industrial machinery, equipment, and parts

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
74439	Derricks for ships, etc other machinery	--	--	0.3	--	0.1	0.1	--	--	12.3
7478	Taps, cocks, valves and similar appliances	1.6	2.1	2.9	3.1	5.9	7.7	6.7	8.2	10.4
74143	Refrigerating or freezing chest	--	0.1	0.2	1.6	4.0	5.7	5.6	10.8	9.7
74181	Instantaneous gas water-heaters	0.1	0.3	0.5	0.5	1.4	1.6	3.3	3.6	5.3
74474	Other continuous-action elevators and conveyers	0.1	--	0.2	0.3	--	0.4	0.3	4.0	4.3
74527	Other packing or wrapping machinery	0.2	0.3	0.9	1.0	0.8	1.3	8.3	3.0	2.7

74189	Other machinery, plant, equipment	0.3	6.3	4.9	2.0	3.9	7.6	5.5	4.7	2.3
74437	Other machinery ,self-propelled	--	1.2	0.4	--	0.2	0.5	0.3	2.0	2.3
74434	Tower cranes	--	--	--	--	--	--	--	--	1.7
74145	Other refrigerating	--	0.1	0.2	0.5	1.2	12.5	2.1	2.8	1.4
74149	Parts of refrigerators, freezers	--	0.1	--	0.4	0.3	0.3	0.7	1.0	1.3
74291	Parts of pumps	0.4	0.3	0.2	0.4	0.4	0.5	0.7	1.0	1.3
74564	Agricultural or horticultural appliances	--	--	--	0.2	0.2	--	0.1	0.5	1.1
74918	Injection types of moulds	0.4	0.4	0.4	0.3	0.3	0.6	0.8	1.2	1.1
74186	Dryers, nes.	--	1.4	2.1	0.8	3.1	4.2	0.4	1.1	1.0
	Above total	3.1	12.6	13.2	11.1	21.8	43.0	34.8	43.9	58.3

Code No. 75: Office machines and automatic data-processing machines

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
7526	Input-output units for automatic data-processing machines	--	--	0.3	0.4	0.4	0.8	1.4	2.6	3.2
75997	Storage units	0.5	0.4	1.2	1.3	1.2	1.8	2.8	2.6	2.9
7522	Digital automatic data-processing machines	0.1	0.1	0.4	0.1	0.3	2.4	1.2	1.4	1.9
7527	Data-processing equipment, nes	0.3	0.7	0.9	0.5	0.5	0.8	0.7	1.2	1.4
7529	Parts and accessories	--	0.1	0.4	0.3	0.3	0.4	0.8	0.9	1.1
	Above total	0.9	1.3	3.2	2.6	2.7	6.2	6.9	8.7	10.5

Code No. 76: Telecommunication equipment

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
76431	Transmission apparatus	0.1	--	0.2	0.3	0.3	1.2	1.0	1.2	1.4

Code No. 77: Electrical machinery, apparatus and appliances

Code No.	Description of commodities	1990	1991	1992	1993	1994	1995	1996	1997	1998
77521	Refrigerators(household-type)	--	0.3	0.5	2.3	4.1	5.4	8.0	9.0	9.7
77281	Boards, panels, consoles, desks	--	--	--	--	--	--	--	2.3	8.1
77571	Vacuum cleaners and floor-polishers	1.2	0.6	1.0	0.9	6.1	5.8	7.1	8.1	7.9
77821	Filament lamps	2.5	2.2	1.9	4.0	5.3	5.1	5.1	7.0	7.2
77822	Discharge lamps	2.3	2.2	2.0	2.7	3.7	4.2	5.2	5.0	6.2
77315	Other electric conductors	0.4	--	1.5	1.0	1.0	0.6	0.7	2.0	3.7
77323	Electrical insulators of ceramics	0.2	0.4	0.8	0.7	0.8	1.7	1.4	2.3	3.2
77522	Deep-freezers	--	0.2	0.3	--	--	0.1	0.4	1.1	2.2
77259	Other electrical apparatus	0.1	0.2	0.2	0.4	0.9	0.6	0.9	1.4	1.4
	Above total	6.7	6.1	8.2	12.0	21.9	23.5	28.8	38.2	48.6

Code No. 78: Road vehicles

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
78219	Motor vehicles for the transport of goods	0.5	12.0	8.1	27.3	46.5	55.1	53.9	105.8	98.5
78434	Gearboxes	15.0	22.3	36.9	43.8	50.3	27.3	31.8	39.7	47.3
7812	Motor vehicles for the transport of passengers	1.5	4.9	24.6	45.6	29.2	15.9	7.1	18.5	13.4
78229	Special-purpose motor vehicles	--	--	0.1	0.2	--	0.7	0.4	--	7.6
78439	Other parts and accessories	0.2	0.7	1.5	1.4	3.5	3.0	2.6	4.2	7.4
7852	Bicycles and other cycles	0.4	0.9	3.3	5.5	4.9	4.6	3.8	6.5	3.4
78432	Other parts and accessories of bodies	--	--	0.2	0.2	0.4	0.7	0.4	0.3	1.7
78629	Other trailers and semi-trailers	--	0.2	0.5	0.8	2.0	1.4	0.3	1.0	1.2
	Above total	17.6	41.0	75.2	124.8	136.2	108.7	100.3	176.0	180.5

Code No. 79: Other transport equipment

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
79324	Fishing vessels	0.1	4.2	5.1	5.7	20.0	3.9	6.6	7.8	32.6
79295	Other parts of airplanes or helicopters	0.3	1.2	0.8	1.4	0.9	1.0	2.3	7.2	18.5
79322	Tankers of all kinds	--	--	--	--	--	--	17.9	--	16.1
79327	Other vessels for transport of goods	15.1	3.4	8.7	12.2	19.1	21.8	12.8	1.3	7.8
7923	Airplanes and other aircraft exceeding2000-15000kg	0.6	0.2	1.5	1.1	1.1	--	5.9	1.7	6.7
7922	Ditto –unloading weight not exceeding 2000 kg	--	--	2.1	2.1	--	0.4	0.1	0.3	2.3
79182	Railway or tramway goods van and wagons	--	0.1	--	--	--	--	--	--	1.0
	Above total	16.1	9.1	18.2	22.5	41.1	27.1	45.6	18.3	85.0

Top 10 (as of 1998)

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
78219	Motor vehicles for the transport of goods	0.5	12.0	8.1	27.3	46.5	55.1	53.9	105.8	98.5
78434	Gearboxes	15.0	22.3	36.9	43.8	50.3	27.3	31.8	39.7	47.3
79324	Fishing vessels	0.1	4.2	5.1	5.7	20.9	3.9	6.6	7.8	32.6

79295	Other parts of airplanes or helicopters	0.3	1.2	0.8	1.4	0.9	1.0	2.3	7.2	18.5
79322	Tankers of all kinds	--	--	--	--	--	--	17.9	--	16.1
7812	Motor vehicles for the transport of persons	1.5	4.9	24.6	45.6	29.2	15.9	7.1	18.5	13.4
74439	Derricks for ships	--	--	0.3	--	0.1	0.1	--	--	12.3
7478	Taps, cocks, valves and similar appliances	1.6	2.1	2.9	3.1	5,9	7.7	6.7	8.2	10.4
77521	Refrigerators(household-type)	--	0.3	0.5	2.3	4.1	5.4	8.0	9.0	9.7
74143	Refrigerating or freezing chests, cabinets	--	0.1	0,2	1.6	4.0	5.7	5.6	10.8	9.7
	Above total	19.0	47.1	79.4	130.8	161.9	122.1	139.7	207.0	268.5

Note: -- Less than US$100,000

Source: ECLAC (Economic Commission for Latin America and the Caribbean), BALDACEL (Base de datos de comercio exterior latinoamericano), División de Estadísticas y Proyecciones Económicas, 1998.

Table 20.3.2 Production Index of Machinery Products (1997=100)

Code No.	Description	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
37	Basic metal materials	73.2	72.3	84.8	86.8	83.7	95.1	101.4	100.0	93.2	90.2
38	Machinery & equipment	59.5	61.0	74.1	83.0	83.8	85.3	88.3	100.0	92.9	84.4
37 & 38	Above total	63.0	63.8	76.8	84.0	83.8	87.8	91.6	100.0	93.0	85.9

Source: ASIMET (Asociación de Industrias Metalúrgicas y Metalmecánicas, A.G.)

20.3.2 Chemical Products

According to product category, the exports of plastics in non-primary forms (Code No. 58) showed the biggest increase, twenty-three times, over the period of 1990-1998, even though the export value was still at US$22.6 million in 1998 (Table 20.3.3). The exports of inorganic chemicals (Code No. 52) expanded steadily from US$145.7 million in 1990 to US$365.6 million in 1998. The exports of products that ranked among the top ten have also expanded steadily from US$223.7 million in 1990 to US$542.7 million in 1998. Two characteristics can be found from Table 20.3.3. One is that the exports of inorganic products are larger than those of organic products. The other is that commodity type products still have a large share of the total exports of chemical products, even though the exports of non-commodity type products, such as medical and pharmaceutical products, have shown a remarkable increase.

Table 20.3.3 Exports of Chemicals by Product Category (US$ millions)

Code No. 51: Organic chemicals

Code No	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
51211	Methanol	61.1	69.1	48.7	53.8	179.0	134.8	92.1	213.8	131.6
51223	Pentaertythritol	10.0	10.8	10.2	8.8	9.4	15.9	13.6	12.0	9.6
51391	Tatic acid,tartaccic acid etc	1.8	2.0	1.6	2.6	2.3	6.8	7.6	5.5	8.8
51119	Acyclic hydrocarbon	--	--	--	--	--	--	0.9	2.7	3.1
51542	Thiocarbonate and dithiocarbonate	0.6	0.7	0.8	0.7	0.8	1.3	2.0	2.5	1.5
51639	Esters of other inorganic acid	0.5	0.6	0.5	0.8	0.3	0.9	0.8	1.4	1.4
51374	Formic acid	1.3	1.4	1.4	1.5	1.3	1.6	1.6	1.4	1.4
51451	Acyclic monoamines	0.2	0.5	1.4	1.5	0.6	2.0	2.2	1.4	1.3
	Above total	76.3	85.1	64.6	69.7	193.7	163.3	120.8	240.7	158.7

Code No. 52: Inorganic chemicals

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
52225	Oxide of zinc, chromium, etc	60.0	52.8	50.2	35.8	37.9	60.7	88.7	135.1	174.8
52352	Potassium nitrate	28.6	32.7	37.2	40.1	44.7	52.3	54.8	65.1	66.8
52379	Other carbonates	22.6	24.2	30.0	30.0	31.6	38.0	39.1	40.4	39.3
52269	Other inorganic bases	6.1	6.6	6.3	6.8	9.4	28.2	21.8	23.0	28.0
52235	Oxides of boron, boric acids	12.6	10.8	13.2	10.6	12.1	13.3	14.1	13.1	15.8
52329	Other chloride, chloride oxides	3.5	5.3	6.5	7.0	9.2	11.8	12.1	13.4	13.6
52431	Salts of oxometallic	6.1	2.3	1.8	0.1	3.2	5.0	8.3	7.9	9.0
52339	Other chlorate	0.9	0.9	1.1	1.1	1.4	1.7	2.3	2.6	5.7

52345	Sodium sulfates	1.8	0.9	0.7	1.3	1.4	1.9	1.5	3.1	4.9
52239	Other inorganic oxygen compounds	2.0	2.6	2.3	2.4	1.5	1.0	2.9	3.3	3.7
52349	Other sulfates	0.9	1.1	1.3	1.4	1.6	1.0	1.5	1.6	1.5
52492	Phosphates	0.6	0.9	1.1	1.2	0.7	1.2	1.0	0.9	1.4
52232	Sulfuric acid	--	--	0.5	0.4	3.0	1.9	0.7	1.6	1.1
	Above total	145.7	140.2	152.2	136.8	157.7	218.0	248.8	311.1	365.6

Code No. 53: Dyeing, tanning and coloring materials

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
53351	Prepared pigments	0.4	0.6	1.5	1.8	1.3	1.3	2.8	2.9	2.1
53329	Other	--	0.1	0.2	0.2	0.7	1.6	1.6	1.9	1.6
53222	Coloring matter	--	--	1.4	5.1	5.9	1.7	1.0	1.6	1.5
53342	Paints and varnishes	0.6	0.8	0.8	0.6	0.7	1.2	1.2	1.8	1.2
	Above total	1.0	1.5	3.9	7.7	8.6	5.8	6.6	8.2	6.4

Code No. 54: Medicinal and pharmaceutical products

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
54293	Medicaments, nes	7.2	10.6	9.4	11.1	12.6	14.5	15.5	17.8	20.9
54219	Medicaments containing other antibiometos	0.7	1.4	1.5	2.4	2.2	2.9	2.9	2.8	4.1
54213	Medicaments containing penicillin	0.4	0.7	0.5	0.9	0.9	1.2	1.8	2.6	2.0
54232	Medicaments containing alkaloids	--	0.2	0.2	0.4	0.7	0.5	0.5	0.9	1.5
54292	Medicaments containing vitamins	0.9	0.9	0.9	1.0	0.6	0.8	0.7	0.8	1.4
54229	Medicaments containing hormones	--	--	0.2	0.2	0.4	0.6	0.4	0.7	1.3
54224	Medicaments containing adrenal cortical hormones	0.1	0.2	0.2	0.2	0.4	0.6	0.7	1.1	1.2
	Above total	9.3	14.0	12.9	16.2	17.8	21.1	22.5	26.7	32.4

Code No. 55: Essential oils and perfumes products

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
5532	Beauty or make-up preparations for the care of skin	1.4	3.0	4.6	6.8	6.6	6.2	8.1	8.9	10.2
5533	Preparations for use on the hair	1.3	5.5	8.3	7.9	8.0	7.8	8.3	7.7	8.7
55352	Personal deodorants	0.4	1.4	3.4	5.0	3.2	2.4	4.7	4.5	5.1
5534	Preparations for oral dental hygiene	0.6	1.1	1.5	4.0	6.8	5.4	2.3	4.4	4.3
55422	Surface-actor washing or cleaning preparation	0.3	0.6	1.2	1.5	1.4	1.1	0.8	3.9	1.8
55141	Mixtures of odoriferous substances	0.6	0.2	0.3	0.4	0.8	1.2	1.1	1.4	1.7
5531	Perfumes and toilet waters	0.6	1.1	1.4	2.6	2.1	1.9	1.9	1.3	1.5
	Above total	5.2	12.9	20.7	28.2	28.9	26.0	27.2	32.1	33.3

Code No. 56: Fertilizers

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
56299	Other	20.7	21.3	23.2	23.7	34.0	27.9	30.8	33.1	39.8
56231	Potassium chloride	--	--	--	--	--	--	0.9	6.5	11.4
56232	Potassium sulfate	--	--	--	--	--	--	--	--	5.6
56291	Fertilizers,nes	--	--	0.1	0.2	0.2	1.2	2.1	3.9	2.5
56219	Other nitrogenous fertilizer	--	--	--	--		0.3	0.6	0.8	1.4
	Above total	20.7	21.3	23.3	23.9	34.2	29.4	34.4	44.3	60.9

Code No. 57: Plastics in primary forms

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
57111	Polyethylene	6.6	8.3	3.4	2.8	0.4	5.3	6.4	6.2	11.8
57594	Alginic acid	1.1	1.7	2.0	2.1	2.8	2.9	3.8	3.7	3.9
57211	Polystyrene	0.1	--	--	--	--	--	--	0.7	1.5
57541	Urea resins	1.0	1.3	1.6	1.6	1.6	1.7	1.8	1.4	1.2
	Above total	8.8	11.3	7.0	6.5	4.8	9.9	12.8	12.0	18.4

Code No. 58: Plastics in non-primary forms

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
58222	Propylene polymer	0.1	0.1	0.5	1.1	0.9	1.6	1.5	1.9	8.8
58221	Ethylene polymer	--	0.4	0.2	0.4	0.6	2.0	3.1	3.8	5.1
58299	Other plates, sheets	--	--	0.3	0.8	2.3	2.8	1.4	3.3	3.5
5812	Tubes, pipes and hoses rigid	0.4	0.5	2.8	1.2	1.3	1.0	1.6	1.7	1.8
5817	Fittings for tubes, pipes and hoses	0.5	0.4	0.6	0.8	1.3	1.7	1.6	2.2	1.7
58211	Plates, sheets in rolls	--	0.1	0.1	0.2	0.5	1.5	2.0	1.5	1.7
	Above total	1.0	1.5	4.5	4.5	6.9	10.6	11.2	14.4	22.6

Code No. 59: Chemical materials and products

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	997	1998
5932	Safely fuses	1.3	2.3	1.6	2.2	2.9	5.4	7.2	8.5	12.1
5912	Fungicides	1.0	1.8	2.7	3.4	3.1	3.6	4.7	5.1	6.6
59229	Prepared glues	0.2	0.7	1.1	1.1	1.4	1.9	2.5	2.8	3.2
59312	Prepared explosives	0.8	0.9	0.8	3.4	1.3	3.2	2.8	2.6	3.2

59899	Others	0.1	0.4	0.8	1.1	1.8	2.4	2.8	3.5	3.0
5911	Insecticides	1.4	1.7	2.0	2.0	2.3	2.7	3.2	3.8	3.0
5913	Weed-killers	0.1	0.2	0.2	0.2	0.3	0.8	2.1	2.8	2.5
59225	Peptones and their derivatives	--	--	--	--	--	--	0.4	1.0	1.2
59865	Activated natural mineral products	0.2	0.3	0.3	0.2	0.6	0.7	0.6	1.0	1.0
	Above total	5.1	8.3	9.5	13.6	13.7	18.0	26.3	31.1	35.8

Top 10 (As of 1998)

Code No.	Description of commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998
52225	Oxides of zinc, chromium	60.0	52.8	50.2	35.8	37.9	60.7	88.7	135.1	174.8
51211	Methanol	61.1	69.1	48.7	53.8	179.0	134.8	92.1	213.8	131.6
52352	Potassium nitrate	28.6	32.7	37.2	40.1	44.7	52.7	54.8	65.1	66.8
56299	Other fertilizer	20.7	21.3	23.2	23.7	34.0	27.9	30.8	33.1	39.8
52379	Other carbonates	22.6	24.2	30.0	30.8	31.6	38.0	39.1	40.4	39.3
52269	Other inorganic bases	6.1	6.6	6.3	6.8	9.4	28.2	21.8	23.0	28.0
54293	Medicaments, nes	7.2	10.6	9.4	11.1	12.6	14.5	15.5	17.8	20.9
52235	Oxides of boron, boric acid	12.6	10.8	13.2	10.6	12.1	13.3	14.1	13.1	15.8
52329	Other chloride	3.5	5.3	6.5	7.0	9.2	11.8	12.1	13.4	13.6
5932	Safely fuses	1.3	2.3	1.6	2.2	2.9	5.4	7.2	8.5	12.1
	Above total	223.7	235.7	226.3	221.9	373.4	387.3	376.2	563.3	542.7

Note: -- Less than US$100,100

Source: ECLAC (Economic Commission for Latin America and the Caribbean), BALDACEL (Base de datos de comercio exterior latinoamericano), División de Estadísticas y Proyecciones Económicas, 1998.

20.3.3 Concentration of Export

The data obtained from ASEXMA show that there is a high concentration of exports in companies that rank among the top ten in terms of export value (Table 20.3.4).

Table 20.3.4 Concentration of Exports

	Number of exporters	Share of top 10 exporters (%)	Share of top 20 exporters (%)
Machinery and equipment	1,184	41.9	56.9
Transport material	316	93.0	96.3
Metal manufacturing products	602	71.0	80.6
Chemical products	350	65.8	78.1
Rubber and plastic products	686	72.3	81.5
Above total	3,138	46.2	55.6

Source: ASEXMA, Statistics database, January 12, 2001.

20.4 Sources of Competitive Advantage of Surveyed Companies

The company survey revealed that critical sources of competitive advantage differ from company to company. This section presents a summary of their competitive advantage but not everything the companies explained to the JICA Study Team. Responsibility for this summary is solely with the study team.

Oppici, a manufacturer of medical and kitchen equipment, exports its products to Argentina, Paraguay, Bolivia, Peru, Panama, Ecuador, and Honduras. They believe that the sources of their competitive advantage are training services for customer employees and engineering capability. Good quality and lower prices are also important factors for competition. They focus on medium-sized products, leaving large-sized products to their Italian competitors and small-sized products to Korean competitors. The company also enjoys a low import tariff, which is important considering that most of their raw materials, basically stainless steel, are imported.

A supplier of software (Sonda) stresses that the source of their competitive advantage lies in its creative capability of doing business. Imagination is all. Since Chile was

an initiator in the privatization of pension funds, the company took the lead in the business of special software for the administration of pension fund systems in South America. The present advantage lies in their good decision making. They also pointed out that the company's service to the customers is a key factor for its growth. In addition, Sonda has established its sales and service networks in a large part of South America. Their business is a technology-intensive industry and, therefore, they recruit many software professionals from Chilean universities such as Pontificia Universidad Católica de Chile, Universidad de Chile, and Universidad Adolfo Ibañez in Valparaíso.

Ducasse, manufacturer of drawer slides and ball bearings, believes that their source of competitive advantage is its sales network in South America. While the company competes with Chinese suppliers in quality and price, their advantage is that they are closer to their customers. They consider themselves flexible in supply, which is another stronghold. Since the product itself is not special, other suppliers are able to manufacture the product with similar quality and cost. Therefore, the key is mainly their sales network. Direct and personal contact through their sales network makes it possible for the company to provide solutions to fit their customers needs with the best service, product variety, distribution and delivery on the market.

ISESA, a manufacturer of abrasives, re-exports products imported from Switzerland and other European countries. The company is a merchandiser as far as their export activity is concerned, but it is also a manufacturer as it converts imported products into what are needed and accepted by the neighboring countries. The sources of competitive advantage are brand names of imported products and their adaptability to local needs. However, they have recently experienced difficulty in export expansion because there are local suppliers in Peru, Argentina and Mexico. They feel it necessary to form alliances with the local suppliers as it is rather difficult to differentiate their products in the market.

Genera, a control system equipment designer and manufacturer, holds several critical sources of competitive advantage. One is its control system technology that has been developed by the company itself. They compete with IBM in some areas and they are proud of having their own technology. Customers regard the quality of their products as better than IBM's. Customers also appreciate their service. Genera tests its products as one of the services, which is part of the company's solution-oriented policy and constitutes another source of competitiveness. Therefore, what they supply is not only a product but also a solution.

Another important key factor is that reliable suppliers support Genera. The company imports various parts and assembles them, but it is not a mere assembler. Since they have the capability to evaluate the quality of the parts, they have designed a basic modem board and assembled it by using imported parts from the best suppliers available on the world market. They pay attention to all the items in the production chain. Sometimes their products are more expensive than those of their competitors, but the cost for customers is effectively lower since their product life is longer. Their corporate philosophy is "quality" and "to make customers happy". Even though larger companies such as IBM provide similar products, Genera's customers feel satisfied with the control system related products in which the company specializes.

Typack is a successful company in exporting non-natural-resource-based manufacturing products, packaging materials for fruits. There are four main sources of their competitive advantage. First, they hold competitiveness in quality, price and cost. Cost competitiveness is due to low costs for raw materials, labor and energy. The lower raw material cost is brought about by Chile's free trade policy, while the lower energy cost is due to hydropower generation. Second, they follow a sharp export strategy and only pay attention to a niche market. For example, their market of the United States is rather small but specialized. Third, they focus their investment on a narrow but rather safe area, which makes it possible for the company to maintain quality and reduce cost. Since only professional managers can formulate such a strategy, their management seems to be competent. Their corporate philosophy is to become a world leader in plastic packages. Fourth and finally, they are located close to their customers, fruit exporters in Chile. They are indirectly exporting their products.

The case of Transformadores Tusan, a transformer manufacturer, demonstrates the importance of strategic differentiation. The company faces difficulty in export expansion due to the appreciation of the Chilean peso vis-à-vis with other currencies in South America over the past years. Their products are not so easy to differentiate and, therefore, the manufacturer is vulnerable to price competition. Brazilian producers are competitive because of the depreciation of the Brazilian real and the large size of their domestic market. The company stresses that they can compete with Brazilian companies if it specializes in more technology-intensive products.

ENAER (Empresa Nacional de Aeronáutica) manufactures aircraft for military use and parts for military and civil aircraft. The company also provides maintenance services for military and civil aircraft. It exports both aircraft and parts, as well as maintenance services to Argentina, Brazil, the United States, Canada, France and Israel. The critical sources of their competitive advantage are guaranteed quality based on high technology, low labor cost and speedy delivery. Due to the high quality, the company has established a reputation among its customers. The aeronautic industry exists only in Chile and Brazil in South America. ENAER follows a "just-in-time" system in order to reduce inventory cost. This state-owned company is a typical solution-oriented business. They pay attention to every customer in order to solve their specific problems. There is a possibility that their technology will be used for the development of other Chilean industries. This company is a good example to show that quality is not enough but another competitive advantage, such as timely service, is necessary in order to export to developed countries.

Etiquetas Toprint, a manufacturer of packaging labels, has various critical sources of competitive advantage. First, they have state-of-the-art technology in a segmented area. Secondly, they can offer excellent services to customers such as short answering time, short delivery time, and technical solutions in a short period of time. These services are made possible by the introduction of information technology. The company can develop a new product, even within 24 hours, by communicating directly with distant customers by the Internet. Such flexible product development is highly appreciated. Their corporate strategy is to provide the customers with "solutions" rather than products. In Chile, it is relatively easy to import most advanced machinery from all over the world. This is also one of the advantages of the Chilean industry.

The uniqueness of this company lies in its alliances with multinational corporations. One of their customers owns two factories in South America, one in Brazil, covering the eastern part of South America and another in Chile, covering the western part of the Southern Cone. The company supplies packaging print for the latter factory. Its executive officers stress that Chilean industries need to develop new products for export since Chile is an open economy with a relatively small domestic market.

Industrias Ambrosoli is the oldest and largest manufacturer of confectionery such as candies and chocolates in Chile. For the Latin American market, they have a clear mission. The company should be a leader in the market and be everywhere ("*Ambrosoli, no corra, hay en todas partes*."). Fortunately, the regional market is similar to the Chilean one in terms of consumer preference. They provide top quality products with good presentation and maintain good relationships with their customers through close contact with them. They also export to the United States and other non-Latin American countries.

Their strength lies in their adaptability to the need of each market, which implies their flexibility in production. For example, the label, design, size, flavor and color of the product can all be modified to suit market needs. Therefore, their flexibility to adapt to special requirements of different markets is a crucial source of competitive advantage. One of their successful strategies for the US market is to make alliances with one of the largest super stores in the United States. The store supplies Ambrosoli's products without the Ambrosoli brand name but only with the phrase "Made in Chile, marketed by (the name of the super store)."

Rhona, a manufacturer of electrical transformers, has three sources of competitive advantage. First, they have had to compete strongly for a long time since the Chilean economy has been open. They are now accustomed to competition and have become efficient. The management of Rhona is also ready to compete in foreign countries. Some of the managers are familiar with the management style of General Electric (GE) since the company concluded a 20-year license contract with GE. Secondly, the company can provide after-sales service on time and quickly. One of their major customers is the mining industry. The industry needs efficient and quick after-sales service because a standstill of machinery at a mining site brings about a substantial loss. Thirdly, the Chilean peso has depreciated against the U.S. dollar.

They suggest that the quality of management should be improved in order to enhance competitiveness of non-natural-resource-based manufacturing products. One of the management people interviewed has worked for a multinational company of U.S. origin and the experience is a source of its efficient management. Based on such experience, he would welcome Japanese experts to train managers in Chilean companies. Training through a management exchange program could help them substantially to learn more about the external business world. The company pursues a strategy to make alliances with such big names as GE and Asea Brown Boveli (ABB). They see a possibility for export expansion to Peru, Bolivia and Argentina since these countries are in the process of developing mining activities and will demand a large number of transformers.

Armat's business line is unique. They manufacture base metal for coins and export

about 95% of their products to more than 40 countries all over the world. The managers are proud of their success, believing that their critical sources of competitive advantage are quality, price and service for their products. Then, they respond to customers' requests quickly and have just-in-time delivery. This is a key to avoid overstocking and storage problems.

INDEC, an engineering company, specializes in the mining industry, the pulp and paper industry, as well as the seismic and port construction fields. It exports its engineering services to Caribbean countries, North and South Americas, India and Zambia. Their sources of competitive advantage consist of a wide experience not only in Chile but also in foreign countries, based on specialized and high technology. They compete with worldwide engineering companies such as Bechtel, Kvaerner, Fluor and SNC-L. Their strength is that they can provide solutions for customers with less capital since they know how to meet customers' needs at a lower price. They have also been able to make alliances with larger engineering companies around the world.

FOSKO, a manufacturer of plastic based packages, has three sources of competitive. First, they provide high quality products with high mould technology. Their major customers are multinational companies that tend to demand high quality to keep their prestige even though it costs significantly more than lower quality products. In order to meet such high requirements, they have even introduced robots into their production line. An advantage of doing business with multinational companies is that they demand higher quality but give customer security in return. Secondly, they can supply low cost products like their competitors due to their stringent cost control. Thirdly, the structure of the organization is slim and functional.

COCESA, a manufacturer of cable wire, exports a substantial portion of their output to the United States, Central and South American countries such as Brazil, Argentina, Peru and Bolivia. The company is owned by Phelps Dodge, a renowned multinational company. They follow a worldwide basis strategy, that is, they export to South American countries while their sister companies export to other continents. Their main sources of competitive advantage are price, quality and logistic services. In the case of sophisticated cable wire, like their product, service is critical since these wires are used at mining sites and if the machinery equipped with the cable wire does not work, the company will incur a great loss. Therefore, the supplier of cables is requested to establish its service base near mining sites so as to suggest particular design alternatives for each need and to provide the product with technical assistance. The most sophisticated kind of cable wire is usually produced on an order-made basis because needs differ by customer.

CESMEC issues quality certificates and provides their service to both Chilean exporters and importers of Chilean products not only in neighboring countries such as Peru, Brazil and Argentina but also in Asian countries like Japan. The sources of their competitive advantage are their wide experience, established good image and brand name, and reliability of the service. Since their service is objective, they have been able to keep the confidence of their customers and beat their competitors. They are proud of theie relationships with customers, i.e., they listen to their problems and suggest solutions.

Salo, s manufacturer of character/sticker albums for children stresses four sources of competitive advantage. First, their corporate mission is clear: "The best entertainment for children". Second, they contact local distributors directly, by which they can be open and honest. Sales managers also take a frank approach to distributors in the countries importing their products by visiting them four or five times a year. Third, they are always ready to adapt to the local needs. Even when the topics are the same, the specifications for albums differ by market due to cultural differences. Salo changes the language, or expressions even in Spanish, according to customers' needs. In this sense, their products are almost custom-made. Fourth and finally, they are professional and innovative in marketing. They hire well-trained managers in this field, which is a key factor for achieving effective marketing. The flat organization of the company facilitates prompt action. They have introduced information technology and had 250,000 visits to their web site last year, presumably mainly by children.

ILKO is an old Chilean company manufacturing kitchen utensils and cleaning products, characterized by the supply of a complete line of products. However, the source of their competitive advantage lies in the manufacturing concept, especially in the way of merchandising their products. They concentrate their production only on core competence utensils, while importing other products from the best and strongest suppliers from all over the world. They consider that their strength is their designing capability, with which they can develop new items, reach new markets and satisfy new needs. This is because the price of their products is almost the same as the prices offered by other supplier. The company aims to become a leader in the South American market. However, they think they have to envision the future trends of the business to achieve such a goal. For this purpose, they also export their products to advanced markets such as the United States. The company stresses that the Chilean manufacturing sector could survive if it invested in the development of clean production processes and reduced the cost of production, by using byproducts and wastes.

The case of Indugas, a manufacturer of instant water heaters, is an example of a market leader as they hold a 99% share of the domestic market and a 20% share of the South American market. In the latter market, they compete with European manufacturers. They have four critical sources of competitive advantage. The first is the lower costs of production. The second is equipment that enables them to adapt to various customers' needs, not only in external markets but also in the domestic market, due to cultural differences in addition to the differences in gas and technical regulations. The third is low duties in Chile due to its free trade agreements with Mexico, Peru and other countries. The fourth is their short dispatch time, which can help their customers reduce stock costs. They feel a real need to expand their exports for two reasons. One is that the Chilean market is gradually opening and the other is that the growth of the Chilean market is modest, only 4% a year. They consider expanding their information platform through electronic means to facilitate a B-to-B (business to business) network with their affiliates.

Drillco Tools, a manufacturer of drilling tools for mining, quarrying and water welling, has several critical sources of competitive advantage in exporting mainly to the United States. First, they supply high quality products. For Chilean suppliers who do not have a consolidated prestige, it is necessary to develop trust. However, they supply

not the best of the best but rather products consistent with quality and at a competitive price, though it is not the lowest on the market. They are also serious in fulfilling their commitment. In other words, they are responsible business people and stress the importance of building trust by being really reliable. They are deeply committed to learn from their customers and listen to them. This is part of their adaptability policy to customers' needs, that is, "Know the country's business culture and be capable of adapting yourself to it." They have also adopted a strategic attitude to build a long-term relationship with customers. For this reason, they are willing to invest and do not expect a short-term profit. This company is one of the leading companies in this area on the world market.

Astilleros Marítimos de la Armada (ASMAR), a state-owned enterprise for shipbuilding and repairing, is internationally renowned for its ship repairing business. They render their repairing service to shippers worldwide. They stress their sources of competitive advantage as follows. First, they have gained their customers' trust for their service and experience over many years. The sources of trustworthiness are time, quality and price. They are proud to finish their repairing assignments on time. Secondly, they understand that quality of service is to fully meet customer expectation and thus they render excellent service. The customers' image of ASMAR is that prices for their service are not necessary low, but reliability and high quality are outstanding. ASMAR has obtained ISO9002.

Esmital, a family-run business manufacturing equipment for fishmeal, pulp and food products, mentioned several sources of competitive advantage. Their installed equipment is their main strength. The company differentiates their products by such characteristics as order-made, solution-oriented, small supply, and post-sales services. The company's engineering capability makes a difference. In addition, they are located close to the their customers, fishing corporations in Chile and Peru. It seems that being a rather small family-run enterprise makes it possible to keep flexibility and good communication within the company.

EDYCE, a manufacturer of metal structures for the mining and pulp and paper industries, stresses that its most critical source of competitive advantage is the quick delivery of products after receiving orders from their customers. This is made possible by their capability to keep the necessary raw materials, basically steel, in stock. The short delivery time is important especially for mining companies since the sooner they can get the fabricated metal structures, the sooner they can start mining activities and make profits – or even just pay back the investment at the beginning. Another source of competitive advantage is good technology. By using German machines, they can supply the products on due delivery time and they can extend services such as designing detailed plans for customers. The company is also equipped with the latest software for design. They fully utilize computerized machines since they need to match different sizes of pieces to one product. The third advantage is that they are located close to their customers. With a long-tailored experience in supplying products to the mining industry in Chile, they have been able to export their products to the mining sector in Argentina and Peru, which have developed more recently. They also expect to export to Bolivia.

SIGU, a manufacturer of metal structures and a supplier of repairing services, is a wealth of entrepreneurial spirit in the sense that it always looks for new product development. The company is aggressive in export but has some difficulties in export expansion since it is a small business. One of the reasons is the high initial cost for exporting heavy equipment as it requires demonstrations to prospective customers abroad. Although ProChile finances commercial missions and encourages interested people to come to Chile, it does not share the cost for such a demonstration in foreign countries. This company strongly believes that their source of competitive advantage is their capability of designing products and assembling the best and cheapest parts from all over the world.

Moly-Cop is a multinational company manufacturing grinding balls for the mining industry and exporting their products to Peru, Argentina and Brazil. While their export markets are currently limited due to the strategy of the parent multinational company, the company has a potential to be competitive in the world market. The main source of competitive advantage is the high quality of their products. It is achieved by their temperature control technology, which is a decisive factor for producing hard and strong balls for the mining industry.

SOMELA is a leading manufacturer of electrical home appliances such as floor polishers, spin dryers and electric heaters with exports up to 30% of its total invoice. The opening of the Chilean market has compelled the company to increase its quality and decrease its costs according to global requirements. This has led to an export strategy based on the Original Equipment Manufacturer (OEM) system to supply major global brands and under ISO 9001 certification during the last ten years. In addition, they import small home appliances to commercialize them on the Chilean market under their own brand. In this sense, the company is also a merchandiser. Such a strategy is one of the sources of their competitive advantage. Other sources include the management, the quality and price of products and the capability of complying with acquired commitments. Strategic thinking is the foremost strength of the company, which is also based on an attitude of listening to their customers.

Laboratorio Chile, founded in 1896, is one of the oldest Chilean pharmaceutical laboratories and presently the leader on the Chilean pharmaceutical market. Lab Chile Corporation owns two manufacturing plants in Chile, two laboratories in Argentina and one pharmaceutical distributor in Peru. Recently, it has received GMP certification from the Chilean Health Authority, the first given in Chile, and complies with the international standard for environmental protection. Lab Chile manufactures more than 900 branded and generic products that cover nearly all the human therapeutics needs. These products are exported to almost all the countries in Central and South America with a good level of acceptance among medical corporations and pharmacists. Besides Chile, its main markets are Peru, Bolivia, Ecuador, Paraguay, Panama and Honduras. The sources of competitive advantage are its commercial management, production capacity and knowledge about the regional market.

Linktronic, a manufacturer of high technology products such as radar, is unique in that they design instruments by their state-of-the-art engineering and have their subcontractors produce the products and deliver them under the Linktronic brand name.

By subcontract, the company can reduce fixed costs substantially. The source of their competitive advantage lies in price, quality, time delivery and trust. Their products are not catalogue sales products but order-made technological goods. Their capability to apply basic technology to radar and robotic machines for the mining industry is also a key because it yields a possibility to reach another interesting fields.

Vitroquímica is a manufacturer of inorganic chemical products such as enamels and pigments for industrial use. It exports almost 45% of their products to other South American countries. Notwithstanding hard competition with two large US competitors, the company can hold about a 20% share of the South American market. The first source of their competitive advantage is the organization. The company has one-year and five-year master plans. Every employee participates in formulating the master plans and, therefore, understands the main goal of the company. The second is a technical license agreement with a German company. This is a great strength of the company since their products are highly technology-oriented and need more R&D and quality control. The third is employee training inside their foreign representative offices, which enhances the level of technical service to their customers. The people who receive the training are those in charge of providing "first aid" for troubles in the customers' factories. Such a capability of supplying technical assistance to customers is a key factor to establish a sound relationship with them. Their business is solution-oriented as well as service-oriented. Finally, free-trade agreements between Chile and some South American countries are also a source of competitive advantage.

The company has formed a strategic exporting cooperative alliance with five other companies in Chile to reach the same customers. Each company exports different products to the same customers. By doing so, they succeed in reducing marketing cost and transportation cost. This management strategy could be applied to other types of export business. They are currently developing B-to-B information technology. Once it is done, they will intend to use the technology mainly for logistic purposes such as checking the stock and delivery time.

Occidental Chemical-Chile, a manufacturer of inorganic chemical products for the pulp and paper and mining industries, exports its products when the domestic demand is below production. In this sense, their exports are only marginal. Since their products are of commodity-type, the export business is competitive. However, the company stresses its source of competitive advantage as updated technology, good infrastructure in logistics such as special containers, and the low cost of production. This company is associated with a U.S. multinational company and operates under the parent company's standards. They must follow the more stringent of either the local or the U.S. regulations for environmental protection, i.e., the highest standards in force.

Envases Flexibles, a manufacturer of plastic packages asserts that price is the foremost source of their competitive advantage because the quality of their products is almost the same as that of their competitors. Other sources are the company's slim organization and the availability of raw materials, especially bi-oriented polypropylene. Al though the company does not point it out, their frequent contact with customers in South America, especially in Argentina, seems to be another source of competitive advantage as such a close relationship facilitates their after-sales service and earns them trust.

Sindelen is a manufacturer of electrical home appliances that exports around 10% of its products with worldwide foreign brands. The main sources of their competitive advantage are quality, price and design that can satisfy foreign companies. These factors enable the company to become OEM suppliers for foreign companies and, consequently, to expand their exports. However, they are in the process of changing the export strategy. They used to export the same type of products as sold on the domestic market, but they have started to produce and export special products that meet the requirements of foreign markets and are becoming a real export-oriented company. Although their exports are still around 10% of the total sales, the growth is remarkable when compared with the share of 1% in the past.

NIBSA, a manufacturer of water and gas system networks, currently exports around 20% of its products to South American countries as well as to some European countries. Their goal is to increase this export ratio to total sales to 50%, because the domestic market is almost saturated and it is difficult to expect a significant increase. Management people stress that they have basically three sources of competitive advantage. The first is their service to customers overseas that are fixed in number and the company has been successful in keeping good relationships with them. They send their engineers abroad to provide services. The second is good quality. The third is adaptability to customers' needs. They focus on customized products rather than commodity-type products. Customers' preference differs from country to country and even by customer in the same country. Therefore, NIBSA tries to meet their needs as much as possible. Such an attitude is highly appreciated by customers.

MADECO, a cable wire manufacturer belonging to a large Chilean holding, exports 60% of its products to all over the world including Latin America, the United States, Europe and Asia. The principal sources of their competitive advantage are: 1) the diverse market portfolio; 2) low-cost production brought about by recent restructuring; and 3) the availability of raw materials suitable for the production of conductors. Their main raw materials are copper, which is definitely abundant in Chile and thus available at a low cost. Their core strategy for export is the diversification of customers for risk hedging. The company is listed on the New York Stock Exchange.

CTI is a large local company that has been manufacturing electrical home appliances for many decades. Gathering several brand names, they are currently exporting around 30% of the production. They expect to increase the ratio to 40% in the next two years, since the domestic market is almost saturated and their market share is already high. They are adopting a strategy of selling their products overseas with influential and well-known brands in each foreign market. They consider that the main source of their competitive advantage is good management, which can facilitate the market orientation and place the right product in the right market. Likewise, good price and best quality, flexibility and commitment are also quoted as important sources of competitive advantage. They have been able to maintain attractive prices due to Chile's open market policy, by which Chilean manufacturers have been exposed to harsh competition but also have learned how to buy the best products from the best suppliers all over the world. They are proud of being a reliable supplier for their customers.

Argos is a Chilean company manufacturing plastic products such as balloons and plates

for parties, as well as other kinds of party goods for children. They are currently exporting around 40% of their production and the main destination is the South American market. They also export products imported from China, Mexico, Spain and the United States to the said market under their own brand name. If such exports are included, exports reach 80% of their total sales. A major source of success in export business is the first-class favorable license obtained from one of the most famous license owners, by which they can supply best quality products. As their products are mainly for children, license owners are nervous about whether license holders, like Argos, can follow the regulations and supply safe products to children. They have always been reliable to the license owners. In addition, they have been able to respond quickly to market requirements. Other sources of competitive advantage are their closeness to the markets, their sales networks supported by their own branch offices in the export countries and the high market share in each of these markets. They are proud of their success in establishing their brand name on the South American market. Finally, they use information technology for the development of flexible products in order to be updated in the dynamically developing market world.

Vidrios Lirquén is a part of a multinational corporation, though it started more than half a century ago as a state-owned company. They manufacture flat glass for windows and glass for the automobile industry. The company was established in Lirquén, Region VIII, due to the availability of raw materials, such as sand. Their activity may be seen as a natural-resource-based industry, but at present, they import around half of the sand because they can get better types of sand from overseas and use imported high technology. As they belong to a multinational group with a global marketing strategy, their exports are limited to the South American market. A key factor for successful export in this field is the logistics cost because their products are of commodity-type. In this respect, they have a good freight system and reliable shippers. Another source of competitive advantage is their ability to respond quickly to customers' needs. The company supplies glass to some original equipment producers such as GM in Arica as well as spare parts to other dealers throughout Santiago.

SOCOMETAL manufactures metal structures mainly for international engineering companies undertaking large-scale projects such as mining and hydropower development. Although there are not a significant number of competitors, the company holds relatively strong competitiveness. The sources of their competitive advantage are: 1) engineering capability; 2) the capacity of lifting in their metal working facility; 3) a slim family-run management; and 4) new equipment. Despite the decreased orders from the mining industry, the company has survived with the equipment bought at a low price from the former owner and focused their business on manufacturing specialized large metal structures for mining projects. New entry to this business is unlikely under the present situation of the mining industry, which is not showing significant growth as before. It is also because this business requires large investments. These factors turn out to be an unexpected advantage for the company, as well as for those already in the business. Base metal, basically steel, used by SOCOMETAL is mainly imported, though it is available in Chile in large quantities.

Harting Aromas, a manufacturer of chemical raw materials for flavor and fragrance, exports 100% of their products to the United States, Europe and Asia. The

characteristic of this industry is oligopolistic, i.e., only three or four companies with a large production capacity dominate the world market, where the demand is rather small. The source of their competitive advantage lies in the location closer to the pulp producing companies that supply the basic raw materials. They have made exclusive and long-term contracts with such companies in Chile, Argentina and Brazil. Harting Aromas holds a monopolistic position in the South American market. The lower price of raw materials relative to the transportation cost, it is difficult for pulp producers in other Latin American countries to supply the raw materials to competitors.

For Schaffner, a manufacturer of distribution transformers, the first source of competitive advantage is their commitment to the business. They stress their seriousness in offering and producing as their strength because this is not common in the Latin American market. The second is their patience in establishing long-term relationships with their customers. The third is their adaptability to local markets. The company follows the regulations that vary by country. However, the most important key to success is the strategy to adapt to niche markets, rather than to mass markets. They supply a wide range of specially designed (customized) transformers and, therefore, the business must be flexible. Their production line is rather labor-intensive to follow such a strategy. This is another source of competitive advantage.

Bellavista Oveja is an old textile company currently pursuing their export-oriented philosophy through "professional management", which is the main source of their competitive advantage. This kind of vision made it possible to take an aggressive policy of investment, targeting good quality and productivity. The success lies in a kind of management buy-out that took place some years ago to "save" the company. The present management bought the company, which had been almost bankrupt, and at a low price. They have taken advantage of lower tariffs to import raw materials.

Elecmetal manufactures special steel for mining equipment such as mills, crushers and shovels. The company is one of the largest suppliers of these products in Chile. Although their business is concentrated on the domestic market, they export crushers to other Latin American countries. They quoted several sources of competitive advantage. The market is near. Their service is excellent paying attention to customer-satisfaction. They say, "Service is a big component. The price of our product is not as important as the service." They are proud of being able to supply products adjusted to the different needs of each mine. Their sales strategy is "lower effective cost" for customers. Their parts may be expensive, but by using the parts, their customers can enjoy fewer shutdowns and thus reduce the effective costs of production.

For Indura, a manufacturer of welding electric rod and industrial gases, the main source of competitive advantage is strategic alliances with a European leading gas company. Other sources are quality, price and technical services to final users. A guiding principle for the company is to provide solutions to the problem of each customer.

Maestranza Fernández is a metal workshop manufacturing structures for the mining industry. They used to export their products to Peru and Bolivia, but in recent years exports have decreased dramatically. The two major sources of their competitive advantage are better prices than their competitors' and quality of their products assured

with ISO9001. They are proud of their ability to compete with U.S. manufacturers and even to beat them by better prices, while the product quality is not inferior. Their competitive price is due to the availability of cheap raw materials as well as a drawback system that encourages the entrepreneurial spirit. In addition, being located in the North Zone, the company enjoys the free-trade zone benefits.

Sociedad Minera Macarena, a manufacturer of special electrical and chemical products, is a unique company. Recently, they have succeeded in developing a new kind of insulator produced from minerals available only in Arica . Such an innovative idea is a key source of competitive advantage. The case is to be noted as one of the industries setting new usage of locally available materials and thus pushing forward the potential of the North Zone.

Maestranza Arica is another metal workshop manufacturing structures for the mining industry. Until recently, they have exported their products for mining projects through influential worldwide engineering companies such as Bechtel and Fluor. However, due to the Asian economic crisis, the company has been forced to restructure its business. In the course of such restructuring, they have re-oriented their business toward services. Departing from manufacturing, the company is transforming itself into a provider of problem solutions. The present source of their competitive advantage is their lower cost. Metal structure products are often imported from Korea and Japan and, therefore, the company has increased its engineering capacity. Another source of competitive advantage is their geographical location. Arica is situated within a 500-km radius of the most important copper mines in the world.

Primex, a manufacturer of sailing boats, exports their products mainly to the South American market. Chile's open economic policy has compelled the company to look for external markets and to become a merchandiser as well. Primex has signed a license contract with a U.K. based, worldwide company and produces and exports under the brand name of the license owner. For the license owner, the main reason for their selecting this company was the seriousness and commitment the company had demonstrated. The license owner poses strict standard regulations for manufacturing their products, which Primex can follow constantly. In the perception of the U.K. company, Chilean companies' commitment is generally stronger than that of Argentina and Brazil. The company also imports some products for the domestic market.

Petroquímica produces polypropylene, classified as a commodity, and exports around 65% of its products, mainly to South American markets. They mention two sources of competitive advantage. First, they keep in touch with their customers and extend technical assistance, while their competitors merely sell chemical products. Technical service is becoming increasingly important to compete in this kind of industry. The company is proud of being a "responsible supplier". Secondly, its plant produces nineteen different products and, therefore, flexibility is required to meet customers' different needs. Their supply is flexible due of their technology.

Editorial Trineo, a printer of publicity products, labels and different kinds of publications, exports only 3-4% of their total production. However, the company supplies publicity products and labels to the regional sales offices of multinational

companies in South America. As the Spanish language is slightly different from country to country even within South America, they adapt their publicity according to the need and preference of the countries they intend to reach. Due to such an effort, they have been able to obtain orders from European multinationals that intend to penetrate different countries in South America.

The two main sources of Editorial Trineo's competitive advantage are good price and excellent quality supported by ISO9001 and ISO1401. With respect to their competitive price, the company states that the key issues are to export under Free Trade Agreements (FTAs) and to know the exact costs of production. Their business is characteristically solution-oriented since their customers are industrial companies with particular needs. This company counts on a serious working team not only within the company but also among their customers. They make use of information technology, an electronic system, for receiving orders and sending price quotations.

CIMM, a service company for mining, exports around 10 to 15% of their service, mainly to the Latin American market. Their service for mining projects covers all the stages, from exploration through exploitation to manufacturing. They hold competitiveness even though competition is getting tougher and mergers among mining-related service companies are increasing in number. The main source of their competitive advantage is know-how for marketing and customer service based on their wide experience. The second source is the price. The third is the infrastructure necessary for rendering services quickly all over the country. Finally, the company is located close to their customers, mining companies in Chile, Peru and Argentina, and its brand name penetrated among them.

Dos en Uno is a traditional Chilean manufacturer of confectionery such as candies and chocolates. The company is currently exporting around 20% of its total production. It plans to expand the export since the domestic market is almost saturated and they have some idle capacity. Their external markets cover Latin America, the United States and Canada, as well as Asia and Africa. The sources of their competitive advantage are: 1) the ability to obtain sugar at a low price; 2) cheap manual labor costs; and 3) the variety of products. In the confectionery industry, the product presentation is crucial, which requires time and labor. Lower manual labor cost is one of the company's strengths. The presence of the company in the market has been enhanced by a strategic alliance with an Argentine company, one of the biggest confectionery companies in the world. The presence is also a source of their competitive advantage.

20.5 Diagnosis

20.5.1 Current Corporate Behavior

While Chile is known as a competitive exporter of natural-resource-based products, the image as an exporter of solution-oriented products has yet to be established. The importance of the export expansion of such products is recognized by many Chilean business people and as government officials. The companies surveyed in this study are serious about their export activity. However, there seem to be only a handful of people who are seriously considering the matter as a national issue and thinking of concrete measures to promote solution-oriented manufacturing exports. Most of the executives

interviewed are aggressive, innovative and entrepreneurial, but the number of such executives is rather limited in Chile as far as the global business for solution-oriented manufacturing is concerned.

The number of export-oriented companies is still small in Chile as a whole. Among the surveyed companies, some companies have just shifted from a marginal exporter towards a major export-oriented company. A marginal exporter means one who exports only a part of its production, depending on the demand and supply situation of the domestic market. On the other hand, an export-oriented company refers to one that makes its production and sales plan by consolidating the domestic and external markets. The reason for such a shift is that the domestic market is becoming increasingly competitive and, therefore, it is indispensable for them to export to stay on business.

The surveyed companies are doing their business with a definite business concept. However, most of Chilean companies appear to be just producing without any business concept, especially for marketing. ASIMET stresses that most of the metal mechanical companies in Chile merely repair machinery for customers. The business philosophy of the surveyed companies is generally clear but not unique except for a few companies. Their slogans most often heard are pretty conventional, such as "Serve the customers, the employees and the shareholders." and "Environment consideration", while one of remarkable mottoes among them is: "Entertain children and supply what every child, regardless of their wealth or poverty, can afford to buy."

Typically in export business, few companies, including those already exporting, have a clear, effective strategy. Even when it is clear, it is not necessarily appropriate in the light of their products, production capacity, target markets, etc. Companies at an infant stage do not have a definite idea of export strategy they should follow. They also face a number of difficulties, e.g., lack of marketing know-how and finance, language barriers, etc. even with a strong intention to start exporting. This is because the initial cost is too high for them, though ProChile extends financial support to them. The initial cost is particularly a serious problem for machinery export. It is expensive to bring a machine to the prospective importer for demonstration, especially when the importer is in a foreign country.

On the other hand, there are some companies that seem to be potentially competitive in the Asian market but are reluctant to export their products to the market. This is because they feel that the Asian market is different from other markets and, more practically, because they do not have enough production capacity to export to Asia. These companies are not risk-takers to expand their production capacity with additional investments for export to the Asian markets.

The competitiveness of a finished product is generally attributable to the strength in integration and linkages among industries. However, strong industrial integration does not exist in Chile. Such a situation may be partly brought about by Chile's open economic policy and the lack of strategic planning for industrial development. Chile needs some policy measures to facilitate the development of industrial integration in order to become a competitive exporter of solution-oriented manufacturing products.

Box 20.5.1 The Japanese Automobile Industry

The competitiveness of the Japanese automobile industry is attributable to various factors. One of them is the strength of related industries. Japan's iron and steel industry still hold competitiveness and can supply good cold coils for automobile bodies at an internationally competitive price. The industry invests in iron and ore mines overseas to secure the raw materials for steel products. Japan's parts industry is also strong, supplying high quality parts to the automobile industry. The Japan's parts industry is supported by the forging and casting industry. Japan's metal working machine industry is also strong and supplies high quality metal for stamping, transfer and welding machines. Most of them are automated, supported by the computer industry. The automobile industry holds its strength by automated assembling lines.

20.5.2 Observed Chilean-Type of Competitive Solution-Oriented Manufactures: Basic Product and Manufacturing Concepts

Chilean competitive manufacturers in the export of solution-oriented products are those who have developed unique product and manufacturing concepts. These concepts are often cited during the company interviews.

Product concept

- Real solution-oriented products
- Service-oriented products
- Directed for niche markets rather than for mass markets
- High quality at a reasonable price
- Product with consistent quality
- Technology and innovation oriented
- Adapted to local market needs
- Special attention to post-sales service

Manufacturing concept

- Order-made products: design, manufacturing, assembling
- Small batch
- Merchandising
- "Brain-facturing"
- Flexible product development through information technology
- Use of technology
- Use of engineering
- Direct personal contact with customers through a well established sales network
- Utilization of cheaper imported materials
- Investment for high quality and productivity
- Taking full advantage of the geographical location: "global strategy"

Basic elements

- Strong and clear corporate identity
- Professional management
- Dedication to customers as a supplier
- Good management
- Slim and functional organization
- Serious commitment to offer
- Trustworthiness

20.5.3 Future Prospect for Solution-Oriented Manufacturing

Following the concept developed by the Boston Consulting Group, most of the exported products in the surveyed companies can be regarded as "cash cow" and "dog", while "star" and "problem child" are hard to find (for the concept, see Table 20.5.1). It seems to be difficult for Chile to become a worldwide exporter in the area of human-resource-based manufacturing products so long as Chile sticks to the existing products, though it could become a leader for some products in the South American market. It is important for Chilean companies to develop new and innovative products, that is, products in "out-flanking industries", and to become a front runner in these fields.

Table 20.5.1 Product Classification by the Boston Consulting Group

Market Share / Market Growth	Low	High
Low	Dog	Cash cow
High	Problem child	Star

Along with the development of the open economy, Chilean companies have more or less transformed themselves from "manufacturers" to "manufacturers with merchandising abilities". Some have been compelled to do so, but others have followed the avenue as a corporate strategy. They have taken a policy of outsourcing for some products that they used to manufacture themselves. A typical case is that they export a product under the brand name of an influential manufacturer by importing most components of the product and adding some components manufactured in Chile. The strategy is positive in terms of efficiency, but the Chilean "manufacturing base" for future development, i.e., infrastructure, technology, knowledge, experience, innovative spirit, etc., may be lost.

20.6 Chile's Strengths: Sources of Competitive Advantage

(1) Open Economy

Chilean managers are accustomed to international competition due to the open economic policy. Open economy means a chance to those who are always exposed to competition. Due to the openness, furthermore, it is possible for Chilean companies to obtain the best raw materials and machinery and equipment at the lowest price from all over the world. This situation facilitates Chilean companies to follow the best merchandising strategies. The open economic policy has also compelled inefficient companies to disappear and competitive companies to grow. People have also become more professional and ready for commitment since they have to adapt to the new reality of fierce competition.

(2) Public Institution

Political, economic and social stability and good logistics such as gateways can also be cited as Chile's strengths, though they should be further improved for Chile as a whole to become a first-class international gateway in South America. In the area of finance, Chile ranks high in South America. The country has established a cash-reserve scheme, aims at coping with inflows of speculative money that deteriorates the business environment. Good management can grow under such a convenient system.

(3) Geographical Position

Chile, being the most developed country on the West Coast of South America, faces Asia, one of the most promising markets in the next decade, across the Pacific Ocean. Such a situation makes it easy for Chile to have alliances with multinationals. For example, an influential worldwide multinational company owns two factories to cover the entire market of South America. One is in Brazil and the other is in Chile. The Brazilian factory covers the market of the East Coast of South America, while the Chilean factory covers the West Coast. Other Chilean companies have chances not only to deal with the Chilean factory of the multinational but also to deliver their products to factories of the multinational and/or other multinationals in the continent once they secure the confidence of the multinational companies. Alliances with multinationals bring about various advantages as stated in 20.7.2 (2).

Mexico is a large country with a population of 90 million and has concluded a free trade agreement with Chile. Chilean companies see the Mexican market as a major export target. This is another geographical advantage.

(4) Engineering Capability

Chile has accumulated engineering capability through the development of copper mining, wood processing, fisheries and shipbuilding. Several engineers interviewed stressed that Chile's engineering is absolutely number one in South America due to its discipline and hard work. There are many universities famous for their engineering schools such as Universidad de Concepción, Universidad de Chile, Pontificia Universidad Católica de Chile and Universidad Técnica Federico Santa María.

(5) Human Capital

Among various aspects related to human capital, the most notable is the Chilean people's attitude toward commitment to offer. They are said to be serious as compared with other South Americans. Such a feature is important in business. Another strength related to human capital is competent management that has been fostered and supported by Chile's open economic policy and stability. Appropriate management can build a long-term relationship with customers, which is indispensable for succeeding in export business.

(6) Knowledge about the South American Market

Chilean business people are knowledgeable about the South American market. It is a strong competitive advantage for exporting products since the business requires close and constant contact with customers.

20.7 Strategies

Export activity is quite different from selling activity. Export is a long-term business, while selling is an easy task as it can be done by offering a lower price than competitors do. Therefore, export activity needs a strategy. Strategy is everything. Companies just selling their products without any export strategy tend to be compelled to go out of export business when the market conditions change. Table 20.7.1 shows the number of new entries to and going-out from export business, though it is noted that the number

is inflated as it includes companies that supply sample products. The numbers of "going-out" are almost the same as those of "new entry" throughout the period of 1993-1998. The large number of "going-out" can be at least partly attributed to the lack of export strategy. The data include both natural-resource-based and non-natural-resource-based, or solution-oriented, manufacturing products.

Table 20.7.1 Changes in Chilean Exporters in 1993-1998

	New entry	Going-out	Addition	Constant	Total
1993	2,098	2,047	51	3,398	5,496
1994	2,239	1,891	348	3,605	5,844
1995	2,066	2,093	-27	3,478	5,813
1996	2,094	2,102	-8	3,711	5,805
1997	1,988	2,026	-38	3,779	5,767
1998	2,007	1,927	80	3,840	5,847
1999	2,121	1,946	175	3,901	6,022

Source: ProChile, *Análisis de la Exportaciones Chilenas*, 2000.

A similar situation can be found in the date obtained from ASEXMA (Table 20.7.2). Since the data covers only solution-oriented manufacturing products, it indicates more precisely the situation of "new entry" and "going-out" in this sector, that is, the numbers of "going-out" are even larger than those of "new-entry". This tendency should be considered disturbing if the country wishes to expand the export of solution-oriented manufacturing products, for which appropriate strategy is necessary.

Table 20.7.2 Changes in the Number of Exporters in 1999-2000

	New entry	Going-out	Exporters in 2000
Machinery and equipment	619	603	1,184
Transport material	232	315	316
Metal manufacturing products	280	311	602
Chemical products	129	134	350
Rubber and plastic products	312	330	686
Above total	1,572	1,693	3,138

Note: "New entry" indicates the number of companies that did not record any exports in 1999 but recorded in 2000. "Going-out" indicates the number of companies that recorded exports in 1999 but not in 2000.
Source: ASEXMA, Statistical Database, Jan.12, 2001.

With the strengths mentioned in Section 20.6, Chile can foster competitive and stable export-oriented companies and formulate appropriate strategy (Figure 20.7.1).

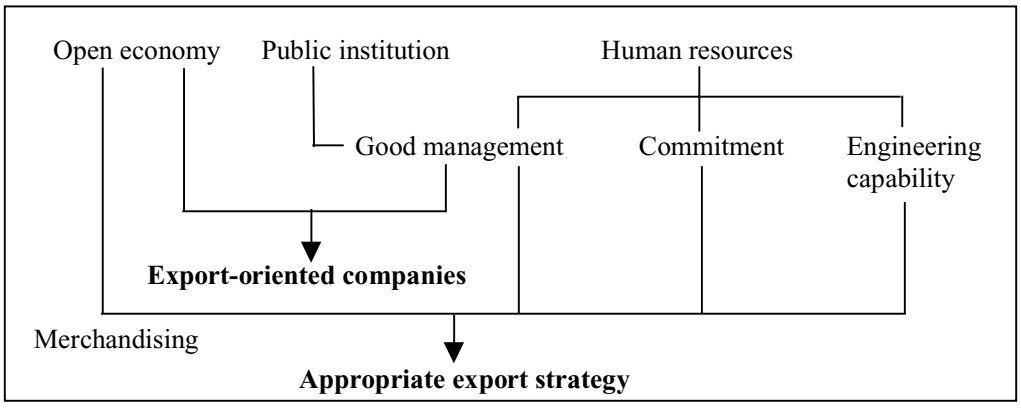


Figure 20.7.1 Strengths of Chile and Export Strategy

20.7.1 Conversion to an Export-Oriented Company by Professional Management

(1) Two Types of Management

Management capability is a central requirement for developing a business. There are two types of management people. One type is those who are inward looking and do not care about export. The other type is those who are outward looking and concerned about export. The latter type of people recognizes that Chile is a country open to the world market and exposed to competition with imported products. They strongly feel the need to improve their efficiency, without which they can not survive in the local market. They expect that higher efficiency will also increase the chance to expand their exports. The open economic policy enables them to import the best materials and machinery and equipment at the lowest price from all over the world and to make alliances with multinational companies. Thus, they can head for a higher degree of international competition. They believe that they are potential winners of the regional economic integration that has been accelerated by MERCOSUR and NAFTA.

A decision to convert a company to an export-oriented one is important. Whether the decision is made or not depends on management people. Although there do not seem to be many companies in Chile that have outward looking managers, the company survey shows that several companies have such managers. These companies include manufacturers of electrical equipment, textiles, confectionery and package printing and an engineering company. Their final goal is to become a leader in the South American market of each product area. The increase in the number of these types of companies is significant for Chile to expand its exports because its domestic market is relatively small. However, an export-oriented company does not necessarily mean that the company's export has a large share of its total sales. Important is that the company is not a "spot" exporter but a "regular" exporter that continues staying in export business.

Box 20.7.1 Japan as a Powerful Exporter

Japan is famous for its strong export activity and one of the most powerful export countries along with Germany. Japan's strength as an exporter lies on two factors. First, Japanese corporations were compelled to reorient their sales to maintain their operations in the factories when the domestic demand turned sluggish. After the World War II, *Zaibatsu*, or conglomerate groups, were dissolved as a way to democratize the Japanese economy. As a result, many new companies were given opportunities to develop and they competed with each other. Their policy was to capture substantial market shares instead of profits. They also became aggressive in investment in order to maintain their market shares. Excess investment yielded excess competition and excess export. Faced with trade conflict, Japanese corporations started to invest in the importing countries so that they could substantially reduce exports. The Plaza Accord in 1985, which brought about a rapid appreciation of the Japanese yen, accelerated the tendency.

The second factor for Japan's export drive is the need to earn import bills because it is not endowed with abundant natural resources. The time when Japanese industries became export-oriented differs from industry to industry. It was the early 1950s for the iron and steel industry, the mid-1950s for the shipbuilding industry, the early 1960s for the electrical machinery industry, the mid-1960s for electronics industry and the late 1960s for the automobile industry.

(2) Recruit of Professional Managers from Industrialized Countries

It is not so easy to change people's mentality. The best way is to train young, aggressive people into managers, but it still takes a considerable time. The second way, therefore, is to recruit professional managers from industrial countries. If there is any restriction on this kind of recruitment, it should be eased as much as possible. Success stories reveal the importance of strategic thinking, which is made possible only by experienced professional managers.

Alliance with multinational companies will facilitate the recruitment of professional managers. It is also purposeful to send Chilean business people to companies in industrial countries to have them learn the way they do business. Through the on-the-job training, they will be able to find how to formulate business strategies. Some of managers interviewed in the company survey had experience of working at worldwide famous multinationals. Their notable performance indicates that such experience is clearly one of the sources of good management.

(3) Conversion from a Family-run Business to One Managed by Professionals

The number of family businesses is large in Chile, though such a situation can be found in other countries including Japan. Generally speaking, the family-run business tends to be old-fashioned, conservative and inward looking and, therefore, a good chance of growth arises when the family invites professional management people. It is necessary to create an environment under which the conversion from a family-run business to one managed by professionals can easily happen. One possible measure to create the environment is a new financial scheme such as finance for Management Buy-Out (MBO), Leveraged Buy-Out (LBO) and Redeemable Preferred Stock (RPS). Another measure is a system that supports the recruitment of professional management people.

Box 20.7.2 A Metal Structure Manufacturing Company for the Mining Industry

It was a family-run company for many years. Faced by drastic changes in the business environment, however, the family decided to invite some young professionals and hand over its management to them. The company has shifted its business style to one which is more outward looking and export-oriented. The company was adversely affected by the Asian economic crisis and was compelled to restructure their business. Recently, they have been successfully working with Bechtel for a big mining project in Peru.

(4) Exchange Program of Managers for Training

The importance of professional training is not limited to higher ranked managers. Training middle management is also significant. It is because top managers are pathfinders, while the analysis of the path and its implementation are undertaken by middle managers. The training of middle management should be done within the company (on-the-job training), rather than outside the company (off-the-job training). This kind of training can be done by inviting export strategy experts from companies of developed countries. It will be easier to invite experts from the company when intending to make alliance with a multinational company.

It is also advisable to invite retired experts from developed countries to train people in

Chilean companies ("industrial cooperation program with exchange of experts") and to arrange internships at companies in developed countries for Chilean companies. These kinds of training programs can be organized by industrial associations with their counterparts in developed countries with the support of the governments of both sides since it is difficult for individual companies to do so. Even for a limited time, e.g., one to two months, such a program will be useful.

20.7.2 Export Strategies: Product Concept and Manufacturing Concept

(1) Strategic Differentiation

1) Analysis of the consumption chain

Chilean companies face two types of competitors. One is price-driven Chinese companies and the other is quality-driven U.S. companies. In order to secure a place, Chilean exporters have to sharpen their strategic differentiation. Strategic differentiation to be followed differs from company to company, but there may be common features in the direction of differentiation.

The consumption chain should be analyzed in detail in order to find appropriate strategic differentiation. Through the analysis, it would be possible to identify new points of differentiation and to develop the capability to formulate successful differentiation strategy. Management people should become accustomed to this kind of work through training, for example, MBA and executive programs supplied by universities in Chile and elsewhere.

2) Option 1: Solution- and service-oriented

There seems to be two options for strategic differentiation by Chilean exporters of solution-oriented manufacturing products. One of them is solution- and service-oriented strategic differentiation. The other is to become an OEM (original equipment manufacturer)supplier or license holder.

Chile can survive in the fields that require a high level of engineering, since the country has accumulated engineering capabilities in copper mining, wood processing, fisheries and shipbuilding. Chilean universities offer the best engineering courses in South America. Engineering yields high value added due to its associated complexity. Sophisticated engineering implies that the product is solution/service-oriented. Chilean exporters of engineering products are not merely sellers but problem solvers. They do not think that their sales activity ends in delivery but should include post-sale service to their customers. In this sense, it is highly important for them to understand what the quality of service is.

The quality of service is different from the quality of goods. Quality control in the manufacturing sector is to reduce variance and ensure that the products conform to clear specifications. On the other hand, quality control in the service sector is to manage emotions, expectations and experiences, to vary specifications, and to adjust to new quality expectations. Not only employees but also managers should be trained on how to they should be different. By nature, a solution- or service-oriented product is for a niche market, its lot tends to be small, and it is custom-made.

In securing the customer's satisfaction, the most important factor is the exporter's serious commitment, which is not widely practiced in South America. The customers order products based on their trust in the exporter's commitment. Chilean companies that intend to enter export business must be serious about their commitment.

Another feature required for a solution-oriented product is that it should be of high quality with a reasonable price. It is necessary to obtain the cheapest materials from all over the world in order to achieve the two goals of quality and price. Internet technology should be utilized more widely for this purpose. The reduction of transaction costs is a key factor, as well as the reduction of non-tradable costs.

Solution-and service-oriented differentiation needs a flexible product development process. By introducing information technology, these developments have come true. Flexible product development follows the following steps: sense customer needs, test alternative technical solutions, and integrate the acquired knowledge into a coherent product design. It is possible to reach a new competitive standard by following these steps. One-to-one marketing and flexible product development are a good differentiation strategy. Among the companies visited, however, only a few companies use information technology in such a way.

Special attention should also be paid to geographic proximity and customer preferences. To be located close to the market is an important factor for constructing a strong trade relationship even in the globalized economy. The location makes easy to find out a way of differentiation because exporters are in a better position to know the market and because the exporter has a great advantage in the distribution network. Solution- and service-oriented differentiation needs to be adaptable to each market and, therefore, the markets of neighboring countries should be given priority when a marketing decision is made. When a company has established an export-base in the South American market, the next target will be the North and Central American markets.

Management characterized by slim and functional organization is also a decisive factor. This concept of solution- and service-oriented products is applicable not only to capital goods but also to intermediate goods and even to consumer products.

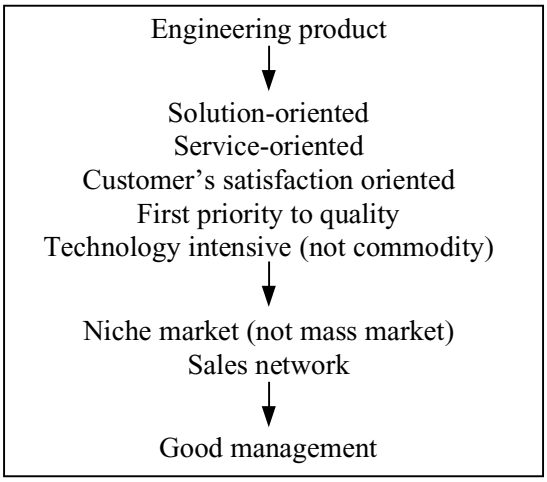


Figure 20.7.2 Option 1: Solution- and Service-Oriented

Box 20.7.3 A Manufacturer of Chemical Products

A manufacturer of chemical products for industrial use makes a five-year master plan and develops export business according to the plan. All the employees are involved in the formulation of this plan, which makes them feel responsible for its implementation. The good organization is one of the sources of their competitive advantage in export.

3) Option 2: OEM supplier or license holder

One of the surveyed companies has become an OEM supplier or license holder. They sell their products under the brand names of multinational companies or strong players in importing countries. By the OEM system, the Chilean company is assured of productivity with substantial amounts. This means that the company targets the mass market, but it is still necessary to provide products of high quality at a reasonable price. Under the OEM system, the Chilean company procures products exported from China and other countries and export them, in turn, under their customers' brands. In this case, the Chinese supplier is their OEM and the Chilean company is their customer's OEM. Chile's open economy has created such complicated business.

License production will fall under this category. Many companies manufacture their products under contracts with license owners. As long as the license has a power in the market, it will bring stable export business to the license holder. However, the license production has two disadvantages. First, the license holder is bound to the license owner's policy and not free to export their products to the markets in which they want to sell. In general, the export territory is limited. Second, if the license owner's technology or brand loses its power, the license holder will also lose the power. It is important to assess the competence of the license owner.

Option 2, *prima facie*, appears be easier to follow. However, it may turn out to be difficult to get the confidence of multinational companies. Chilean companies are in a good position to be assigned as OEM suppliers or license holders. This is because a reputation has been established that Chilean products are of good quality to meet strict requirements by their customers at reasonable prices.

These two options are not exclusive to each other. Some companies may follow both strategies and succeed, but those following Option 2 should also aim at Option 1.

(2) Strategic Alliance with Multinationals and/or MERCOSUR Players

1) Advantages of alliances

There are four advantages in making alliances. First, alliance with multinationals becomes a source of prestige. Secondly, this is a way to hold a substantial share of the export market. Thirdly, it is possible to evade price competition, even though strict quality control is required. Finally, it is easier to become a beneficiary of technology transfer, including management know-how. Chilean companies can transform themselves into export-oriented ones with the help of multinationals.

2) Strategic alliance with Asian companies (indirect export to Asian countries)

It is not so easy for Chile to export solution-oriented manufacturing products to Asian

countries due to the long distance between Chile and Asia. However, it may be possible for Chilean companies to export their products to Asian multinational companies on the American continent. For example, the business activities of many Japanese companies have become global and they operate factories in countries on the American continent, e.g., the United States, Canada, Mexico and Brazil (Table 20.7.3). Some Korean companies are following the same strategy. Now that Chilean companies have become leaders in South America, their next target customers should include Asian companies operating in South America.

Table 20.7.3 Number of Japanese Companies Operating on the American Continent

	Canada	USA	Mexico	Panama	Brazil	Argentina
Manufacturing	145	1,799	141	4	212	11
Commerce	179	1,723	66	49	117	27
Banking/Insurance	21	247	6	16	23	2
Service	21	639	10	8	35	2
Above total	366	4.408	223	77	387	42

Source: *Toyo Keizai Data Bank*, 2000.

Export to these factories is partially indirect export to the Asian market. This kind of trade is useful as a step to increase exports to Asia, though not many Chilean companies seem to be aware of its strategic importance. Chilean companies have to pay attention to multinationals of Asian origin and strengthen their sales promotion to these potential customers. The handicap of distance would be dissolved. Chilean companies play a role supporting industries for these multinationals including Japanese ones. Why should not Chilean companies consider becoming OEM suppliers for Asian companies?

For example, a Chilean company plans to produce OEM goods with imported Japanese machinery for Japanese corporations in Mexico. The Japanese buyers will feel the assurance of the quality of such products. This is a way for a Chilean manufacturer to get orders from Japanese buyers.

Box 20.7.4 A Label Manufacturer

An influential Chilean manufacturer of labels exports its products to sales networks of a multinational perfume company of French origin in the South American market. This is indirect export to the European market. Why could not Chilean manufacturers export their products to the sales networks of Japanese companies in Mexico? In this case, the export is to Mexico. The company can save a lot of money thanks to the FTA in force.

Box 20.7.5 Parts Supply: A Supporting Industry

Any kind of mechanical part is manufactured and delivered to customers within one week. The customers are Japanese factories located in Mexico, Brazil and Argentina. If necessary, several manufacturers could form a special purpose company so as to meet the order. The business concept is that of a "supporting industry."

3) Strategic alliance with MERCOSUR players

Chilean companies' counterparts for alliance are not limited to multinational companies. Chilean companies should also look for alliances with MERCOSUR players. For example, Argentina shares problems with Chile as far as trade issues are concerned.

Their domestic market is not so large with the relatively small population. Both countries are endowed with natural resources and there are many natural-resource-based processing industries. However, the Argentine machine processing industry is not competitive. They import most of the machines from Italy and the United States. As a matter of fact, there is a possibility to cooperate between Chile and Argentina. One example is to cope with multinationals and/or suppliers in Italy and the United States by forming alliances among machinery manufacturers in both countries.

Box 20.7.6 Alliance with Argentina

A Chilean manufacturer of food processing machinery cooperates with an Argentine manufacturer of similar food processing machinery. The Chilean manufacturer exports its products through the sales network of the Argentine manufacturer when the latter can not supply the products. On the other hand, the Argentine manufacturer exports its products to other areas of the sales network of the Chilean manufacturer. By doing so, the two countries together can beat imports from other countries. The question is whether it is efficient from the economic point of view. If both manufacturers' products are less competitive, they will lose. Therefore, it is necessary to set a benchmark. Both manufacturers are required to achieve the efficiency target based on the benchmark.

(3) Strengthen Sales Networks in Arica or Iquique

With the development of regional integration between the northernmost zone of Chile and neighboring countries, the importance of the macro-regional market will increase. Exporters will feel it necessary to expand and strengthen their sales activity in the macro-region since the exportable products from Chile to the region will be mainly for a niche market, not for a mass market. An export base in Arica or Iquique would be convenient for those who intend to intensify their export operations in the macro-region.

20.7.3 Strategy for Development of Innovative Industries

(1) Types of Innovative Industries

It is urgent for Chile to foster "stars" business, though there are many "cash cow" products at present. Without “stars”, it will face a dismal situation in ten years.

Box 20.7.7 SONDA: A Software Company

SONDA is the biggest software company in Chile. It was established in 1974 and has become one of the biggest companies in Chile. The privatization of the pension fund system made it possible for the company to become the number one in this field, since they developed special software for the pension fund administration. Chile led the privatization of such systems among the neighboring countries. In this sense, it developed a new industry. It holds competitiveness in export since this new industry was originated.

Key words for the Chile’s innovative industry will be human capital, gateway and materials (Table 20.7.4). They are Chile’s three main resources and should be given special attention. Chile has many potential ports, endowed with various materials and abundant good management, but its successful industries will be those that are innovate

and make full use of these advantages.

Table 20.7.4 Keywords for Innovative Industries

Human capital	Gateway functions	Materials
• Data analysis • Insight into environment • Sophisticated data base • Engineering • Creation of new business concept • Creation of new business • New center of "brain-facturing" • Headquarters in South America • Full utilization of universities' potential • Full utilization of the capacity of universities	• Information on the flows of cargo and vessels • Information on behavior of major corporations • Information on neighboring countries • Flow of people • Data base • Phytosanitary problem and drug dealing problem • Diversified services • Tourism • Privatization know-how • Know-how of port management • Supporting industries • Engineering	• Information on species • Information on deposit • Overwhelming information on mining projects • Information on material industry • Data base • Use of materials • R&D activity • Diversified services • Primary industry and manufacturing • Engineering

Source: Elaborated by the JICA Study Team.

The following are some examples of Chile's innovative industries.

1) Industries related to the gateway function

With the development of regional integration, there may be new industries emerging to support the integration. Although the size would be small, in the case of a new industry, it is highly possible that the industrial products will be exported to neighboring countries. This is because the industry will hold an advantage as an originator.

With the development of regional integration under MERCOSUR and NAFTA, it can be expected that many cargoes will converge to Chilean gateways and that many new types of industries will have a chance to grow. Such industries include logistics, packaging, material handling, engineering, spare parts, supporting, information technology and various kinds of services.

2) Development of material-related industries

Development of new usage of materials

Chile is endowed with various types of materials ranging from minerals, forest resources, fish and agricultural materials. Some of them are those only Chile owns. Some companies have paid attention to these specialties and have developed new products by using them as raw materials. Although their exports are currently still negligible, the specialties can be developed into new export products. Chile can command the world market, however small, if they are new and scarce. There is a big potential for Chile to become a front runner in these fields.

Clean production development

Chile has started to introduce clean production processes into manufacturing industries. If the country succeeds in this filed, it will enhance its international competitiveness

since clean production can substantially reduce the total cost of production. Chile's strength is its abundant availability of raw materials. Processing technology itself is important because the materials become useful only after being processed into other products. A totally clean industry that fully utilizes by-products and manages wastes should be established. The introduction of clean production process has just begun around the world and, therefore, there is a chance for Chile to become one of the pioneers in this field. The country will be able to develop and export technologies for clean production by the concentration of human and financial resources in this filed. Chile's engineering capability will facilitate the development of clean production.

However, there are two problems for the acceleration of the clean production process. First, the majority of Chilean enterprises are not so conscious about environment conservation as enterprises in developed countries are, though the situation is changing. It is advised for the related government agencies to take more stringent environment conservation policies and measures. Second, the cost for technology development for the clean production process is so high that only a few large enterprises can afford to get engaged in the work. The burden is too heavy for SMEs. It will be necessary to design a new scheme under which even SMEs can get access to the technology. As a case of clean production, the JICA Study Team proposes a scheme to solve the net workshop problem existing in the salmon industry of the South Zone in Section 19.4.3 in Chapter 19.

CORFO has been supporting the development of clean production technology, but it must accelerate the process by sponsoring a ten-year program with a definite target. The clean process development should be carried out principally by the private sector with technical assistance from universities. The program can be formulated as a cost and benefit sharing scheme, for example, the costs and benefits can be shared, one third for each, by CORFO, universities and private sector.

Development of machinery industry related to natural-resource-based products

Chile has not fully developed processing and manufacturing machines even for natural resources. The suppliers of machinery are sometimes multinational companies with a large market share, as well as a large scale of production. Chilean suppliers cannot compete with them. The present situation of the machinery industry can be partially explained by the underdeveloped processing industry (Figure 20.7.3). Chile still exports a large part of its natural resources in an unprocessed form. Therefore, the first strategy for the development of the machinery industry is to enhance the value added of natural resources. In other words, it is a matter of developing processing industries. If this is done, the domestic demand for processing machines will expand.

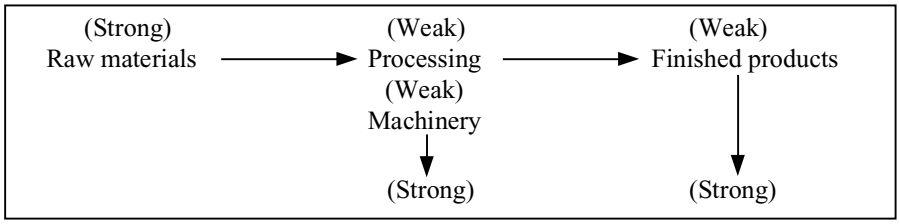


Figure 20.7.3 Necessity of Machinery Industry

It is significant to foster the processing machinery industry since the best equipment must be used in the production process in order to obtain high quality natural-resource-based products. Without the development of the machinery industry, the cluster of material-related industries remains small and weak. Chile imports a substantial amount of capital goods (Table 20.7.5). Some of these imports would be replaced by domestic products upon the development of machinery industries related to natural-resource-based products. This suggests that the domestic market for these products has a high potential. Furthermore, it is expected that Chile will become known for and competitive in the export of these capital goods.

Table 20.7.5 Imports of Capital Goods (CIF, US$ millions)

Year	Imports
1995	4,187
1996	4,773
1997	5,489
1998	5,117
1999	3,296

Source: Central Bank of Chile, *Monthly Bulletin*, various issues.

Box 20.7.8 YKK of Japan

YKK is the largest zip manufacturer in the world. The company manufactures zippers in their 84 factories all over the globe. The corporate philosophy of the company is to manufacture and supply products of the best quality. They started to produce their own machinery in order to ensure the quality. However, the company was still not satisfied with the quality and went as far as producing the raw material they needed, which is aluminum.

With the disappearance of basic metal mechanical industries in the past, it is difficult to recommend that every part of the machine from foundry to casting should be produced domestically. Therefore, the following two strategies should be pursued.

One is a strategy for the process. First, Chile designs products with excellent engineering and imports the necessary parts at the lowest price from the world and then assembles them into complete products. Secondly, the core parts should be manufactured domestically because it is necessary to secure the best quality of the products.

The other is a strategy for alliance and integration. In developing solution-oriented manufacturing industries, it would be efficient to make full use of the technology accumulated in the mining sector, some state-owned enterprises and universities under alliances and integration programs. Potential core companies are state-owned enterprises and around 20 mining companies that exported spare parts for the mining sector to foreign countries for an amount of US$50 million in 1999. Although the areas to be developed are quite different from the mining industry, there are some common features between the spare parts manufactured by them and spare parts needed in other industries such as food processing or wood processing. This is one of the strategic alliances between the mining industry and other industries.

In the areas of development of new use of materials, universities would be one of the key actors. The University of Concepción has already engaged in several biotechnology development projects in cooperation with the private sector. In the past, the university used to develop the technology and then to bring the technology to the private sector. At present, it discusses the target for development with the private sector, by which more strategic development in biotechnology has been made possible.

It is often said that it is rather difficult to unite Chilean companies under some kind of cooperative scheme because they prefer to be independent. However, it is possible to cope with this problem by incorporating a special purpose company. The companies involved will organize another company with a view to achieving a certain purpose. By doing so, these companies can keep their independence. The participation of a foreign company in the special purpose company is also welcome. The integration should be deepened from a horizontal one to a vertical one.

Petrochemical industry

Talcahuano has stepped into a petrochemical complex by the establishment of a polypropylene factory in the area, though some basic derivatives are still lacking. There is a possibility that the petrochemical based-industry will develop further since there are other investments for the production of naphtha derivatives. In particular, there is a good opportunity for the plastic industry because demand for plastics is expected to continue growing with new uses. It is also anticipated that the industry will expand its exports to the South American market.

3) Human capital intensive industry

One of industries relevant to Chile's three main resources, i.e., human capital, gateways and materials, is no doubt the information industry. Chile as a whole is already equipped with a significant number of computers. Chilean companies and industries are accustomed to using computers and information technology. However, it seems that they are not good at industrializing or commercializing information. Therefore, a potential industry to be developed is one that industrializes and/or commercializes various kinds of information obtained from the economic activities related to the gateway functions and new materials. Certainly, such an industry will be largely based on human capital. Details of the development of the information technology industry are discussed in Chapter 21.

(2) Strategy for Promotion of Foreign Investment

Massive investment will be needed in order to develop innovative industries. It is especially necessary to attract foreign investors who are willing to make use of Chile's excellent human capital with their technologies. Every kind of foreign direct investment brings about technology to some extent and creates job opportunities in the host country. However, what Chile really needs is "high quality" investment by "strategic partners." The most important strategy for investment promotion is therefore to identify the "strategic partners" for Chile and invite them quickly. Strategic partners differ by area. Japanese companies may be selected in the areas of information technology and the development of material-related industries. Qualifications for strategic partners will be as follows.

- Commitment to a long-term relation
- Dedication to Chile's economic development
- Contribution to the development of Chile's human capital
- A sound and innovative technological base
- Competent management
- Effective marketing strategy with experience in export business
- Strong international competitiveness

In order to attract investment of high quality by strategic partners, it would be necessary for the Chilean government to change the way to approach prospective investors. Instead of publicizing the favorable investment climate in general, Chile will need to concentrate on some specific areas and specific projects. Chile should internationally announce that it is looking for strategic partners for the development of really innovative industries. In order to call for such investment, Chile needs to identify strategic projects where foreign investments are required and prepare proposals for investment promotion. The Foreign Investment Committee could provide a list of investment projects to potential investors all over the world through the Internet.

20.8 Government Support

The above-mentioned strategies should be followed by the private sector basically. The principal role of the government is to *encourage* the private sector to become more export-oriented. However, it is necessary that the government sectors provide some support to SMEs to become an export-oriented company by appropriate export strategy.

(1) Assist SMEs for Conversion through Professional Consultation

CORFO and ProChile develop a case method for SMEs' successful conversion to an export-oriented company with cooperation by ASEXMA, ASIMET and business schools of universities. Using the case method, professional consultants are trained on how to proceed the conversion, as well as CORFO, ProChile, ASEXMA and ASIMET. Trained professional consultants assist SMEs in their conversion.

CORFO currently provides similar services to SMEs through such schemes as the Technical Assistance Fund (FAT) and the Management Support Program (PAG). The proposed scheme are different in: 1) Professional business schools develop the case study method; 2) The case study focuses on how SMEs successfully convert to export-oriented companies; 3) It includes financial engineering on how to finance the conversion project; and 4) Target companies will be selected with a strategic view due to the limited funding and handling capability of CORFO and ProChile. First priority should be given to the companies in Tiers 2 and 3 indicated in Table 20.8.1. Companies in Tier 1 will not need much support because their export business is deemed to be in the right track. On the other hand, companies in Tier 4 are given second priority because their export business is supposed to be just emerging. For the purpose of the selection, exporters' performance and their profile are analyzed in detail.

Table 20.8.1 Exporters by Export Value in 2000

(1) Machinery and equipment

Tier	Export of each company (US$)	No. of enterprises	Share (%)	Total export (US$1,000)	Share (%)
4	- 100,000	1,010	85.3	7,854	5.2
3	100,000 - 1 million	150	12.7	36,412	23.5
2	1 million - 10 millions	22	2.0	87,361	56.3
1	10millions -	2	0.2	23,293	15.0
	Total	1,184	100.0	147,066	100.0

(2) Transport materials

Tier	Export of each company (US$)	No. of enterprises	Share (%)	Total export (US$1,000)	Share (%)
4	- 100,000	273	86.4	3,841	1.6
3	100,000 - 1 million	31	9.8	9,492	4.0
2	1 million - 10 millions	7	2.2	27,028	11.4
1	10millions -	5	1.6	197,432	83.0
	Total	316	100.0	237,793	100.0

(3) Metal manufacturing products

Tier	Export of each company (US$)	No. of enterprises	Share (%)	Total export (US$1,000)	Share (%)
4	- 100,000	511	84.9	5,552	2.8
3	100,000 - 1 million	62	10.3	20,887	10.8
2	1 million - 10 millions	25	4.1	58,119	29.3
1	10millions -	4	0.7	113,699	57.1
	Total	602	100.0	198,255	100.0

(4) Chemical products

Tier	Export of each company (US$)	No. of enterprises	Share (%)	Total export (US$1,000)	Share (%)
4	- 100,000	283	80.9	2,050	2.4
3	100,000 - 1 million	53	15.1	21,779	25.1
2	1 million - 10 millions	13	3.7	49.086	56.6
1	10millions -	1	0.3	13,856	15.9
	Total	350	100.0	86,769	100.0

(5) Rubber and plastic products

Tier	Export of each company (US$)	No. of enterprises	Share (%)	Total export (US$1,000)	Share (%)
4	- 100,000	608	88.6	6,751	5.6
3	100,000 - 1 million	62	9.0	19,219	15.8
2	1 million - 10 millions	14	2.0	30,523	25.1
1	10millions -	2	0.4	65,194	53.5
	Total	686	100.0	121,687	100.0

(6) Total of (1) - (5)

Tier	Export of each company (US$)	No. of enterprises	Share (%)	Total export (US$1,000)	Share (%)
4	- 100,000	2,685	85.6	26,048	3.3
3	100,000 - 1 million	358	11.4	107,789	13.6
2	1 million - 10 millions	81	2.6	244,259	30.9
1	10millions -	14	0.4	413,474	52.2
	Total	3,138	100.0	791,570	100.0

Source: Elaborated based on ASEXMA, Statistics database, January 12, 2001.

(2) Assist SMEs for Conversion by Private Equity Finance

It is expected that new professional management people participate in the management of non-export-oriented companies. To enhance the chances of their participation, it is necessary to create such an environment. One of these measures may be to establish private equity finance institutions that extend finance for Management Buy-Out (MBO), Leveraged Buy-Out (LBO), or Redeemable Preferred Stock (RPS). These financial schemes are illustrated in Figures 20.8.1, 20.8.2 and 20.8.3. Chile's market for these kinds of finance is not well developed at present, but it will be needed in the not too distant future. CORFO could contribute to the acceleration of the conversion by providing necessary funds to the private financial institutions as a third tier agent.

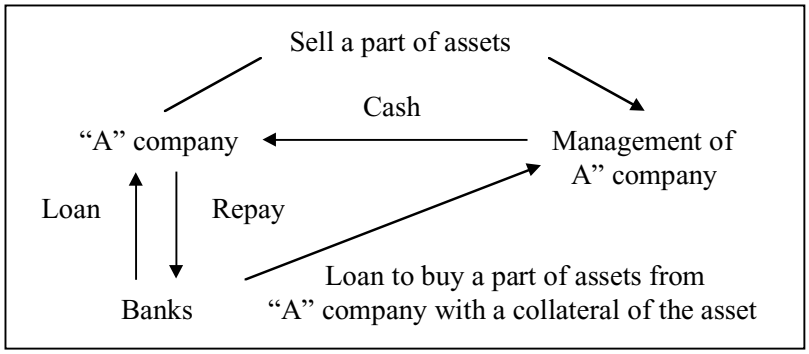


Figure 20.8.1 Financial Scheme for Management Buy-Out (MBO)

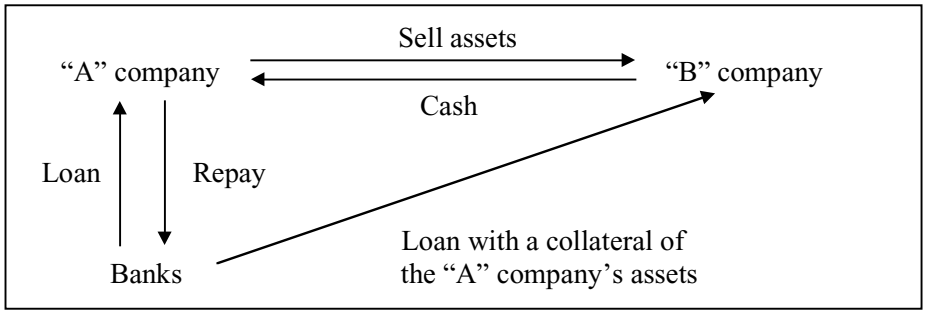
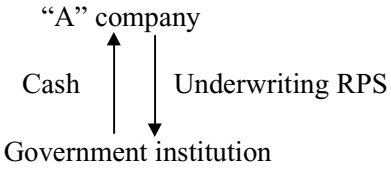


Figure 20.8.2 Financial Scheme for Leveraged Buy-Out (LBO)

(1) Scheme



(2) Terms and condition
1) Redeemable: for example 10 years
2) Dividend: for example 7% preferential to common stock
3) No voting right
4) Prepayment is allowed.

(3) A case in Japan: Underwriting redeemable preferred stock (1950)

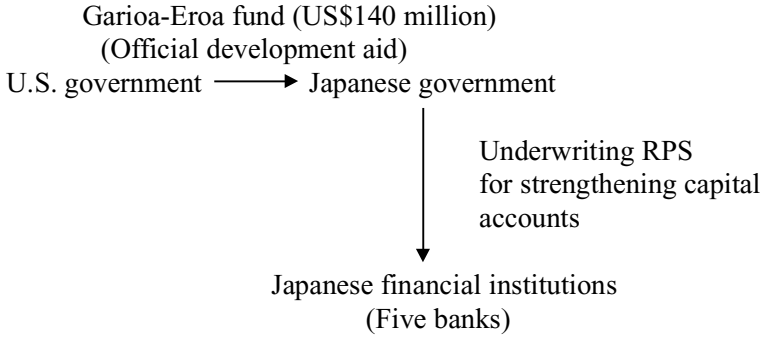


Figure 20.8.3 Financial Scheme for Redeemable Preferred Stock (RPS)

(3) Assist SMEs for Export Strategies by Extending Professional Consultation

Professional consultation similar to one stated in (1) above is extended to SMEs formulating their export strategies. The difference lies in that the quality of service is one of the key areas. This is because service becomes more important in export business and the "quality of service" is quite different from the "quality of product". Training on financial engineering will also be excluded. The mechanism of developing the case study and training with the method is the same as the consultation services for conversion to an export-oriented company. The way of selecting target companies is also the same.

(4) Assist SMEs for Export Strategy by Managers Training Program

By nature, the export strategies are formulated by companies themselves. However, support from the government is necessary and important for SMEs. CORFO is to give advice on the formulation of export strategies. Like in the conversion program, CORFO develops case methods on how to formulate export strategies in cooperation with ProChile, ASEXMA, ASIMET and business schools of universities. Using the method developed, professional consultants train SMEs' management people on how to formulate export strategies.

In addition, the government will design and implement a management exchange-training program through international cooperation on a government-government basis. Currently, there is no such program, though there many training programs by international cooperation. SMEs' managers are sent to companies overseas that are successful in their export business to study how to formulate export strategies. SMEs may also receive foreign managers with expertise in formulating export strategies for training their managers. In providing these services, priority is given to the companies of Tier 2 and 3 indicated in Table 20.8.1

(5) Strengthen information service to SMEs

With the development of SMEs' internationalization, the chances increase that SMEs receive orders from various countries. However, it is difficult for SMEs to collect necessary information on such points as the credibility and reliability of the importers (countries and companies) and their business custom and characteristics that a Chilean company should take into consideration. This is especially true when the importers are located far from Chile as Asian countries are.

ProChile is requested to provide necessary information to SMEs. However, it is difficult and inefficient for ProChile itself to be always prepared to provide every kind of information on every country because information needed by SMEs varies by type of export and destination. Therefore, it is advised that ProChile should provide information on "who knows most about the importer (the country)", instead of the information itself on the country, by preparing a list of "information sources". Based on the information provided by ProChile, SMEs will contact the right person or organization for necessary information about the importer. ProChile's role is to keep contact with the information sources and create a good environment under which SMEs have easy access to the sources. The cost for such assistance is not so high.

(6) Establish Chilean Image Worldwide: "Made in Chile"

In contrast with its natural-resource-based products, Chile's solution-oriented manufacturing products are not well known in the world market. These products do not capture the attention of foreign customers due to the lack of information on their quality. It is therefore necessary to establish a clear image to earn trust and confidence from customers. The reputation of Chile's strength, i.e., engineering capability, must also be spread worldwide. The image will help Chile's companies to become OEM suppliers or license holders for multinational companies. A good image is a kind of "external economy" and one of the national assets.

The government, not the private sector alone, should play an important role in establishing a good image of Chilean solution-oriented manufacturing products. The government should help the private sector to clarify the concept and diffuse it to the world. One of the most important factors for accomplishing this task is a long-term commitment of the government since it takes a long time to build an image. The government, the private sector and universities make alliance to achieve the goal. Universities' engineering capability should be further strengthened and advertised more to the world.

Chile lacks industries that make a campaign to establish a good image in the world market with a will to become a first-class exporter in this field. If there is an industry in which such a will is embodied in its engineering activity, the campaign will not be so difficult. It will be necessary to focus on Chile's campaign effort for the image in areas with outstanding engineering capability such as energy, environmental, mining, transport, metal mechanic, chemical, wood, fishing and software engineering.

ProChile's effort has not been sufficient for solution-oriented manufacturing products, while it has made a great contribution to enhancing the image of Chile's natural-resource-based products. It is advised that ProChile should try to focus its export promotion on solution-oriented manufacturing products, though there are not so many of them at present as compared with natural-resource-based products. ProChile should, for example, design a common logotype that identifies the product as a Chilean one to promote engineering capital goods in the world market. Exporters of solution-oriented manufacturing products can use the logotype when they export their products. Key words for the logotype may include:

- Engineering capability
- Solution- and service-oriented
- Serious commitment

(7) Create Favorable Environment for Innovative Industries

1) Lift of a 35% additional tax on professional service import

The government may need to concentrate its resources in the areas related to solution-oriented manufacturing by allocating more funds for research and development (R&D). The "fund" does not necessarily mean a subsidy. The funds that can be provided for that purpose are rather limited and the allocation of public funds to R&D activities is only 0.7% of GDP in Chile at present. In order to overcome this problem, the

government follows a strategy of spending money for the creation of an environment that can attract foreign investment for the development of innovative industries. This strategy is well organized, but there are other ways to overcome the problem. Inviting foreign professionals is an example, though such a program has a problem that an organization that invites foreign professionals must pay an additional tax of 35% on the personal income for a stay less than six months. It is suggested that the government should remove this regulation. As a part of the open economic policy, import duties was reduced to 9%, but the import duty on professional services is still high. This situation seems to contradict the economic policy.

Government support is not confined to R&D by the private sector. The government should also be an export promoter when other governments are the main buyers of the product. It is hard to earn the trust of potential importers because a new product tends to lack an internal market test in Chile. The government should provide a chance to the exporters by becoming a test market itself. It could also award a certificate based on the test.

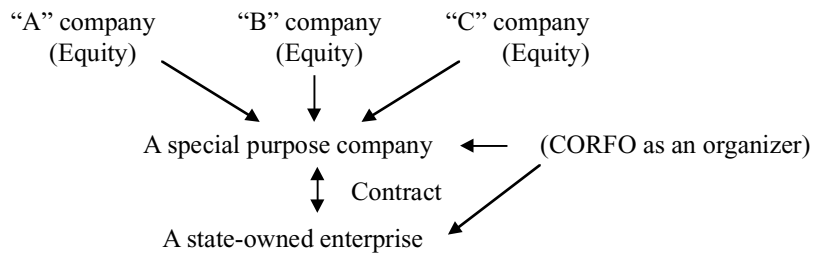
2) Organizing alliance and integration program for the machinery industry

The government assists the private sector in developing the machinery industry by organizing alliance and integration programs among the private and state-owned enterprises concerned. This is different from the existing government support, such as CORFO's instruments for technological innovation (FDI) and clean production, in the three points. First, it is expected that CORFO functions more actively, that is, CORFO identifies a project and organizes the parties concerned with the project. Secondly, strategic projects are selected from various projects. Thirdly, emphasis is given to the development of machinery-related industries as illustrated in the following two cases.

Case1: Alliance with A State-owned Enterprise

A state-owned enterprise decides to procure machinery or its core parts from a group of domestic suppliers under the conditions: 1) The price is not higher than that for imported products; and 2) The quality is not inferior to imported products. A domestic supplier can become a member of the group only when it has obtained quality and environmental certificates such as ISO 9000, ISO 9001, ISO14000 and ISO14001. The enterprise then transfers its technology if it is requested. The domestic supplier is awarded a certificate for their participation in the program. CORFO coordinates the alliance and integration program. Other companies, which are not directly involved in the project, will support the participants by supplying some related products to the participants. The participants will then organize a special purpose company that will make a contract with the state-owned enterprise for the work as shown in Figure 20.8.4.

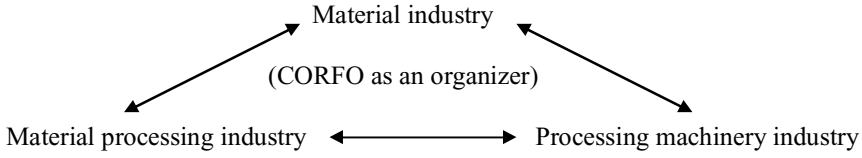
Figure 20.8.4 A Special Purpose Company



Case 2: Alliance among Material-related Industries

An alliance is organized among the material, material processing and processing machinery industries. The purpose is to integrate the whole process of material related industries from upstream to downstream including the machinery industry. The material industry and the processing industry develop a new use of the material and a new clean process, respectively, while the machinery industry develops machinery supporting the former two activities. Since this trial is quite new, it is expected for foreign companies to join the alliance and integration program as strategic partners for R&D investment. CORFO selects a strategic project and makes a development plan for the project and organizes it as shown in Figure 20.8.5.

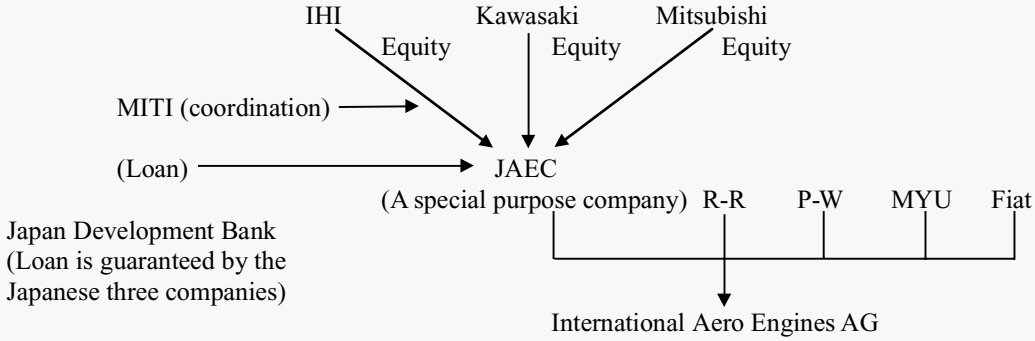
Figure 20.8.5 Alliance and Integration



Box 20.8.1 V 2500 Project in Japan

The Japanese aerospace industry developed a new engine for commercial airplanes in cooperation with worldwide engine manufacturers with support from the Ministry of International Trade and Industry. This project was called the XJB Engine Development Project or V 2500 Project. The outline is as follows.

(1) Started in March 1980
(2) Participants: IHI (Japan), Kawasaki Heavy Industry (Japan), Mitsubishi Heavy Industry (Japan), Rolls Royce (UK), Pratt and Whittney (USA), MYU (Germany), and Fiat (Italy).
(3) Structure



(4) Work share : Japan 23%, R-R 30%, P-W 30%, MY U 11%, and Fiat 6%.
(5) Commercialization : 38 orders from Pan American Airway in 1985 (287 orders from all over the world at the end of 1988).

3) Industrial cooperation agreements

Regional governments and CORFO could make a contribution to the investment promotion of innovative industries by concluding industrial cooperation agreements with Japanese banks. Although Japanese banks' behavior have changed dramatically due to some structural adjustments in the Japanese economy, the relation between banks and their corporate customers is still strong in Japan. Japanese banks hold information

about their corporate customers that range from their financial situation and future business plans to their needs for finance and investment. This is because major funding sources are still loans from banks.

The industrial cooperation agreements aim to: 1) introduce Japanese potential investors to local industries in the regions of Chile; and 2) introduce Chilean exporters to Japanese potential importers. A Japanese bank concluded such agreements with about 40 regional governments in the United States and European countries. These agreements were concluded on a non-exclusive base and the parties concerned had no obligation. The scheme of the bank ceased to work in 1990 because of some changes in the Japanese economy. However, the framework seems to be workable and useful.

Box 20.8.2 Alliance in the Japanese Maritime Industry

The Japanese maritime industry used to be strong with the No. 1 or 2 position in the world market before the World War II. During the war in 1940-45, however, the industry lost 2,503 vessels with 8,290,813 gross tons. At the end of 1945, the remaining capacity of the vessels was only 1,1702,000 gross tons. After the war, the Japanese government took a policy to reconstruct vessels by extending strong financial support for the industry. Owing to the policy, new 35 vessels with 2,322,918 gross tons were built in the period of 1947-56. The finance was extended to every maritime company that wanted to build vessels without assessing their competitiveness. Therefore, the international competitiveness of the industry remained low, though the volume of vessels built cleared the target.

When the market began to turn to sour, the Japanese maritime industry deteriorated their financial position with severe competition from the United States, United Kingdom and other developed countries. The government recognized that a new policy was inevitable. In 1960, the maritime industry reorganization law was enacted. The law prepared supportive financial measures, which were different from the previous ones in the sense that special and preferential finance could be only given to companies who were ready to enhance their competitiveness by merging with their competitors and increasing their scale of economy. The fundamental condition was that only core companies with vessels of more than 500 thousand gross tons and only groups with vessels of 1,000 thousand gross tons were entitled to the preferential finance. The 16 core companies were integrated into only 6 companies as is shown in Table 20.8.2. The Japanese maritime industry regained its international competitiveness, but the industry faced another crisis after 1971 due to the appreciation of yen. Further reorganization proceeded and the industry was finally integrated into only 3 core companies. This case reveals that subsidized or preferential finance should be given only when it serves to enhance the competitiveness of the industry

Table 20.8.2 Maritime Companies in Japan and Their Capacity

	No. of vessels in core co.	G/T(1,000)	No. of vessels in group	G/T(1,000)
Shosen Mitsui	83	1,235	197	2,325
Nihon Yuusen	78	1,046	153	2,279
Kawasaki Kisen	55	433	104	1,552
Japan Line	53	897	69	1,056
Shouwa Kaiun	31	609	54	1,017
Yamashita Shinnihon	45	570	85	1,114

Source: Japan Ship Owners Association, *Fifty Years History*, 1997, pp. 125-126.

To Japanese banks, there is an advantage, that is, most of them count on an investment banking division and they are ready to do this kind of business.

4) Assist private companies in looking for strategic partners

The government makes an every effort to find strategic partners for the development of innovative industries in Chile. Approach by government high-ranking officials may be useful and necessary. The government promotes investment with proposals for strategic projects.

(8) Support SMEs' Access to Information Technology

The nation's total productivity will be enhanced by the introduction and full use of information technology (IT). There is no major problem in getting access to IT in Chile, though there is still room for the better use of IT by Chilean companies. The issue is how to increase the use of IT by SMEs. Government support may be necessary to facilitate SMEs' access to information technology (For more detailed information on this issue, see Chapter 21).

(9) Improvement of Access to Finance of Non-Traditional Industries

ASEXMA stresses that it is difficult for a private entrepreneur to materialize it even if he/she has a good export strategy or plan. This is because it is not easy to obtain the necessary funds, especially for the export of solution-oriented manufacturing products, since not many financiers are knowledgeable about the non-traditional sector and they do not want to take risks. Even if they dare to take a risk, the term would be one year at longest. It is necessary to improve such a situation by identifying the problems of Chile's current financial system as the JICA team often heard similar comments throughout this study.

(10) Publicize Strengthened Clusters

In order to demonstrate the strengths of Chilean industries to the world, it is necessary for the country to consolidate at least a few industrial clusters. CORFO has designed some industrial development centers, e.g., Concepción as a center for the engineering industry. ProChile can also advertise the clusters when it promotes the export of solution-oriented manufacturing products. Table 20.8.2 shows four potential industrial clusters found in Chile, though they should be considerably strengthened and amplified.

Box 20.8.3 Industrial Clusters in Japan

Some cities are famous for their industrial knowledge accumulation in Japan. For example, Tsubame City in the Niigata prefecture is famous for silver hardware. Suwa City in the Nagano prefecture is famous for precision instruments such as watches. Oota Ward in the Tokyo Metropolitan Area is also famous for its cluster of unique SMEs. Everybody knows these cities and what their strengths are.

(11) Government's Initiative

The Chilean government has a strong commitment to the export promotion of non-traditional products. The commitment could be expressed by, for example, its statement on "omnibus competitiveness enhancement".

Table 20.8.2 Major Industrial Clusters in Chile and their Characteristics

	Concepción area	Valparaiso area	Puerto Montt area	Arica area
• Key words	• Human capital • Gateways • Materials (natural resources)	• Human capital • Gateways • Link to Cuyo, Argentina • Link to the Metropolitan Region	• Human capital • Materials (natural resources)	• Human capital • Gateways • Macro-region
• Key industries and organizations	• Metal mechanic industry • Petrochemical industry • Cement industry • Shipbuilding • Engineering service • Pulp and paper • Universities	• Information and media industry • Professional and diverse business services • Information technology industry • Tourism • Universities	• Fisheries • Aquaculture • Engineering service • Tourism	• Automobile industry • Education • Medical services • Tourism
• Key actors	• ASMAR • Universities • Supporting industries for copper mining	• Universities • Shippers	• Aquaculture companies • Engineering companies	• Bolivian and Peruvian companies and investors • GM
• Characteristics	• Material-related industries	• Professional and diverse business services	• Eco-products • Salmon cluster	• Gateway in the macro-region

Source: Elaborated by the JICA Study Team.

20.9 Action Plans

Figure 20.9.1 shows a total package of action plans to carry out the strategies. Major action plans are a conversion program (A-1) and a development program of innovative industries (B-1). The former program consists of three sub-programs (A-1-1 to A-1-3) and is supported by four related programs (A-2-1 to A-2-4). The latter program consists of two sub-programs (B-1-1 and B-1-2). These two major action plans are backed by the government's manifest for its strong support to export and investment promotion of solution-oriented manufacturing. In executing the action plans, CORFO would carry out the following two tasks.

(1) Organize a Follow-up Committee

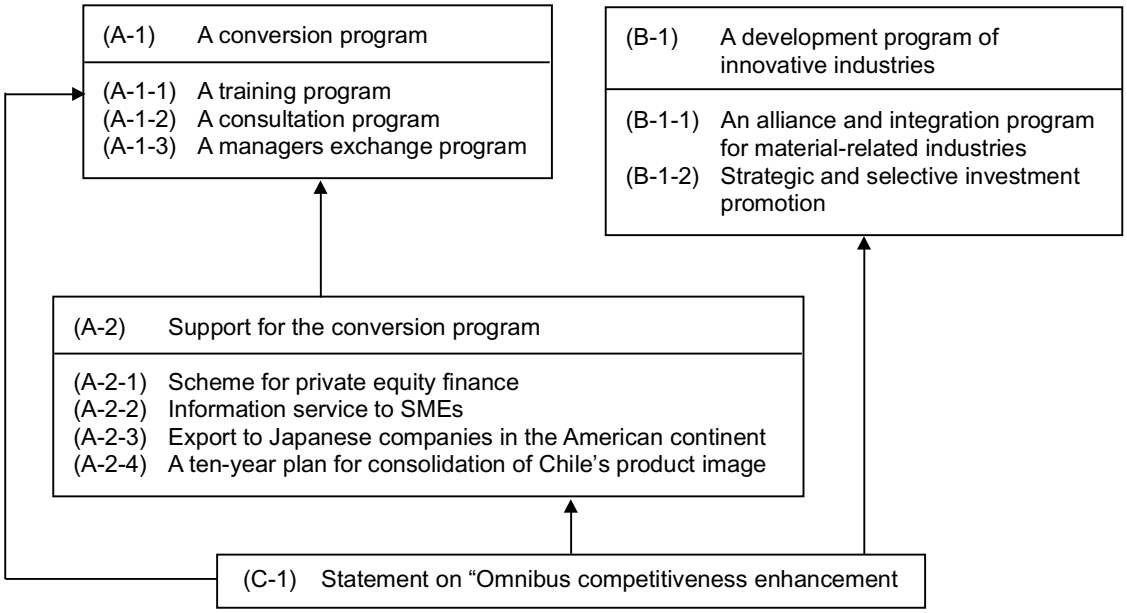
The role of the committee, which would include the Ministry of Economy, CORFO and ProChile, would be to decide how the proposed programs will be carried out. The committee would also be in charge of checking the progress of the project and taking the necessary measures to implement the project.

(2) Set a Five-year Target

CORFO would collaborate with the Ministry of Economy to set a five-year target for the export of solution-oriented manufacturing products by type of commodities, that is

chemical products, and machinery and others, with the support of ProChile. The target figure should be set every year, so that it is easy to follow the performance. It will not be too ambitious to set a target of expanding the export of solution-oriented manufacturing products by double in the next five years. A committee would be established to: 1) review the performance; 2) develop new strategies; and 3) take measures to achieve the target.

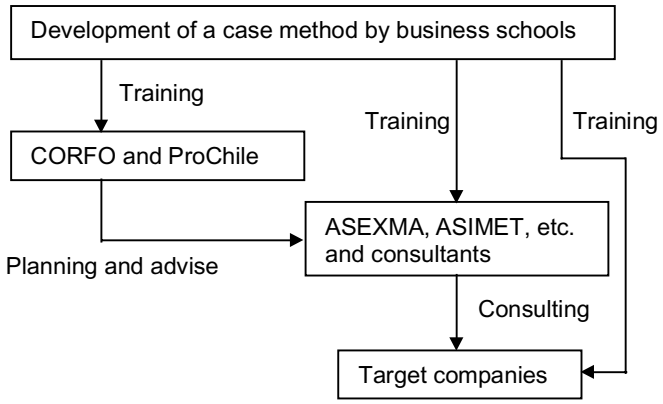
Figure 20.9.1 A Total Package of Action Plans



In making a target plan, the statistical analyses of exporters' profiles conducted by ProChile and ASEXMA, respectively, should be carefully reviewed. It is advisable to pay special attention to exporters by size, considering exports in a range from US$100,000 to US$10 million. These exporters have a great potential to expand their exports, since they already know how to export but, at the same time, still have room for expansion. These exporters are deemed to be apostles to plant the Chilean image on potential importers. If this image is successfully placed on importers, it will become easier, even for smaller companies, to start their export activity. Exporters with an export value larger than US$10 million are already knowledgeable about the business and may not need much advice. On the other hand, exporters with an export value smaller than US$100,000 are less competitive in external markets and, therefore, their priority should be given to the domestic market for the time being.

(A-1) Develop a program for SMEs to accelerate the conversion and formulation of appropriate export strategies

(A-1-1) A training program

Location	All region
Time to be implemented	2002 -
Institutions Responsible for Implementation	CORFO in cooperation with ProChile, ASEXMA, ASIMET and universities
Objectives	To assist SMEs in their conversion from a marginal exporter to an export-oriented company with appropriate export strategies.
Contents of Projects / Concrete Actions to be Taken	(1) Develop a case method and train SMEs with the method in cooperation with business schools (2) The flow of the training is as follows.  (3) Target companies are strategically selected. First priority is given to companies whose exports range from US$100,000 to US$10 million. For the purpose, exporters' performance and their profile are carefully analyzed. (4) Differentiation from the existing similar programs (e.g., FAT and PAG) is made to avoid duplication by focusing on: • SMEs • Conversion to an export-oriented company • "Export strategy": A model • Quality of service • Financial engineering (e.g., MBO and LBO) • Attention to corporate behavior rather than the market (5) Training is Off-JT for 2 months with 50 participants in one class. The number of classes is 2-3. The content is general but basic. (6) The subjects to be studied in the case study are: • The importance of corporate identity and philosophy • How to formulate corporate strategies for export expansion • What are Chile's advantages • How to differentiate their products and services: strategic differentiation for Chilean manufacturers • Solution-and service-oriented with engineering for a niche market • OEM suppliers or license holders for a mass market

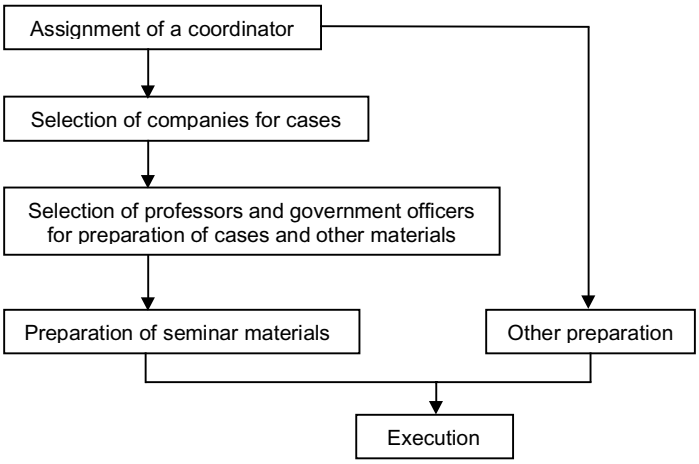
	• Difference between the quality of service and the quality of product and how to improve the former • How to create product and manufacturing concept • How to make alliances with multinationals and/or MERCOSUR players • How to finance the conversion plan (7) Cost sharing is 40:60 between the public and private sectors. (8) The execution plan is to be made not only at country level but also at regional level (9) Benefits of the case study method are to:[1] • Let you learn through experience: simulates real-life situations in limited time and with limited resources • Renew the intellectual excitement that comes with facing managerial challenges. • Give you experience in performing essential managerial tasks: consider complex data, sort facts from opinions, sort important from trivial detail, analyze situations, pinpoint alternative, make decisions, plan actions, work with others, etc. • Point out that complex problems do not have single "correct" answers. • Shows you the necessity of supporting your positions with evidence and reason. • Broaden your perspective and increases your understanding of the relationship among people, things, events and the organization's environment. • Improves your communication and group interaction skills, your ability to convey ideas, to listen to reason and to ask the right questions. • Helps you to develop the ability to identify potential problems and recommend realistic actions and original answers to new problems and new interpretations of old problems. (10) Advantage of the conversion program to CORFO and ProChile is that it enables them to understand the real situation of export by SMEs. They will also have a clue to manage exports and develop new export promotion programs since they are more deeply involved in SMEs' export activities. (11) Details of the operation are provided on the following page.
Expected Effects	(1) The number of companies going out from export business can be reduced to half of the current level. (2) The number of export company will increase by 200 every year on a net base. (3) Exports can be increased by US$70-80 million every year as a target.

[1] Source: Helen Kelly, *Get Results with the Case Method*, Info-Line, ASTD, March 1987.

(A-1-1) A training program: A sample seminar program

Day	Program	Day	Program
1	Orientation	24	Quality of service
2	World economy	25	Case study (1)
3	-ditto-	26	-ditto-
4	Economy of MERCOSUR, NAFTA, APEC and Japan	27	Case study (2)
5	-ditto-	28	-ditto-
6	Necessity of export and investment promotion in Chile	29	Case study (3)
7	-ditto-	30	-ditto-
8	Export and investment in Chile: past performance and their characteristics	31	Case study (4)
9	Function of CORFO, ProChile and FIC	32	-ditto-
10	Corporate organization and structure: SMEs' characteristics	33	Case study (5)
11	-ditto-	34	-ditto-
12	Financial management: general concept and schemes such as MBO, LBO and RPS	35	Case study (6)
13	-ditto-	36	-ditto-
14	-ditto-	37	Case study (7)
15	Methods of formulating corporate strategy	38	-ditto-
16	-ditto-	39	Case study (8)
17	-ditto-	40	-ditto-
18	Internationalization of SMEs: cases for other countries	41	Case study (9)
19	-ditto-	42	-ditto-
20	Chilean competitiveness	43	Case study (10)
21	-ditto-	44	-ditto-
22	Methods of formulating export strategy	45	Evaluation and conclusion
23	-ditto-	46	-ditto-

Procedure for developing a case method



Contents of case materials

1) Outline of the company
2) History of the company
3) Corporate philosophy and strategy
4) Financial position
5) Export performance
6) Export strategy
7) Factors for their success
8) Problems the company faced and decision making on solution of the problems
9) Another alternatives in solution
10) Question to participants in the seminar

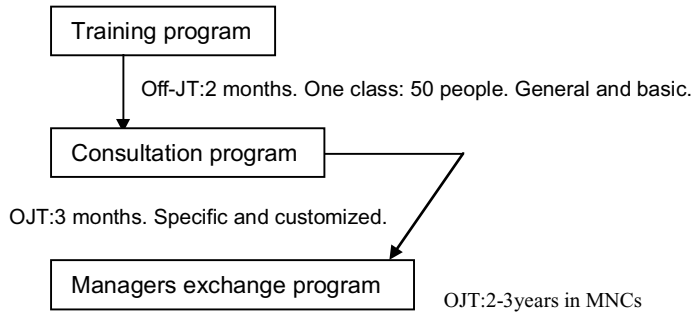
(A-1-1) A training program: Examples of cases for the case method

Company	Location	Product	Keywords
Esmital	Concepción	Metal structures	Solution-business
Bellavista Oveja	Concepción (Tome)	Textile	Conversion to export-oriented company, professional management
ASMAR	Concepción	Shipbuilding	Quality of service
ENAER	Santiago	Airplanes	Quality of service
INDEC	Santiago	Engineering service	Solution-business, customers in less capital countries
Salo	Santiago	Character album	Production under license
Editorial Trineo	Santiago	Graphic industry	Exports to multinationals
Drillco Tools	Santiago	Machine tools	Serious commitment, technology-intensive
SOMELA	Santiago	Electrical home appliance	OEM supply, export strategy
Shaffner	Santiago	Distribution transformers	Serious commitment, adaptability to local needs
ARMAT	Valparaíso	Base metal for coins	Quality of service
Rhona	Valparaíso	Distribution transformers	Quality of management, after-sales service

(A-1-2) A consultation program

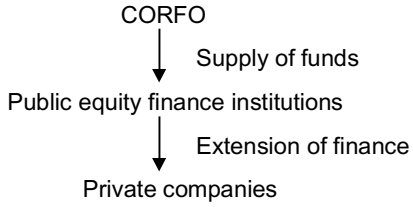
Location	All regions
Time to be Implemented	2002 -
Institutions Responsible for Implementation	CORFO in cooperation with ProChile, ASEXMA, ASIMET and universities.
Objectives	To supplement the training program in A-1-1.
Contents of Projects / Concrete Actions to be Taken	(1) The program is OJT for 3 months (c.f., the training program). (2) The program is specific and customized. Upon request of an individual company, consultation service is provided on: • How to convert to an export-oriented company • How to formulate export strategies fitted to the company (3) Cost sharing is 30:70 between public and private sector. (4) The execution plan is to be made at country and regional levels.

(A-1-3) A managers exchange program

Location	All regions
Time to be Implemented	2000 -
Institutions Responsible for Implementation	CORFO in cooperation with AGCI, ASEXMA, ASIMET and the chamber of commerce of each country
Objectives	To supplement the training program in A-1-1 and the consultation program in A-1-2.
Contents of Projects / Concrete Actions to be Taken	(1) The program's uniqueness is the "managers exchange" program, which is not popular in Chile. (2) The program is OJT for 2-3 years in multinational companies (MNCs) and a kind of internship program. (3) Upon request from an individual company, arrangement will be made. (4) Market studies and research on other countries' case are conducted in the initial stage. (5) A good example is an internship training program developed by the Chamber of Commerce of Chile and of the United States of America. (6) The above three programs are linked as follows.  (7) Cost sharing is 10:90 between public and private sector. (8) The execution plan is to be made at country and regional levels.

(A-2) Support for the conversion program

(A-2-1) Private equity finance schemes for the conversion

Location	All regions
Time to be Implemented	2002 - 2004
Institutions Responsible for Implementation	CORFO (The market study is conducted by private consultants.)
Objectives	To assist SMEs in their conversion to an export-oriented company by extending necessary finance.
Contents of projects / Concrete Actions to be Taken	(1) Finance scheme to be prepared would be MBO (Management Buy-Out), LBO (Leveraged Buy-Out), and RPS (Redeemable Preferred Stock). (2) Since the market of these schemes is not matured in Chile, studies are to be conducted on the future prospects of the domestic financial market as well as the situation of developed countries. The study items include: • Present and future market sizes in Chile • Existing financiers of these financial schemes in Chile • Present terms and conditions for these financial schemes • Present situation of developed countries • Needs of SMEs • Basic concept for a private equity finance institution • Design new schemes, and institutions if necessary (3) New equity finance institutions would be established. (4) CORFO would be a third tier agent as follows. 

(A-2-2) Information service to SMEs

Location	All regions
Time to be Implemented	2002 -
Institutions Responsible for Implementation	ProChile
Objectives	To assist SMEs in getting information on importers (or countries).
Contents of Projects / Concrete Actions to be Taken	(1) ProChile collects information on who knows most about importers (countries) and makes a list of "information sources". Examples for Asian countries are: • Japanese trading houses in Chile • Japanese banks in Chile • Chile-Japanese Economic Committee (2) Information needed is: • Credibility and reliability of the countries. • General points such as way of doing business to be taken into consideration when SMEs export their products. (3) ProChile announces the start of such information services to SMEs.

	(4) ProChile introduces SMEs to the information source. (5) To obtain information, SMEs get access to the information source suggested by ProChile. (6) ProChile assigns an officer specialized in such a service. The officer makes a daily contact with information source.

(A-2-3) Promote exports to Japanese companies on the American continent

Location	All regions
Time to be Implemented	2002 -
Institutions Responsible for Implementation	ProChile
Objectives	To expand the exports of Chilean type solution-oriented manufacturing products to Japanese companies.
Contents of Projects / Concrete Actions to be Taken	(1) Chilean companies export their products to Japanese multinationals on the American continent. This is indirect export to Japan by alliance with Japanese multinationals. (2) Targets: The United States, Canada, Mexico and Brazil. (3) ProChile organizes two missions, one to Japan and the other to other countries on the American continent. The mission to Japan aims to express to Japanese companies that Chilean companies are ready to supply their products to Japanese affiliates on the American continent. The mission on the American continent is organized to express to the Japanese affiliates on the continent what products Chilean companies can supply to them. In the latter case, it is advised for Chilean companies to bring the introduction letters from Japanese head offices in Japan. **Indirect export to Japan:** A Chilean company ↓ Export A Japanese multinational company in South America --- **Direct export to Japan:** A Chilean company ↓ Export The Japanese multinational company in Japan

(A-2-4) A ten-year plan for the consolidation of the image of Chilean solution-oriented manufacturing products

Location	All regions
Time to be Implemented	2002 -
Institutions Responsible for Implementation	ProChile in cooperation with CORFO, ASEXMA, ASIMET and industry leaders and universities
Objectives	To assist exporters of Chilean type solution-oriented products in their export expansion by strengthening the nation's image for the products.
Contents of Projects / Concrete Actions to be Taken	(1) The proceeding is as follows. • A special committee is formed by the above mentioned organizations. • The committee listens to opinions in the parties concerned including the private sector, regional governments and universities. • The committee discusses the matter and reaches a consensus on the image of Chilean products. • The committee elaborates a slogan and designs a logotype. • ProChile designs a promotion signboard for some products such as machinery and equipment with the slogan and the logotype. (2) Key words for the slogan and the logotype are: • Engineering capability • Solution-and service-oriented • Serious commitment (3) In building a consensus on the image, its engineering capability should be discussed in more details by type of engineering. (4) Other special promotion materials are produced to advertise Chile's engineering activity. (5) The existing industrial clusters, such as those in Concepción, use the logotype to advertise their strengths. (6) The establishment of Chile's image for Chilean type solution-oriented manufacturing will be especially beneficiary to SMEs and companies considering export business. This is because such an image is one of external economies and common public goods and saves some part of their export promotion costs. The expected effect seems to be tremendous. (7) ProChile will not issue any certificate to Chilean exporters in this plan. (8) A case of medical supply products: ProChile has good experience in promoting the export of some medical supply products. They made a series of pamphlet to promote these products. Unlike wine, for example, it is difficult to make a pamphlet for the export promotion of only one product in the case of solution-oriented manufacturing products. It is thus advised to follow the case of the medical supply products.

(B-1) A development program of innovative industries

(B-1-1) An alliance and integration program for material-related industries

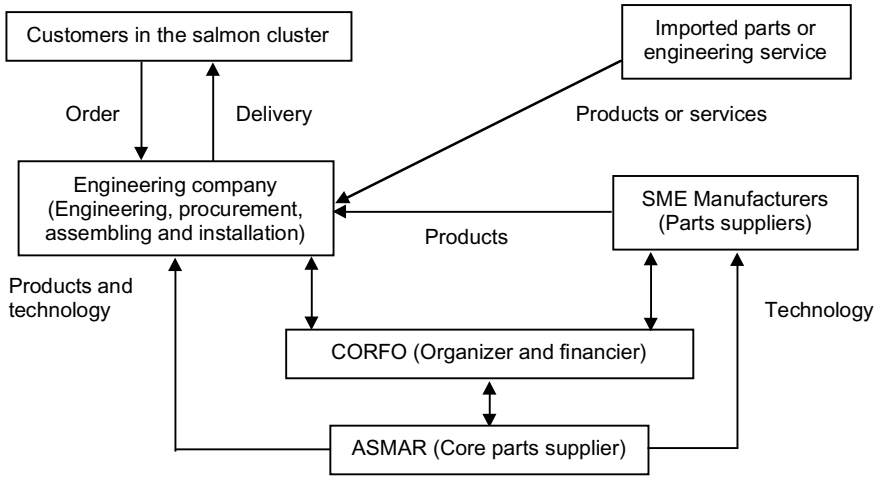
Location	All regions
Time to be Implemented	2002 -
Institutions Responsible for Implementation	CORFO in cooperation with ProChile, ASEXMA, ASIMET, state owned enterprises, and industrial sectors
Objectives	(1) To achieve the development of innovative material-related industries through strategic alliance and integration. (2) To accumulate know-how in a more effective way through alliance and integration.
Contents of Projects / Concrete Actions to be Taken	(1) CORFO organizes the project. (2) Key actors are CORFO, state owned enterprises, material industries, mining-related manufacturing industries, and machinery industries. (3) This is a package project consisting of: • New usage of materials • Clean production of materials • Machinery and equipment for the clean production (4) This project is characterized as one of strategic projects for Chile in the 21st century. (5) The proceeding is as follows. • CORFO finds candidates of projects • CORFO selects a project to be implemented. • CORFO prepares a preliminary proposal for the project and calls participants. • CORFO selects participants as strategic partners for the project. • A special committee is formed by CORFO, ProChile, ASEXMA and ASIMET to implement the project. • A working group to be set up under the committee draws a detailed alliance implementation plan. • The program is executed. • The committee evaluates the case. • The committee documents the process and result of the case and know-how derived from the implementation. • The committee prepares for the program to be implemented in the second step. (6) The implementation of the project bill bring about know-how on: • Project organizing and coordinating • Financial engineering • Technology management (7) Proceed to more comprehensive and strategic projects. (8) Foreign investors are invited as participants. (9) One example is a pilot project for “development of innovative industries related to salmon farming industries” proposed for the South Zone. (10) Examples of development programs for Region VIII are provided on the following page bearing the reference stated in (9) above.

(B-1-1) An alliance and integration program: A case for Region VIII

1. Machinery and equipment related to a salmon cluster

(1) Type of products
- Special trucks equipped with heavy crane
- Special boats
- Special cranes
- Efficient washing machines for net workshops
- Robots operating under sea
- Water treatment equipment
- Waste treatment equipment
- Tunnel-type dryers for wet nets

(2) Development scheme



(3) Role of CORFO
- Identify development need
- Identify products to be developed
- Advice on the selection of participants: SME manufacturers
- Arrange finance if necessary

2. Feasibility study on the development of the plastic industry in Chile

(1) Marketing Strategy: Focus on the following markets:
- Salmon cluster in the South Zone
- Markets of products for natural-resource-based products (e.g., packaging materials)
- GM factories in Arica as well as in other South American countries
- Indirect export markets
- Macro-regional markets
- Integrated regional markets

(2) Establish a F/S company

(B-1-2) Strategic and selective investment promotion

Location	All regions
Time to be Implemented	2002 -
Institutions Responsible for Implementation	CORFO and Foreign Investment Committee
Objectives	To promote high quality investments by strategic partners.
Contents of Projects / Concrete Actions to be Taken	(1) What Chile really needs is high quality investments by strategic partners. (2) Project proposals are prepared, for example, on gateway-and material-related projects. (3) Project proposals are presented at investment promotion seminars, where the following points are stressed. • Target: Look for strategic partners • Sources of competitive advantage • Potential for diverse services • Potential for professional services • Potential for logistics related to gateways • Potential for the development of material-related industries • Function as a headquarter in South America (4) As one of measures to promote investments from Japan, seek the possibility of concluding an "Industrial Cooperation Agreement" between CORFO or regional governments and Japanese banks as follows. Bank's Clients ↕ Information Japanese banks ↕ Agreement CORFO or a regional government ↕ Information Companies looking for investment A sample form of the agreement and the details of the cooperation are provided on the following page.

(Sample of agreement)

Cooperation Agreement Between CORFO And "X" Bank

CORFO and "X" Bank, having considered the mutual wishes and efforts of Chilean and Japanese authorities to reinforce their industrial cooperation;

Having agreed that the development of industries in their respective areas is a permanent concern of both parties and that their common intent is to promote overseas investment and trade cooperation between Chile and Japan; and

Being aware that both parties have the appropriate expertise to promote industrial cooperation between their two areas and to provide advice related thereto;

Both parties have agreed to initiate cooperation in the following terms:

1. Content
   The parties will promote cooperation between Chile and Japanese companies through direct investments, joint ventures, licensing agreements, trade expansion, and other means.

   The precise description of this cooperation will be set forth in detail in other agreements to be concluded between the parties, based upon future joint studies to find the optimal forms of cooperation most beneficial to each party.
2. Reporting
   Reporting facilities will be established between the two parties at appropriate intervals mutually agreed upon in order to determine the overall joint strategy and the areas of prospective cooperation.
3. Non-exclusivity
   Both parties have the option to conclude this same sort of protocol agreement with any other party or parties.
4. Duration
   Both parties retain the right to terminate this agreement at any time with advance notice.

IN WITNESS WHEREOF this agreement has been executed by the parties hereto upon the (date)

"X" bank CORFO

Details of the cooperation

(1) Exchange of information
To hold meetings, whenever the necessity arises, in order to exchange opinions and information on investments in both countries.

(2) Provision of information
To keep such materials on economy, trade, investment in both countries that Chilean and Japanese companies may be interested in.

(3) Development and implementation of investment projects
To introduce information and services to Chilean and Japanese companies.

(4) Seminars and missions
To do its best to cooperate when missions are sent or seminars are held.

(C-1) A statement on "Omnibus Competitiveness Enhancement" by the government

Location	All regions
Time to be Implemented	2002
Institutions Responsible for Implementation	CORFO in cooperation with Ministry of Economy, ProChile, the Ministry of Public Works, Transportation and Telecommunications, the Ministry of Education, ASEXMA, ASIMET, universities, and other organizations concerned
Objectives	To support and enhance the export of Chilean type solution-oriented manufacturing products through expressing the government's strong commitment and initiatives.
Contents of Projects / Concrete Actions to be Taken	(1) A special committee would need to be organized for the preparation of the statement. Such a committee would include the above-mentioned organizations as members. (2) The statement would include the following subjects. • The importance of the export expansion of Chilean type solution-oriented manufacturing products as a means to diversify the exports. • The importance of improving the Chilean image as a country holding special engineering capability. • The importance of developing innovative industries in such fields as new material utilization, clean production processes, machinery industries related to Chilean type solution-oriented products and industries related to the gateway functions. • The importance of developing information technology and diffusing it to SMEs. • The importance of the role of state-owned enterprises in transferring their technology and management know-how to SMEs, targeting export promotion. • Designate some industrial cities as development centers for the purpose of strengthening industrial cluster. (3) Long-term commitment is indispensable if the country wants to prioritize a certain sector in its resource allocation.

20.10 Proposed Time Schedule

The time schedule for implementing the action plans is proposed in Table 20.10.1. "M" in the table indicates a month, e.g., "6M" and "12M" stand for the first six and twelve months, respectively.

Table 20.10.1 Proposed Time Schedule

Action plan	6M	12M	18M	24M	30M	36M	42M
(A-1-1 and A-1-2) Training and consultation program							
(1) Development of training and consultation program	--------						
(2) Training of CORFO, ProChile, ASEXMA, ASIMET, and consultants		--------					
(3) Execution			--------	--------	--------	--------	--------
(4) Revise the program				---			
(A-1-3) Managers exchange program							
(1) Study on needs and cases in other countries	--------	--------					
(2) Form an internship program			--------				
(3) Negotiate target countries				--------			
(4) Execution					--------	--------	--------
(A-2-1) Scheme for private equity finance							
(1) Study on needs and cases in other countries	--------	--------					
(2) Set up a financial institution, if necessary			--------	--------			
(3) Execution					--------	--------	--------
(A-2-2) Information service to SMEs							
(1) Making a list of "information sources"	--------						
(2) Start the service		--------	--------	--------	--------	--------	--------
(A-2-3) Export promotion to Japanese companies on the American continent							
(1) Analysis of Japanese companies on the American continent	--------						
(2) Dispatch missions		--------	--------				
(A-2-4) A ten-year plan for consolidation of Chilean image							
(1) Build a consensus on the image	--------	--------					
(2) Design a logotype			--------				
(3) Campaign				--------	--------		
(4) Evaluate and revise						--	
(B-1-1) An alliance and integration program for material-related industries							
(1) Select a pilot project	--						
(2) Design an implementation plan	------	--------					
(3) Start the pilot project			--------	--------	--------		
(4) Go to the next project						--------	--------
(B-1-2) Investment promotion							
(1) Preparation	--------						
(2) Hold seminars		----		----		----	
(C-1) "Omnibus Competitiveness Enhancement"							
(1) Organize the committee	--						
(2) Prepare the statement	-----	--------					

21 INFORMATION TECHONOLOGY (IT) INDUSTRY

21.1 Fundamentals for the Development of Hardware, Software and Contents Industries

Figure 21.1.1 demonstrates some characteristics of the main sectors, compared according to their effect on the rate of unemployment, human resource dependency, and infrastructure. Hardware and call centers entail the greatest employment creativity, while they tend not to be affected by the availability of highly skilled workers. On the contrary, the productivity of the contents and software industries does depend on such availability of workers. The locations for hardware and call centers require intensive infrastructure development, mostly through the provision of large space, roads, buildings and modern facilities. The contents and software industries enjoy more autonomy in terms of basic and building infrastructure, though they require substantial and modern infrastructure related to Information and Communications Technology (ICT).

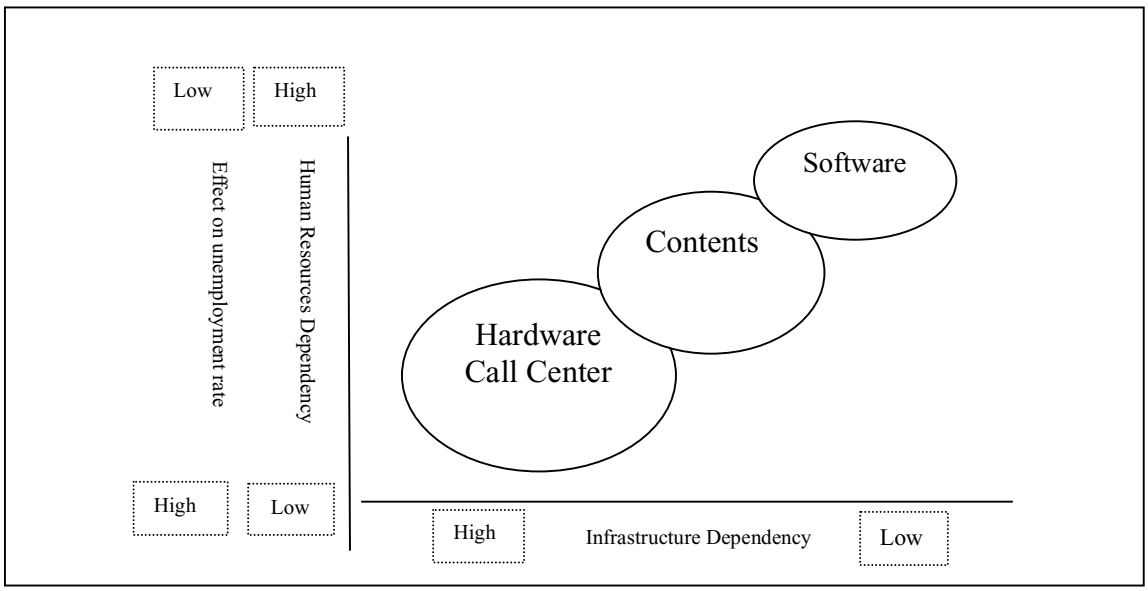


Figure 21.1.1 Some Characteristics of the Main Sectors

Source: JICA Study Team based on Okinawa Prefecture Document, Japan, 2000.

Table 21.1.1 evaluates some fundamentals for the development of the hardware, software and contents industries. Chile has greatest potential in the software industry, while it also possesses the basis to promote the contents industry fostered by its high quality human resources. This is because Chile's strengths are based on modern ICT infrastructure and, in general, the availability of high skilled labor. These strengths, according to the table, correspond to the fundamentals to develop the software and contents industries.

Concerning the hardware industry in Chile, the supporting industry, such as manufacturing parts for hardware, has not yet been well developed. Thus, the potential to develop this type of industry appears to be more limited.

Table 21.1.1 Some Fundamentals for Hardware, Software and Contents Industries

	Hardware	Software	Contents
Size of domestic market	Not important	Not important	Not important
Dependency on related industry	High -Manufacturing -Parts Provision -Hierarchical structure	Low	High -Subcontracting -Team work
Infrastructure	Transport, electricity	ICT infrastructure	ICT infrastructure
Location	Huge space for the facilities	Proximity to universities	Proximity to town amenities
Skill of labor	Low	High	High (artistic sense)
Labor Cost	Low -Quantity of cheap labor	High	High

Source: JICA Study Team.

21.2 Potential for IT Industries in Chile

This Chapter outlines potential fields and tasks with respect to the call center, software, and contents industries.

21.2.1 Potential for Call Center

Several countries, such as Ireland and India, have tried to attract call centers. A call center is the key factor enabling companies to achieve high quality Customer Relationship Management (CRM). Currently, the worldwide CRM services market is boasting solid growth. According to the International Data Corporation (IDC), revenue from this industry will increase at a compound annual growth rate (CAGR) of 25%, from $61 billion in 2001 to $148 billion in 2005. This growth far exceeds that of the overall IT services market, which shows a CAGR of 12% during the years 2000-2005.

There exist some conditions to attract call centers including low telecommunication tariffs, low employment cost, tax incentives, availability of skilled multilingual staff, and state-of-the-art telecommunications. For instance, Ireland has invested US$5 billion to create one of the most advanced networks in Europe. With diverse fiber optic connections on all major European routes, it delivers crystal clear connections worldwide (an intercontinental routing service, designed for companies with international call centers, provides a toll-free capability between Europe and the U.S.).

The time difference between Japan and Chile (12 hours) might appear an attractive incentive for a Japanese call center; however, Chile does not yet have sufficient knowledge of the Japanese language. In comparison, Brazil possesses a large Japanese decent population, suggesting that the language is more widely spoken. The ability to speak a foreign language is an important asset to attract a call center. In this way, it would be beneficial for Chile to produce a multilingual staff.

21.2.2 Potential for Software

Software is utilized to upgrade services and infrastructure of the existing economic and industrial sectors. The development of this industry will thus enhance the competitiveness of the economy as a whole.

(1) Necessary Requirements to Develop the Software Industry in Chile

Formulating a linkage with the U.S. is an important factor for software development. This may be done, for example, by developing high capacity optic fiber with the U.S. or by utilizing any kind of human network related to Chile as mentioned in Section 13.2.3.

In addition, other requirements are necessary to develop the software industry including the development of human resources and the development of venture capitals as mentioned in Section 13.1.2.

(2) Some Potential Fields in the Software Industry

Cross-language software is a potential field for the Chilean software industry, as a basement to Spanish language software. English is a dominant language, especially on the Internet, while Table 21.2.1 demonstrates the increase of Spanish as well. It is, however, still underrepresented compared with real world proportions.

Table 21.2.1 Share of English and Spanish on Cyberspace

	Real World Share (%)	1998 cyberspace (%)	2000 cyberspace (%)
English	10.5	75.0	60.0
Spanish	6.25	2.35	4.85

Source: Funredes, 2000.

According to IDC, the worldwide market for e-business globalization support applications will increase at a compound annual growth rate (CAGR) of 48.7% from US$74.4 billion in 2000 to over US$540 billion in 2005. Additionally, cross-language software revenues will achieve an overall CAGR of 28.7% and increase from US$67.3 billion in 2000 to US$237.5 billion by 2005.

Potential ideas for the promotion of the software industry are introduced including e-government, education, logistics, Supply Chain Management (SCM), natural disaster countermeasures, religion networks, and finance.

E-government

The effort initiated by the Chilean government to promote e-government is a good incentive for the implementation of new applications and services in the public sector. Such an advanced Chilean e-government will allow for the enhancement of the export business of IT companies to Latin American markets.

Education

Chile has been eager to apply IT to its education system long before many Latin American countries, e.g., the Enlaces Project. Chile could prove an ideal test-market for e-learning in Latin America due to its relatively advanced education system and experience in the field of IT education.

Logistics and SCM

As a gateway of Latin America, system development to simplify custom procedures might lead to the development of the software industry. In the field of logistics, an advanced information processing system for sea cargo might be considered, while the development of SCM focusing on Chile's advantageous market might lead to the development of new applications. A transaction between fisheries in Chile and Japan is

one example.

Natural Disasters and Countermeasures

Application development to advance countermeasures against earthquake and other natural disasters might be considered. In accordance with the realization of e-government, a real-time information network may be developed by the public sector. Applications for the simulation of damages and decision-making tools for evacuation are possible countermeasures.

Religion Networks

The countrywide church network might foster the development of the IT society, especially in rural areas, and dissolve the digital-divide. Installing public service kiosks in churches throughout the country is a possible idea. Another suggestion is to develop on-line connections between churches and Christians through the application of CRM. Churches also have potential to act as content providers.

21.2.3 Potential of Contents Industry

(1) Nature of Contents Industry

Section 13.2.3 mentions why the contents industry may benefit if it is near various city amenities. Some examples include: convenience and easy access (twenty-four hour affordable amenities, Silicon Alley in New York), youth culture and trend (Bit Valley in Tokyo), and liberal culture (Multimedia Gulch in San Francisco).

Although the nature of this industry does not allow that the governmental policy creates a cluster, according to the New York model, there still remains an effective way to foster further development of the original cluster. A zoning policy, undertaken after the early recognition of a burgeoning cluster, will receive a multiplier effect to further promote the contents industry cluster. In terms of human resources, artistic sense and creativity are as important as IT skills.

(2) Necessary Requirements to Develop the Contents Industry

The contents industry in Chile allows that its development is organized through the preparation of an environment favorable for IT professionals and artists, including the offer of grants, subsidies and assistance. To introduce proper policies towards its continual development, dialogue between the government and the industry should be established.

Regarding the software industry, there exists an organization among companies. For example, ACTI conducts dialogues with some governmental. On the other hand, however, a formal association has not yet been established within the contents industry, while it is not clear which governmental agency is responsible for the industry (most companies in the contents industry are micro ventures).

There is an informal association, “First Tuesday” founded in October 1999, which aims to provide an occasion for communication between IT entrepreneurs. Exchange of knowledge and informal communication is crucial in the contents industry because such interaction creates business opportunities and leads to cluster development. The government should support such informal communication to stimulate interaction among companies.

(3) Some Potential Ideas for the Contents Industry

The contents industry is a major component of the e-business industry. According to IDC, worldwide e-business spending will more than triple from almost US$22 billion in 2000 to close to US$69 billion in 2005.

Figure 21.2.1 demonstrates the predicted growth of e-commerce. In spite of the doom and gloom of IT industries, huge growth of "B to B" and m-commerce (mobile) is expected respectively.

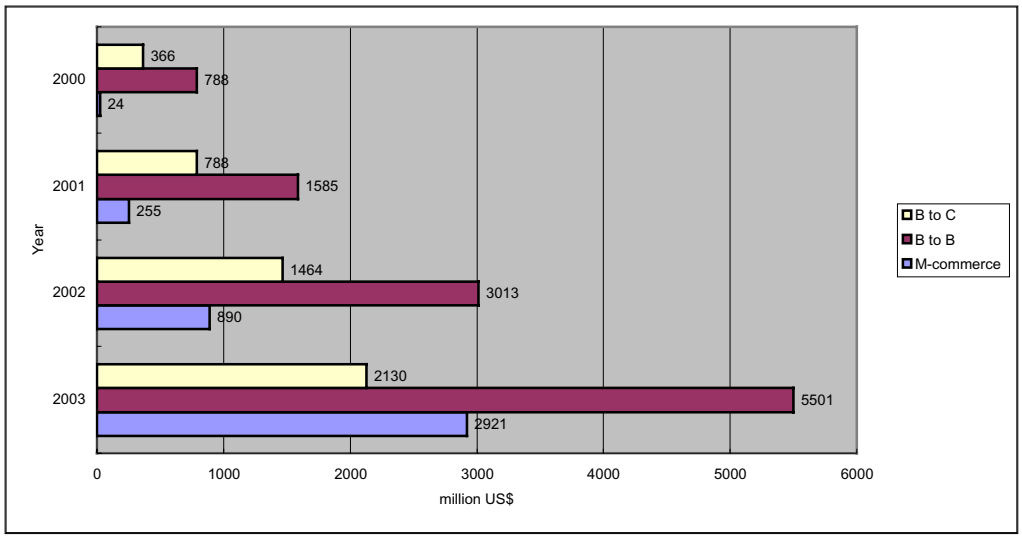


Figure 21.2.1 E-commerce in Latin America

Source: Mikio Kuwayama [2001], *E-commerce as a tool of export promotion for SMEs: Comparison between East Asia and Latin America*, CEPAL, Santiago.

Some specific ideas for the promotion of the contents industry are introduced below.

Establishment of the Contents Market

For example, the government of Puerto Rico has tried to establish an "e-cinema market" and has abolished tax on profit from the transfer of contents' rights.

Location Service for Film Shooting

A location service to attract film services might be possible, as Chile possesses an attractive landscape for film production. The development of related services, such as the film commission service, would help to nurture contents and contribute to the local economy. For example, a few companies from Hollywood moved to the province of British Columbia in Canada because of its active policies to attract film production companies.

Outsourcing Service for Animation Industry

Chile has potential to provide manual dexterity, artistic sense and IT skill required in this sector.

21.3 Direction of IT Industry in Chile

This Chapter indicates the future direction of the IT industry in Chile. Firstly, the importance of R&D and export-oriented businesses is stressed by introducing the

country's historical background. Then, the future direction of the IT industry in Chile, "IT Solution Providers", and its business domain is introduced. Finally, the country's role as an IT gateway for the Latin American market is mentioned as a means to promote export.

21.3.1 Lessons Learned from the 1980s and 1990s

"Born in the eighties, Chile's software industry experienced an important growth during the late 80's and early 90's, which encompassed big hopes for the future and positioned it as one of the most promising industry sectors in Chile for the coming years. Since then, however, it has decayed and only some isolated successful cases arise from the general context and are seen as guides for recuperating lost opportunities. These hopes were supported by the historical record of US $40 million worth in exports during 1992-93. Nowadays, not only has the exports level dropped to about US $6-8 million, but so has the domestic activity." (Celle and Bertossi, "Information and Communication Technology in Chile," 2000.)

Several reasons account for this situation. Firstly, the software industry could not shift to an export-oriented business; secondly, it could not catch up with the changes in new technology, which might have been caused by lack of resources and efforts; and thirdly, little opportunity existed for micro companies after ten years of open market policy (on the contrary, some IT companies experienced increased opportunities and firmly established their business in the 1980s and 90s by taking advantage of open economic policy, e.g., privatization).

From such lessons mentioned above, Chilean IT companies must be export-oriented with all the time effort in R&D, while a proper business environment for IT micro and SMEs should be prepared, e.g., technical assistance to access new advanced technology, and financial assistance under well-defined conditions.

21.3.2 Present Position of IT Companies in Chile

The IT industry is composed mainly of two types of companies as demonstrated in Figure 21.3.1; the "Core IT Company" and "IT Solution Providers". "Core IT Companies", e.g., Microsoft in the U.S., are knowledge-intensive, develop core software technologies and export their products from high value activities. On the other side, "IT Solution Providers", e.g., Electronic Data Systems (EDS) in the U.S., develops solution services from such core technology. Most IT companies in Chile currently belong to "IT Solution Providers".

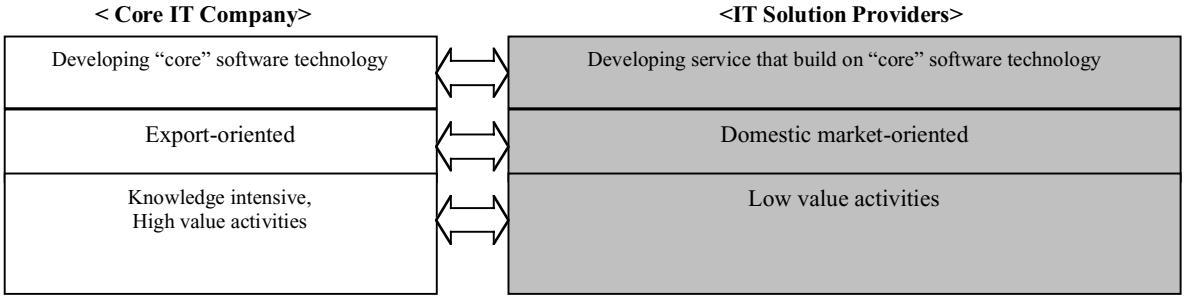


Figure 21.3.1 Comparison "IT Solution Providers" and "Core IT Companies"

Source: JICA Study Team.

21.3.3 Business Domain of the IT Industry in Chile

As Chile has limited resources and strengths in the field of technology innovation at present, it should direct resources towards providing solutions as "IT Solution Providers" for the following five years. This will be the preliminary step towards the development of indigenous "Core IT Companies".

Figure 21.3.2 demonstrates the business domain of "IT Solution Providers". Being the "IT Solution Providers", the Chilean R&D system should be directed towards R&D for commercialization: processing technology innovation towards commercialization. In terms of human resources, the need for "IT Solution Providers" should be considered more and the curriculum of educational institutes should be adjusted accordingly. Marketing and service management skills are strongly required so that "IT Solution Providers" may be competitive.

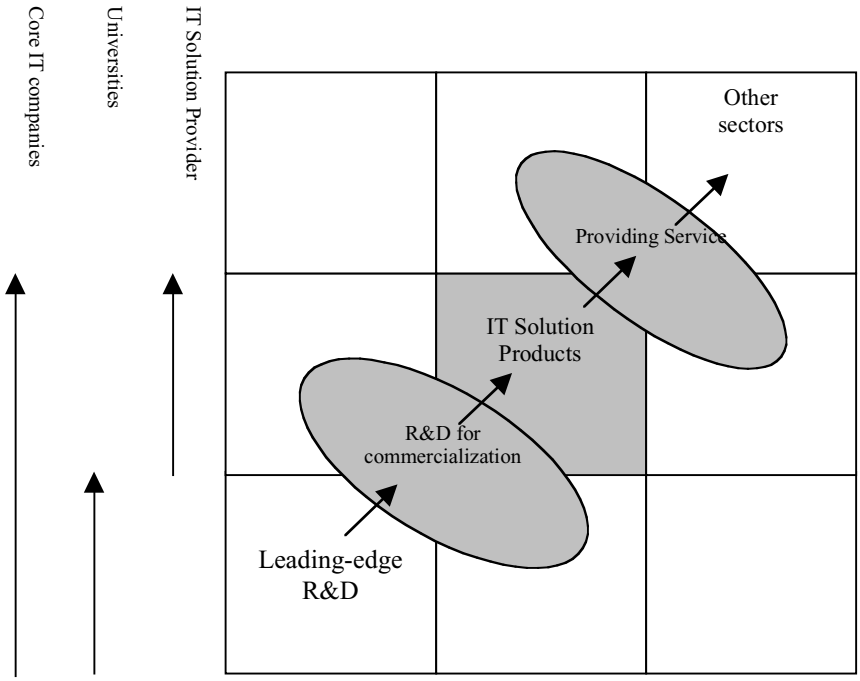


Figure 21.3.2 Business Domain of IT Industry in Chile

Source: JICA Study Team.

In addition to the fostering of R&D for commercialization during the next five years, leading edge R&D should be simultaneously carried out towards the development of indigenous "Core IT Companies". As this is not a business domain of "IT Solution Providers", the public sector should take initiative. Figure 21.3.2 demonstrates the necessary means to change from "IT Solution Providers" to "Core IT Companies" in the fields of R&D and human resources. Governmental initiatives are necessary for leading edge R&D, while some governmental support is desirable to supply suitable human resources for "Core IT Companies".

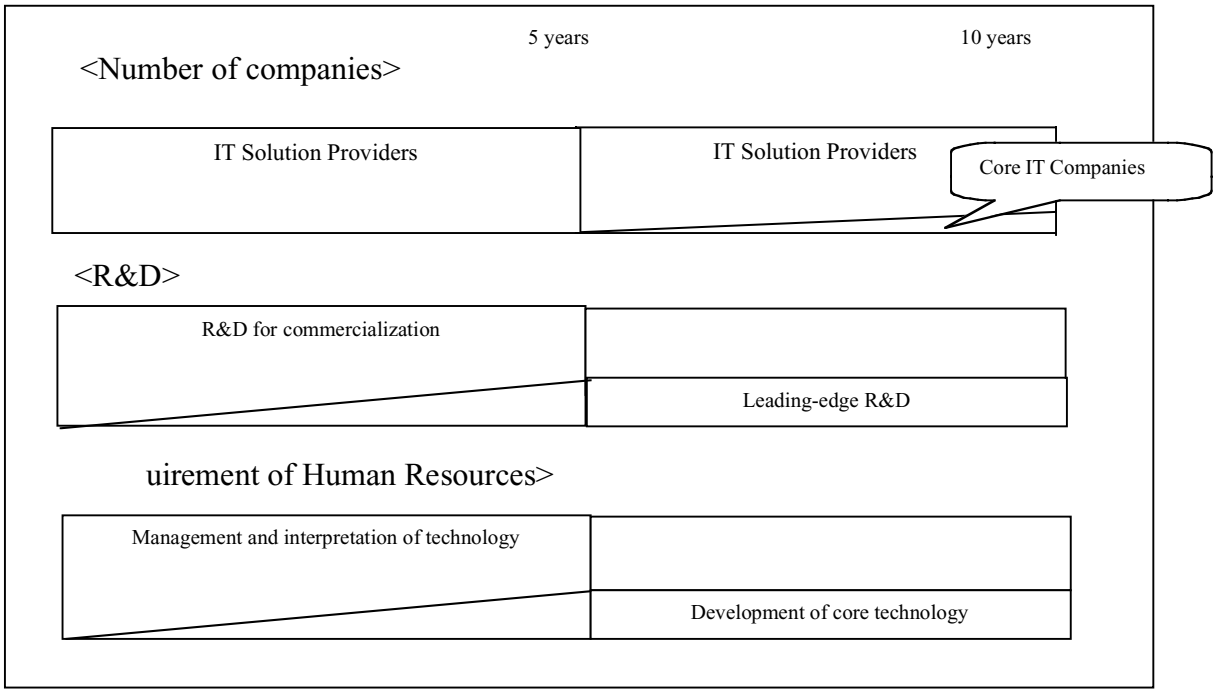


Figure 21.3.3 Shift from "IT Solution Providers" to "Pure IT Companies"

Source: The JICA Study Team.

21.3.4 IT Gateway of Latin American Market

As Chilean IT companies must shift to an export-oriented business, they should strengthen their function as a gateway of the Latin American market by reinforcing the following aspects:

- *"An IT consultant for foreign IT companies";*
- *"A data center for the Latin American IT industry";*
- *"A Human Resources development center in Latin America"; and*
- *"An innovation hub that develops prototypes and customizes software specifically for the Hispanic market* ".

Together with strengthening Chile's function as a gateway of the Latin American market, growth of the IT market in Latin America is necessary. The idea "e-Latin America" is introduced below.

"e-Latin America"

Chile should try to enhance collaboration among Latin American countries towards the development of an IT society in Latin America. According to the model of "e-ASEAN (Association of Southeast Asian Nations)", Latin American governments should enhance communication between ministries, companies and universities across borders in order to offer a common policy direction. More developed countries, such as Chile, should provide technical assistance to less developed countries. This will also lead to the enhancement of business opportunities for Chilean IT companies.

"e-ASEAN" is a project that aims to enhance the IT of ASEAN countries and develop their competence in the world market. For this purpose, it has promoted several tasks: creating an inter-governmental global information infrastructure; promoting trade

liberalization of ICT products, services and investments; enhancing cooperation in the development of ICT within ASEAN member countries; and reducing the digital divide within ASEAN member countries. In addition, ICT leading member states have agreed to help others develop ICT capabilities. Japan has also promised to give priority to ASEAN in the distribution of a US$15 billion aid package to improve the digital divide among developing countries, while Singapore has recently announced that it would invite IT engineers and teachers in other ASEAN member countries to Singapore for training, with assistance from Japan's official development assistance (ODA).

21.4 Tasks to Develop the IT Industry

This Chapter introduces principal tasks towards the development of the IT industry in Chile.

21.4.1 Clarifying Its Direction and Implementation Body

Several policies have already been introduced towards the development of the IT industry and e-government in Chile. To gain momentum for further development, clear direction and collaboration among players are necessary.

a. Vision: "e-Chile: World-Level IT Country"

Today, the government must organize a consistent policy with a clear vision to foster its primary goal of a full-fledged "IT society". Rather than fostering the "promotion of the IT industry", or the "development of infrastructure", or the "realization of e-government", as individual initiatives, the "IT society" proposes to include all three achievements, as shown in Figure 21.4.1. The government should, therefore, clarify its vision towards the development of an IT society, e.g., "e-Chile: a world–level IT country", which demonstrates its political will to its citizens and other countries in the world. In such a way, it is desirable to establish a mid-term plan towards the development of the IT society.

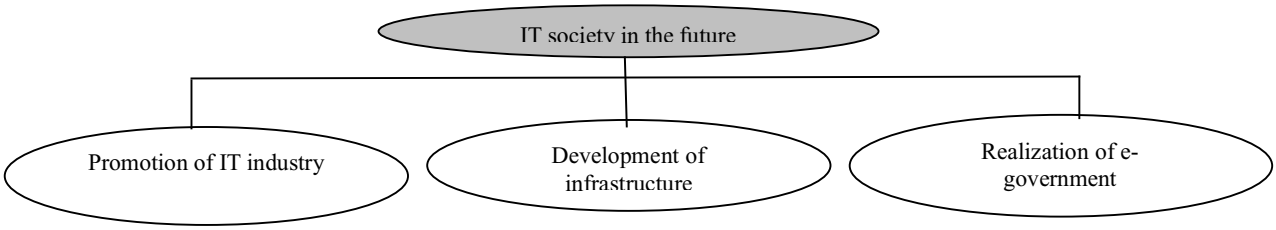


Figure 21.4.1 Structure of IT Society

Source: JICA Study Team.

For example, in Japan, a new scheme, "strategy towards e-Japan", was introduced in January 2001, with a vision to become "the most advanced IT country in the world in five years".

b. Implementation Body

The Chilean government has introduced several strong policies supported by the leadership of the President. However, the latent problem is to determine which organization is able to coordinate governmental policies and be responsible for

implementation. At present, as shown in Table 21.4.1, the Ministry of Economy is responsible to coordinate related policies, though there is doubt as to whether the Minister has enough authority to implement them. The Ministry should have enough authority for smooth implementation, though, if this deems difficult, a new inter-ministerial organization, "Task Force", should be established.

Table 21.4.1 Vision and Implementation Body

Vision	Implementation body
IT society : "e-Chile"	Ministry of Economy or "Task Force"
IT industry development	CORFO
e-government	Ministerio Secretaria General de la Presidencia
Infrastructure development	SUBTEL

Source: JICA Study Team.

Establishment of a "Task Force" under the leadership of the President is expected to be the driving-force to implement "e-Chile". For example, Singapore, Malaysia, and Japan have established a new organization to implement policies towards an IT society. In 1999 in Singapore, the Info-Communication Development Authority of Singapore (IDA) was established after merging the National Computer Board with other agencies. A mid-term plan was formulated by IDA recognized as, "ICT 2001 (2001-2010)".

21.4.2 Collaboration among Players

Effective promotion and implementation of policies are not possible without effective collaboration among players. Collaboration among the public and private sector and universities is necessary to unify policies and initiatives in the same direction. For example, partnership between IT companies and universities could create effective promotion of IT human resources as well as R&D development. This would be done by building a collaboration system, such as R&D for commercialization, curriculum reform, and technological assistance for micro and SMEs in the IT industry.

Another example is a public support scheme. Some specific agencies and programs have been created by CORFO and CONYCIT for the same purpose of promoting R&D for technological innovation. The problem, however, is lack of priority and coordination among the programs. If the government wishes to develop the IT industry in Chile, it should clarify its direction, as well as give priority to directing resources to the IT field. Program coordination that focuses on the same objectives would create a much more effective system.

For better coordination, establishment of a new organization, which decides direction and priority, should be considered. Such an organization should be a localized one in order to meet regional needs. For example, a new organization in Valparaiso would decide allocation of public assistance according to regional direction and priority.

<e.g. Case of FONDECYT, FONDEF and FDI>

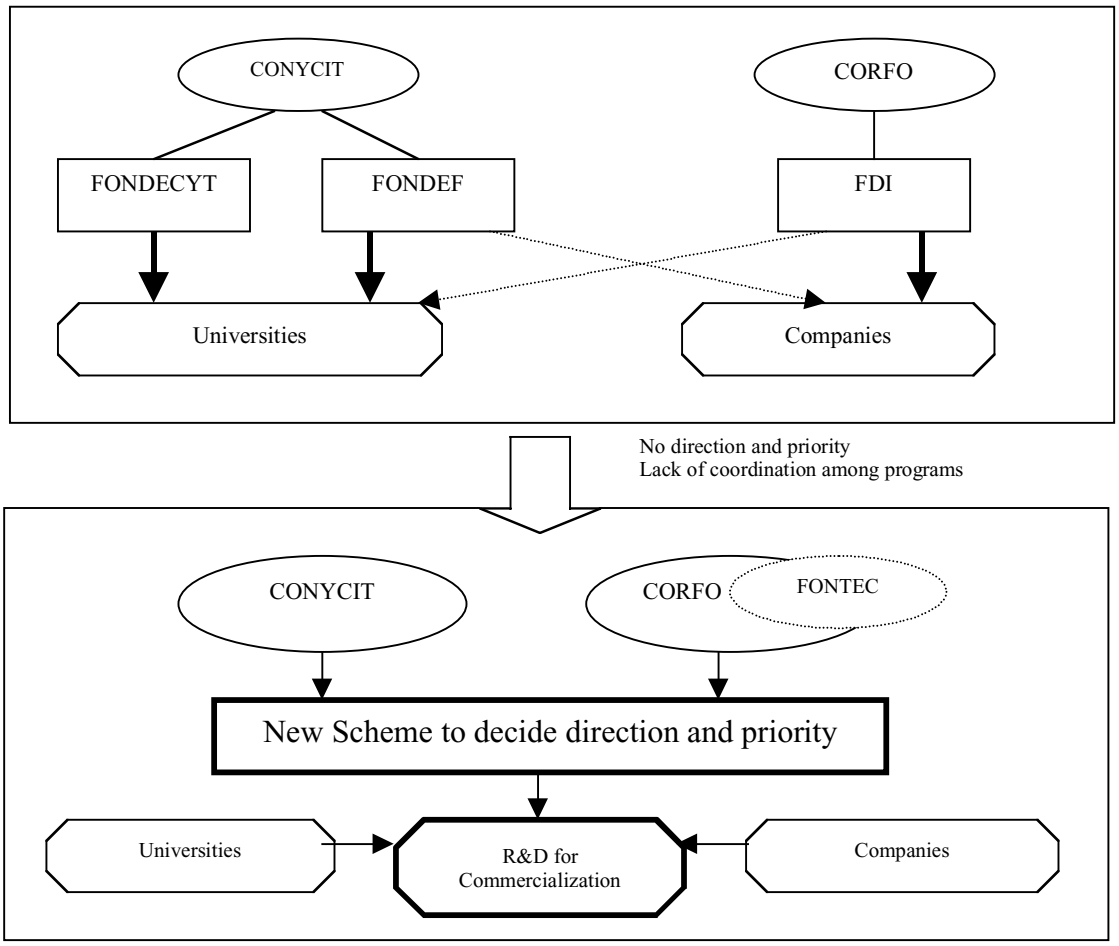


Figure 21.4.2 Reform of Public Support Schemes

Source: The JICA Study Team.

21.4.3 To Strengthen R&D

In Chile, only 0.65% of total GDP is invested in R&D, which is smaller than developed and some developing countries (see Figure 21.4.3). Concentration of R&D is in universities and research institutes, while the linkage between such research centers and relevant industries are not well developed.

Two types of R&D exist as mentioned before: leading-edge R&D and R&D for commercialization. To enhance the former, a "National Innovation System" should be introduced. A "National Innovation System" is a public initiative to promote R&D. The goal is to ensure business prosperity and growth of the IT industry during the next one hundred years by promoting leading-edge innovation. This would be realized by the public sector with cooperation from the private sectors and universities, e.g., the "Apollo Plan" in the U.S.

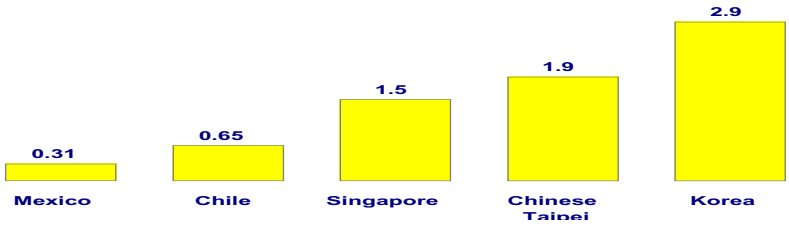


Figure 21.4.3 R&D as a Percentage of GDP, Selected APEC Member Economies

Source: UNESCO, Statistical Yearbook, 1999.
Note: 1995 Figures for Mexico and 1996 for Chile

To promote R&D for commercialization, technology transfer is crucial. It is highly important to establish better coordination among universities, research organizations and IT companies. Re-organization of the public fund scheme could be a potential idea to promote coordination and foster links among players, e.g., case of FONDECYT, FONDEF and FDI, as already mentioned.

The private sector is responsible for the weak aspects regarding R&D in Chile. To improve this, governmental R&D tax incentives, which encourage more companies to invest in R&D, should be strengthened, and attraction of the R&D division of multi-national companies (MNCs) by some financial incentives should be considered.

21.4.4 To Promote Export and Attract Investment

(1) Strategic Alliance with Advanced IT Countries

The government should consider developing strategic alliances with IT advanced countries to enhance trade in the industry. The U.S., Japan, Singapore, Taiwan, Australia, Ireland and Spain are mentioned here as potential strategic partners.

For example, a strategic alliance with the U.S. would determine Chile as a gateway to the Latin American market for US companies. Furthermore, Chilean companies would provide customer service to U.S. companies located in Latin America. Meanwhile, the U.S. would pour counter investment, and offer technology transfer and human resource training to their Chilean business partners.

Strategic alliances with Singapore and Taiwan would compensate for Chile's weakness in manufacturing. Original Equipment Manufacturers (OEMs) from Singapore and Taiwan would develop and supply Chilean IT products in the Latin American market, while Chilean enterprises would focus on R&D for commercialization targeting that specific market.

A strategic alliance with Spain would be opportune for Chilean companies to open and enhance businesses in the Spanish market. For Spanish companies, Chilean companies are good candidates for outsourcing in Latin America.

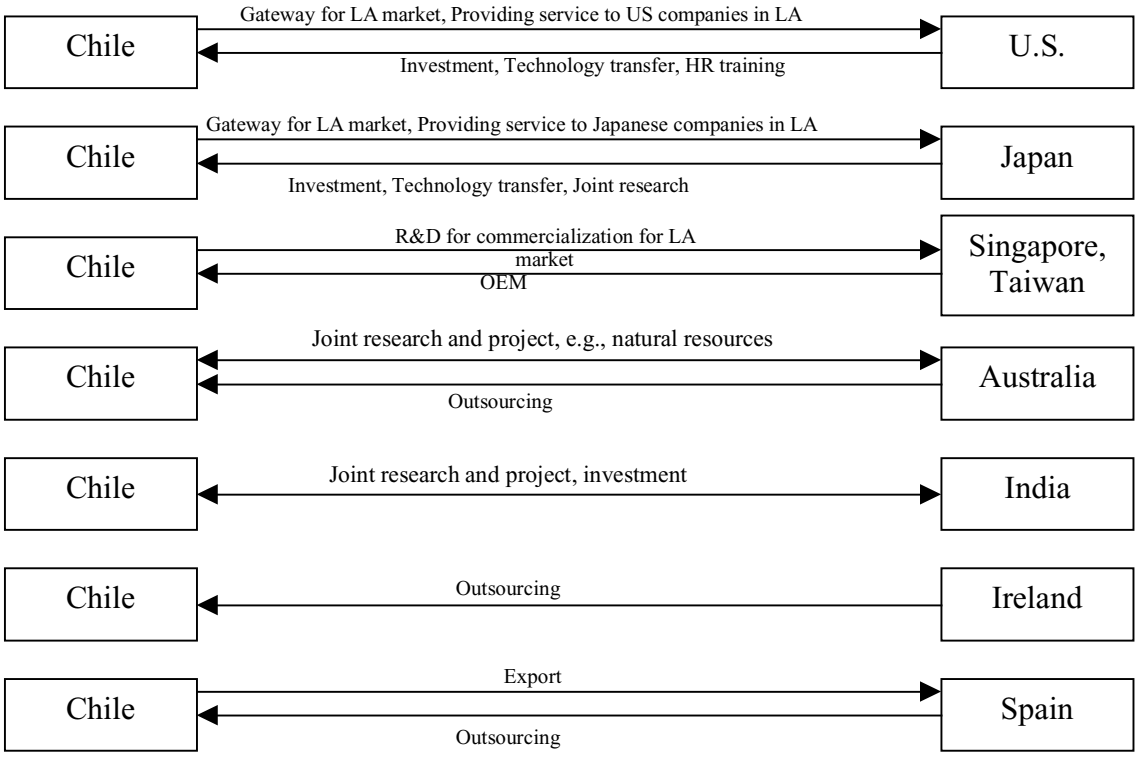


Figure 21.4.4 Image of Strategic Alliance with Chile

Source: The JICA Study Team.

(2) Some Business Ideas between Chile and Japan

Software Development for Logistics

For Chile, as well as Japan, logistics is an important service sector. Collaboration in software development would enhance trading opportunities between both countries, e.g. Supply Chain Management for natural resources, agriculture and fisheries.

Software Development for Natural Disasters

Software development for natural disasters is another possibility, as both Chile and Japan are frequently subject to earthquakes. Joint research would enhance research data and business opportunities for software development.

Joint Research in the Pacific-Rim

As both Chile and Japan are countries of the Pacific, joint research regarding culture and the environment could prove beneficial, e.g. marine resources, environment protection, weather observation and forecast.

Joint Research concerning Integration of Mobile Technology and ID number

The most advantageous opportunity in Chile to foster an IT society is the ID number system, which does not exist in Japan. Joint research concerning the integration of mobile technology and an ID number, for example the integration of a private mobile number and an ID number, would enhance possibilities towards a Chilean IT society.

IT Human Resources Center with Japanese Assistance

The promotion of IT human resources in Latin America, for example the establishment

of an IT human resource center in Chile, would foster further development of an IT society in Latin America. Chile should take advantage of international assistance and assistance from more advanced IT countries such as Japan, e.g. establishment of a training course for other Latin American countries with Japanese ODA assistance.

Customer Center for Branches of Japanese Companies in North and South America

For Japanese companies located in North and South America, there is a need to provide a basis to enhance customer relation management. Establishment of a customer center that provides services under the name of branches of Japanese companies in North and South America is a potential business idea.

Outsourcing Service for Animation Industry

Japanese animations are recognized worldwide for their high quality, while Chile has potential to provide the manual dexterity, artistic sense and IT skill required for this sector.

(3) Some Examples of Recent Japanese Investment

NEC Cooperation Opens Software Development Center in Argentina

During the next 5 years, NEC will invest a total of US$100 million to establish a new development center near Buenos Aires, in order to become a comprehensive provider of service and solution in the telecommunications market. The cooperation plans to export local production to the Hispanic world, for example, in the fields of e-government, the financial sector, e-commerce and IP technology for mobile Internet.

This case exemplifies a business model: Chile attracts investment from MNCs while MNCs export their products to the Latin American and other Hispanic markets. To attract MNCs, Chile must provide a proper IT environment and continuously be the most advanced IT country in Latin America.

Sumitomo Cooperation Invests in Venture Fund in Brazil

Sumitomo (a general trading company) has agreed to invest in a venture fund, raised by Brazilian venture capital recognized as, “FIR Capital Partners”. The fund will invest in IT and bio-related entrepreneurs. Sumitomo aims to find and nourish promising entrepreneurs in advanced technology fields for future business opportunities. The Inter-American Development Bank and the public sector in Brazil, such as SEBRAE, will invest together.

This case exemplifies a Japanese company that has chosen to invest in Latin America together with an international organization and the public sector. Chile should investigate such a model to attract foreign company investment and nourish Chilean IT entrepreneurs.

(4) Investor Relations (IR)

In order to attract investment, IR activities should be strengthened. Such activities entail performing accountability to investors and are best realized by top managers. Core ideas related to IR include the “3Cs”: credibility, clarify (to clarify its target and strategy) and consistency (IR activity must be done consistently). The government should also make known the country’s advantages, as well as disadvantages, and achievements during the year. Ideally, the President will realize this initiative. Examples of various activities are

suggested as follows.

- Promote CI (country identity).
- Actively foster IR activities under the lead of the President.
- Enhance the relationship with IT enterprises and the media in foreign countries.
- Establish IR offices in IT advanced areas.
- Create symbols for image promotion.

21.4.5 Development of Human Resources

In general, the level of human resources in Chile is high, while it can foster development of the IT industry. On the other hand, however, lack of IT professionals and the gap between university curriculums and the demands of IT companies are noticed. It is important to clarify the competency of IT human resources, while this should reflect the direction of the IT industry in Chile of "IT Solution Providers".

For the software and contents industries, necessary skills (technical and non-technical) are shown in Tables 21.4.2 and 21.4.3. It is exemplified that the skills required for each industry are quite different, while, non-technical skills are important for both.

To develop human resources for the IT industry, a system of collaboration between IT companies, universities and educational institutes is highly important, e.g., job matching. In such a way, universities and educational institutes should consider the needs of IT companies and reflect them in their curriculums.

Table 21.4.2 Necessary skills for IT Human Resources for Software Industry

	Technical skills	Non-technical skills
1	Internet development	Marketing
2	e-commerce	Strategic planning
3	Applications / Systems development	Customer service
4	Database administration	Presentation
5	Net protocols / Topologies	Interpersonal

Source: Japan White Paper on Multimedia 2000, SEARCC Report 1999-2000, JSPMI.

Table 21.4.3 Necessary skills for IT Human Resources for Contents Industry

Art related skills	Technical skills	Social science skills
Graphic design	Engineering	Communication theory
Image design	System development	
Music	CG programming	
Animation	Internet development	

Source: Japan White Paper on Multimedia, 2000.

To catch up with technological development, a recurrent education system for IT engineers and technicians is strongly necessary. Further financial support from the public sector will stimulate IT companies to invest in employee education, while a recurrent IT education system could also be a potential market for Chilean IT companies. Deregulation of educational systems, which provides flexibility and allows universities and educational institutes to meet current and changing demands of technological development, is also necessary.

For the internet-related industry, entrepreneurs play a critical role. According to the EIU (Economist Intelligence Unit), Argentine is recognized for its entrepreneurial culture, while nearly half of all Latin American-based Internet ventures are located in Argentina. To further develop the IT industry in Chile, promoting entrepreneurship is an important challenge.

21.5 Case Study of Valparaíso

As requested by CORFO, the case study focuses on the area of Valparaíso. This Chapter introduces strategies and action plans towards the development of the IT industry in Chile and the area of Valparaíso in particular.

21.5.1 Future Direction of the IT Industry in Valparaíso

The future direction for IT companies in Valparaíso is "IT solution providers for other industries and other countries". Companies in the IT industry provide IT solution services to other industries located in and outside Valparaíso, thus improving the competitiveness of other industries. Ultimately, demand for IT companies by the other industries increases. Figure 21.6.1 demonstrates IT industry development in the Valparaíso area. To be competitive as "IT Solution Providers", constant effort towards R&D for commercialization with export-oriented businesses is necessary.

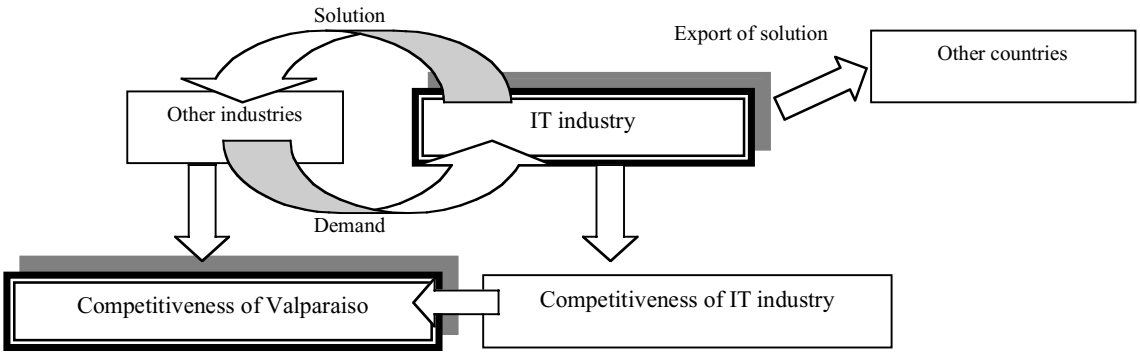


Figure 21.5.1 Image of IT Industry Development in Valparaíso Area

Source: JICA Study Team.

21.5.2 Strategy towards IT Industry Development in Valparaiso

(1) Vision for the Future

The future vision of Valparaíso should be recognized as being a "world-level IT city" by regional, provincial and municipal governments. It is highly important to establish such a vision and promote it worldwide because foreign IT companies determine where to realize investment by the area's hospitality, including good intentions of the public sector. The vision should be elaborated with the participation of the residents of Valparaíso, because it is related to the future development of Valparaíso. With such participation, general awareness of the city will increase.

To promote the city, not only public relations (PR), but also IR activities, are highly necessary. As already mentioned, IR includes mutual communication between Valparaíso and world investors, together with the free flow of information and accountability. Regional advantages, as well as disadvantages, and comprehensive achievements gained during the year in the Valparaíso area should be announced. In addition, it is mandatory that governors at the regional, provincial and municipal levels demonstrate their commitment to achieve an annual target.

(2) Strengthen R&D for Technology Transfer

Only 0.65% of total GDP in Chile is invested in R&D, while collaboration between universities and the industry is not well developed. To be competitive worldwide, R&D is crucial suggesting that the amount of expenditure must be raised and the system of R&D among universities and the private and public sectors must be improved.

Two kinds of R&D exist including leading-edge R&D and R&D for commercialization. The latter is especially needed for the IT industry in the Valparaíso area because its future direction is to become an "IT Solutions Provider". To promote R&D for commercialization, collaboration between universities and the private sector is especially necessary to realize technology transfer.

To raise the amount of expenditure in R&D, especially from the private sector, three major policies should be considered: financial incentives, good IT environment and the public sector's initiative. Although some public support programs already exist such as FONDEF and FDI, there is still room for improvement. Some additional financial incentives should be considered to stimulate expenditure in R&D, while the system, that allocates resources, should be improved towards a more localized program (more suitable for Valparaíso's situation). As investment from MNCs, especially in the R&D section, could trigger R&D investment from Chilean companies, such MNC investment should be stimulated. A favorable environment is one of the most important factors to attract R&D investment. This can be improved upon by, for example, providing additional financial incentives and hospitality to MNCs afforded by the public sector. Excellent infrastructure (transportation and telecommunications), reasonably priced land, and good human resources are beneficial, while the establishment of a Science & Technology Park, providing such benefits, should be considered.

When the promotion of R&D for commercialization is secure, promotion of leading-edge R&D should begin to foster "Core IT Companies". Regarding leading-edge R&D, the public sector should take the first initiative to promote technological innovation, followed by collaboration with universities and the private sector, to be achieved by a national scale innovation system. In the case of Japan, some of these projects were not successful, however, technology transfer through the project has been very beneficial for various private companies.

(3) Foster Export-Oriented Businesses

Chilean companies naturally shift to export-oriented businesses due to the small domestic market. For IT micro and SMEs, however, it is not so easy due to lack of resources and know-how. Some financial incentives are therefore needed to stimulate the motivation of such businesses in the IT industry. Regarding other means of assistance, delegations overseas and the realization of exhibitions will prove beneficial.

The exporting IT service is very different from other export activities. In such a way, the establishment of new institutes that focus on export activities for the IT service is desirable with assistance from ProChile. In Japan, for example, Japan External Trade Organization (JETRO) has introduced several projects in this regard. An example is the "Tiger Gate Project", whose goal is to foster SMEs that work actively in high-tech fields

(especially IT related) to develop their business further by hatching new ventures at several incubators in the U.S. Another project is the "International Techno Business Forum", whose goal is to create opportunities for companies interested in technical tie-ups, business alliances and other business relationships. JETRO has also established a website where companies may search for an international business partner. For example, one Chilean company has registered the exchange proposal to sell their frozen fruits and vegetables.

For future export promotion, the image of the Chilean IT industry as a provider of good services and products should be clarified. In this way, a vision to foster the IT society should first be established, while IR activities to promote this vision and attract attention to the industry must be strengthened.

(4) Improve IT Environment and its Competitiveness

Valparaíso must become more competitive to attract IT companies from other regions and countries. To improve its competitiveness, therefore, a proper IT environment should be maintained. Good infrastructure (transportation and telecommunications), reasonably priced land, and good human resource supplies are needed.

Some cities in the world have introduced zoning policies and established technology parks, for example the Hsinchu Park in Taipei, and the Australian Technology Park in Sydney. They offer not only good infrastructure but also a system of collaboration among players. In some parks, financial incentives are offered when a company realizes investment. Currently, there are two parks in the Valparaíso area, while both are still in development. It is important to understand those characteristics preferred by an IT company regarding such technology parks.

Valparaíso City itself must become more attractive by organizing proper town management. For example, companies from the contents industry value the existence of amenities when deciding where best to invest. In addition, the development of broadband infrastructure in the Valparaíso area should be promoted as an experimental city in Chile.

To attract MNCs, a special policy, besides only financial incentives, can prove effective. MNCs are concerned with the violation of Intellectual Property Rights (IPRs) and therefore consider whether a regulation exists to protect those rights before realizing investment. Though Chile has introduced a law for IPRs, there is doubt regarding its validity. Therefore, if Chile and Valparaíso demonstrate serious commitment to protect IPRs, it will be attractive for MNCs. Supply of human resources is also a key factor to attract MNCs. For example, Intel in Costa Rica is recognized as being attractive due to its high level human resources.

It is sometimes mentioned, especially from IT companies in Valparaiso, that there is lack of IT professionals and a gap between the curriculum of universities and demands required by IT companies. It is therefore important to clarify the competency of IT human resources for the IT industry in Valapraíso, as "IT Solution Providers".

An incubator function is deemed beneficial for an IT entrepreneur. The functions of an

incubation center in general are rental space, management advice, business plan support, administration support, capital support, marketing support, finance and accounting, law and patent advice. While the Universidad Técnica Federico Santa María will open an incubation center, there could also exist other incubation centers, such as a private center. In the U.S., there are several kinds of incubation centers including public, public-private cooperation, university and private. The private incubation center is very business oriented, while the incubator manager is sometimes entitled to a personal equity stake in the company. There should exist several incubation centers in the Valparaíso area, allowing for healthy competition and a more favorable IT environment.

There is discussion as to whether Chilean culture discourages entrepreneurs due to its "lack of adventure atmosphere and intolerance to business failures". A strong incubation function is therefore necessary to overcome this cultural aspect, while the nativity of entrepreneurs will lead to the creation of a new entrepreneurial culture. For example, as mentioned earlier, Argentina is home to nearly half of all Latin American-based Internet ventures, while it creates an impressive entrepreneurial spirit.

(5) Increase Business Opportunities

The most attractive factor for IT companies is the existence of business opportunities. To increase such opportunities in Valparaíso, a demand-side approach is needed. There are already some established industries in Valparaíso, however, the local economic situation has not been satisfactory and some companies, especially SMEs, are reluctant to apply IT. By providing proper guidance and training, they could become customers of IT companies. The logistics and tourism industries especially have the most potential in Valparaíso, and joint projects between IT companies and those industries should be considered.

Governments at the provincial and municipal levels could prove strong customers for IT companies. The governments should introduce e-government, similar to the progressive policies introduced by the central government. By making use of outsourcing, e-government will contribute to regional economic development. For example, the South Australian Government has outsourced a total of US$500 million of IT infrastructure to EDS (9 year contract). Operations realized by EDS in the State had already contributed more than US$123 million to the economy, with governmental cost savings of around US$12 million per year.

When e-government is realized by so-called "total outsourcing", an outsourcer sometimes is responsible to help develop the regional IT industry. For example, the government of Gifu prefecture in Japan has been outsourcing its information system for approximately US$100 million in 7 years. The outsourcer is responsible for not only the operation of the system in the public organization, but also IT industry development in the prefecture. Such introduction of "total outsourcing" should be considered to foster the progress of e-government and the development of the IT industry.

Realization of e-government should provide business opportunities for IT companies, especially for micro and SMEs. For example, the Japanese government has introduced new bidding policies to give preference to such enterprises, e.g., providing information, introduction of an optional contract, segmentation of contracts, and simplification of the

bidding process.

Most customers of IT companies in Valparaíso are located in Santiago. High-speed telecommunication infrastructure between Valparaíso and Santiago is therefore necessary to increase business opportunities. For example, the Malaysian government has been establishing the "Multi Media Super Corridor" between Kuala Lumpur, the New International Airport, Putrajaya (new capital) and "Cyberjaya", the new IT city. These four areas will be connected utilizing high-speed optic fibers, highways and high-speed railways. In addition to excellent infrastructure between Valparaíso and Santiago, development of a broadband in the Valparaiso area will lead to an advanced IT society and business opportunities for IT companies will expand.

21.5.3 Action Plans

The strategies and action plans proposed for Chile, Valparaíso in particular, are summarized in Table 21.5.1. As the strategies are partially explained in Section 21.4 for the country as a whole and in Section 21.5.2 for Valparaíso, this section explains the action plans in more detail. They are discussed as actions to be taken to achieve each strategy, though some action plans are useful in achieving two or more strategies.

Table 21.5.1 Strategy and Action Plans

Strategy		Action Plans
Vision for the future	Clarification of vision "Valparaíso as an IT city"	Establish "IT Charter"(declaration to become a world-level IT city) by participation of all players
		Establish "Task Force"
		Investor Relations (IR) of Valparaíso
Strengthen R&D	Improve public support and collaboration system	Establish "IT Development Center"
		Restructure public support program : "Autonomy", "Localization" and "Direction and Priority"
		New incentives for R&D expenditures
		New incentives for multinational corporations (MNCs)
	Good IT environment	Establishment of "Science & Technology Park"
		Improve infrastructure
	Public sector initiative	"National Innovation System"
Foster export-oriented businesses	Stimulate IT companies' motivation and support	New incentives for export business
	Support IT companies' activities	Establishment of "IT Development Center"
	Promotion of IT industry overseas	Investor Relations (IR) of Valparaiso
		Strategic Sister Cities
Improve IT environment and its competitive-ness	Good IT environment	Establishment of "Science & Technology Park", "IT Special Zone"
		Improve infrastructure
		Increase human resources supply
		Establishment of "a court" specializing in IT
		Improve living conditions
		Financial incentives and support
	Good human resources	Increase human resources supply
	Give support to entrepreneurs	Establishment of incubation centers in "IT Special Zone"
Increase of business opportunity	Demand-side approach	IT training by "IT Development Center"
		e-government at provincial and municipality levels
		Dissolve digital divide
	Improve infrastructure	Good connection between Valparaíso area and Santiago
		Develop broadband infrastructure

Source: Elaborated by the JICA Study Team.

21.5.3.1 Vision for the Future

(1) Declaration of IT Charter

An "IT Charter" (a declaration in the realm of a "world-level IT city") should be elaborated by top authorities in the Valparaíso area and be declared with the participation of citizens (this direction should be owned by local people at all levels). The charter should include not only matter related to the IT industry, but also a future vision of the IT society in Valparaíso towards a "cyber community", because this is a matter of regional development itself more than a matter of the IT industry. The vision is based on the promotion of the IT industry, development of IT infrastructure and the realization of e-government.

To realize an "IT Charter", a "Task Force" should be established, as discussed in Section 21.5.4.

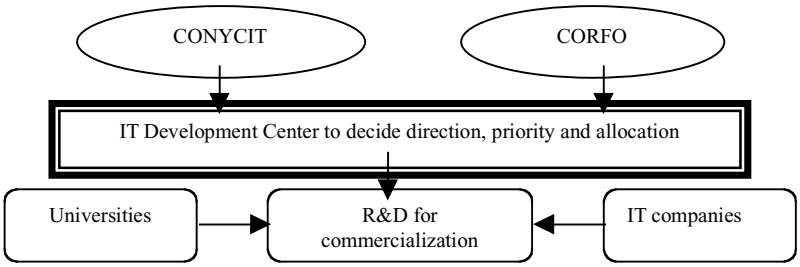
Objectives	- To demonstrate the vision and intention of Valparaíso worldwide. - To raise the awareness of local people.
Time to be implemented	2001 – first half of 2002
Background	- Local initiative is still invisible. - Awareness of local people should be raised. - Image and promotion of Valparaíso is necessary to attract IT companies.
Contents of the project	- Establish a declaration in the realm of Valparaíso as a "world-level IT city" by top authorities and with the participation of citizens. - The charter demonstrates a proposal for future achievements, directing a new emphasis towards the promotion of an IT society as a "cyber community" and its benefits to the local community. - The charter outlines the standards of services to IT companies in the region and will thus, by demonstrating Valparaíso's willingness, attract IT companies.
Institutions responsible for implementation	Regional and provincial and municipal governments

21.5.3.2 Strengthen R&D

(1) Establishment of a New Institute: "IT Development Center"

For "R&D for commercialization", technology transfer plays a crucial role, while the system of collaboration between universities and the private sector is necessary. The present situation, however, demonstrates the lack of collaboration, as shown in Section 13.1.2.

To overcome this challenge, a new institution should be developed to promote collaboration among players: an "IT Development Center". The main goal of this Center would be to promote collaboration among players, while it could also provide business support to IT micro and SMEs.

Objectives	- To strengthen R&D by increased collaboration among players. - To establish a driving force towards the development of an IT society.
Time to be implemented	2001 – 2002
Contents of the project	**<Strengthening R&D>** - To promote technology transfer to IT companies and R&D for commercialization. - The Center could be an autonomous agency to decide direction and priority of R&D and allocate resources from government support programs, e.g. integrate the scheme of CONYCIT and CORFO as shown in Section 21.5.2.  **<Promotion of Collaboration>** - Promote collaboration among IT companies, e.g., formal and informal meetings to exchange information, foster policy study groups, joint research, etc. - Promote collaboration between IT companies and universities, e.g., joint activity towards the availability of an appropriate number of skilled staff to meet future industry needs, database of current IT-related research projects being conducted in each university, etc. **<Data Center>** - Provide information and statistics related to the IT industry in Chile and Latin America. **<Business Support>** - Business support for micro and SMEs, e.g., information gathering, promote collaboration among IT companies, match-making among business partners, etc. - Promotion of export, e.g., delegations overseas, exhibitions, etc. **<Others>** - IT training to other industries. - Recurrent IT education to IT professionals. - Commercial activities, e.g., Internet Service Provider (ISP), IT training, holding of conferences, etc.
Institutions responsible for implementation	Universities, ASIVA with support from the public sector (CORFO, Prochile, and governments at the central and regional levels)
Possible source of finance	Self-financed Non-Profit Organization (NPO) with investments from the public and private sectors and universities.

(2) New Incentives

There are four conditions that would justify government intervention including: to achieve growth of indigenous companies; to gain job opportunities; to contribute to GDP; and to accomplish regional development (Pricewater House Coopers, 1999). The

economic condition in the Valparaiso area, prospect of the IT industry and its effect on other industries will move the public sector to introduce new incentives.

To strengthen R&D, two main tasks exist including the "stimulation of R&D from the private sector" and the "stimulation of investment from MNCs". The central and local governments should consider the appropriate means to realize these tasks, while major incentives are shown in Table 21.5.2. Regarding other tasks including the "development of a critical mass of IT companies" and "export stimulation", possible incentives are introduced in the table.

Table 21.5.2 Tasks and Main Incentives

	To stimulate R&D	To attract MNCs	To stimulate export	To make critical mass
1 Decrease in corporate Tax		+		+
2 Decrease or exemption of import tax		+		
3 Simplification of the importing process		+		
4 Simplification of the exporting process		+	+	
5 Decrease in investment tax, e.g., depreciation	+			
6 Exemption of local tax, e.g., property tax		+		+
7 Financial support for investment, e.g.. R&D, fixed assets	+	+		+
8 Simplification of procedures to obtain working visa		+		
9 Assistance given to site and worker procurement		+		+
10 Subsidy to projects which aim to increase R&D	+			
11 Subsidy to projects which aim to increase export			+	
12 A special support agency to facilitate the overall investment process	+	+		+
13 Grant per employee		+		+
14 Grant for training		+		+
15 Subsidy to investment sponsors	+			
16 Subsidy to pre-investment		+		+

Note: + - Very important.
Source: The JICA Study Team.

Objectives	- To stimulate R&D expenditure. - To attract investment from MNCs in R&D.
Time to be implemented	2002 – first half of 2003
Background	- Amount of R&D expenditure must be increased from IT companies. - Investment from MNCs in R&D could trigger R&D investment from Chilean companies.
Contents of the project	Major incentives to stimulate R&D and to attract MNCs are demonstrated below. Such incentives should be considered at the central and regional government. <R&D> - Decrease investment tax, e.g., depreciation. - Financial support for investment, e.g. R&D, fixed assets, etc. - Ten subsidies directed at projects to increase R&D. - Establishment of a special support agency to facilitate overall investment process. - Subsidy to investment sponsors. <MNCs> - Decrease in corporate tax. - Decrease or exemption of import tax.

	- Simplification of the importing process. - Simplification of the exporting process. - Exemption of local tax, e.g., property tax. - Financial support for investment, e.g.. R&D, fixed assets, etc. - Simplify procedures to obtain working visa. - Assistance given to site and worker procurement. - A special support agency to facilitate the overall investment process. - Grant per employee. - Grant for training. - Subsidy to investment sponsors. - Subsidy to pre-investment.
Institutions responsible for implementation	Government at all levels (central, regional, provincial and municipal).
Possible source of finance	Government at all levels (central, regional, provincial and municipal).

(3) "National Innovation System"

In addition to "R&D for commercialization", the promotion of leading-edge R&D should be initiated towards nativity of "Core IT Companies". To increase leading-edge R&D investment, the public sector should play a leading role, while at the same time stimulating the private sector through use of financial incentives.

Objective	To promote leading-edge R&D through an initiative fostered by the public sector.
Time to be implemented	2003 -
Background	- R&D in Chile is weak. - Leading-edge R&D is necessary to foster innovative "Core IT companies".
Contents	A "National Innovation System", such as the Apollo Plan in the U.S., is a promising national project for future technology development. This will be implemented through an initiative fostered by the public sector with cooperation from the private sector and universities. Its purpose is to ensure business prosperity and growth of the IT industry in the next hundred years by promoting leading-edge innovation.
Institutions responsible for implementation	- It will be a project-based organization. - Public sector with cooperation from the private sector and universities.
Possible source of finance	Primarily from the public sector, with investment from the private sector and universities.

21.5.3.3 Foster Export-oriented Business

(1) New Incentives

It is desirable to introduce new financial incentives to stimulate IT companies to become export-oriented businesses. Some major incentives are demonstrated in Table 21.5.2.

(2) Business Support by "IT Development Center"

As mentioned previously, it is necessary to provide assistance to IT micro and SMEs

including delegations overseas, the holding of exhibitions, etc. In such a way, an "IT Development Center" could play an important role.

(3) Strategic Sister cities

Valparaíso has already established sister city relationships with the following cities: Cordoba (Argentina), Oviedo (Spain), Bat-Yam (Israel), Long Beach (the U.S.), Arequipa (Peru), Malacca (Malaysia) and Novorossysk (Russia). It also has brother port relationships with Osaka Port (Japan) and Busang Port (South Korea).

Objective	To promote export and investment with advanced IT cities.
Time to be implemented	2002 – 2003
Background	- Promotion of an image of Valparaíso is necessary to develop the "IT City". - Exchange with advanced IT cities will prove useful for export promotion.
Contents	Valparaiso should choose a sister city from a strategic point of view. Establishment of sister city relationships with international IT advanced cities could be the means necessary enabling Valparaíso to promote its own IT industry. Sister city partnerships have the potential to realize numerous varieties of programs, e.g., exchange of business information, match-making to establish business partners, joint projects, cultural exchanges, etc.
Institution responsible for Implementation	Regional, provincial and municipal governments.

21.5.3.4 Improve IT Environment and Its Competitiveness

(1) Zoning

It is likely that foreign and indigenous IT companies will be eager to invest following the establishment of a park together with a favorable IT environment. Zoning development includes well-organized town management such as the establishment of industrial sites with quality residential and commercial areas. Park security is also an important element, while good market access should be maintained. Furthermore, financial incentives are offered to the company upon investment in zoning development.

Figure 21.5.1 demonstrates park classification, while for an "Industrial Park", only facilities for production and land are provided, a "Science and Technology Park" provides research institutions and systems for technology transfer.

	Facilities for production	Land	Research institute	Facilities and organization for technology transfer	Incubator
Industrial Park	◄	►			
Research Park	◄		►		
Science & Technology Park	◄			►	
Innovation Center					◄►

Figure 21.5.2 Classification of Parks

Source: JICA Study Team.

To promote the IT industry in Valparaíso, R&D is indispensable. Therefore, the

"Science & Technology Park" will prove suitable, including land, research institutions, facilities and organization for technology transfer. The park in the Valparaiso area should provide private and national research institutions, universities, joint research institutions, information centers, and technical exchange institutions. Examples of elements related to the "Science and Technology Park" are shown in Table 21.5.3. To prove competitive internationally, the provision of services, for example promoting interaction between players, is necessary in addition to quality infrastructure.

Table 21.5.3 Requirements for Science & Technology Park

Minimum requirements	Good infrastructure.
Necessary requirements	Elaboration of concept/image of the park and promotion activities.
Satisfactory requirements	Promotion of interaction between players.
Expected requirements	Establishment of preferential regimes, e.g. tax incentives. Town development for living spaces and promotion of cultural spaces.

Source: The JICA Study Team

(2) Science & Technology Park for R&D in Valparaíso

Objective	To realize an IT cluster by attracting the R&D division of IT companies.
Time to be implemented	2002 - 2004
Background	- R&D in Chile is relatively weak. - Technology transfer is crucial for IT micro and SMEs. - Collaboration between universities and the private sector is necessary for R&D.
Contents	This includes a zoning policy to attract companies, research institutions and universities for the purpose of R&D. The main functions of the park are below. - To plan and practice R&D through company and university collaboration. - To achieve technology transfer directed at micro and SMEs in the IT industry. Facilities should include: private and national research institutions, universities, joint research institutions, information centers, technical exchange institutions and incubation centers. New financial incentives should be introduced to trigger the attraction of MNCs, especially in the R&D division. Quality infrastructure in the park and between Valparaíso and Santiago is essential, while a special purpose company (SPC) may operate town management. A system of collaboration between universities and companies may be realized by an "IT Development Center".
Institution responsible for implementation	A special purpose company (SPC) with private company investment and public sector support.
Possible source of finance	- Primarily investment from the private sector. - Public support to provide quality infrastructure. - New financial incentives from the public sector.

(3) IT Special Zone

Objective	To realize an IT cluster by providing an incubation function.
Time to be implemented	2001 – 2002
Background	- For IT companies, especially the contents industry, whereby interaction among companies is important. - An incubation function is necessary for IT entrepreneurs.
Contents	The zoning policy aims to incubate IT entrepreneurs and to attract the software and contents industry (both indigenous and foreign). The zone fosters a cluster of industries towards the development of a critical mass. Some new financial incentives from the public sector are provided to attract investment, while universities are involved for technology transfer. An "IT Special Zone" is located along the coast from Valparaíso to Viña del Mar. Facilities are provided by renovating existing old buildings. The IT companies in the zone will receive some advantages such as business support from the incubator, financial incentives, etc.
Institution responsible for implementation	A special purpose company (SPC) with private company investment and public sector support.
Possible source of finance	- Primarily investment from the private sector. - Public support to provide quality infrastructure. - New financial incentives from the public sector.

Figure 21.5.3 demonstrates the image of a "Science & Technology Park" and an "IT Special Zone" in the Valparaiso area.

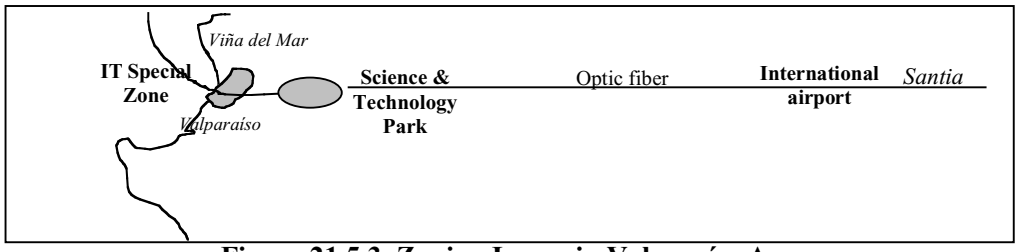


Figure 21.5.3 Zoning Image in Valparaíso Area

(4) Infrastructure Development in Valparaíso Area

In general, infrastructure for telecommunications is well developed in Chile. However, to attract IT companies from Santiago and other countries, Valparaíso must be more competitive through further ICT infrastructure development.

a. Building a node of optic fiber = Internet Exchanger

An optic fiber line exists beginning in Argentina and connecting to Santiago and Valparaíso, advancing north along the Pacific Coast, thus fostering Valparaíso as a gateway of Latin America. While Valparaiso acts as the gateway for optic fiber, a node currently does not exist. If there were a node as an "Internet Exchanger", Valparaíso would be an Internet network basement in Latin America and the world. A node of optic fiber as an "Internet Exchanger" will increase the competitiveness of Valparaíso and

will contribute to the development of the IT industry.

b. Development of Broadband Infrastructure as an Experimental Sector

In addition to an "Internet Exchanger", development of broadband infrastructure will be very attractive for The IT industry. Though the cost is high, it is desirable to realize its implementation as an experimental area for future technology development.

Objective	To improve IT infrastructure in Valparaíso.
Time to be implemented	2001 -
Contents	1) To install a node of optic fiber = "Internet Exchanger" An "Internet Exchanger" includes an Internet exchange function and is connected directly to the "Internet Exchanger" of other countries. (At present, there is one "Internet Exchanger" in Chile located in Santiago.) A second "Internet Exchanger" in Valparaíso would engender the decentralization of the Internet network in Chile and provide direct connection to other countries. It would also lead to: - the contribution of transmission effectiveness in the country; - the improvement of connectivity in the area in terms of quality; and the provision of advantages to foreign IT companies since increased connection abroad is viewed as attractive for various IT companies. 2) Development of broadband infrastructure.
Institution responsible for Implementation	Telecommunications companies and the public sector.
Possible source of finance	Investment from the telecommunications companies and support from the public sector.

(5) Establishment of "a Court" Specializing in IT

Objective	To attract MNCs by providing a solution regarding IPRs.
Time to be implemented	2003 – 2004
Background	- One of the most serious concerns among MNCs is the protection of Intellectual Property Rights (IPRs). - There is doubt concerning validity of the IPR law in Chile.
Contents	A court that specializes in IPR in the IT field should be established, where IT companies may open a case involving fewer procedures and receiving quick judgment. Existence of such a court will prove an attractive factor for MNCs.
Institution responsible for Implementation	The central government.

(6) Increase Supply of Human Resources to the IT industry

To supply suitable human resources to the IT industry, a system of collaboration between universities and IT companies is necessary. In such a way, an "IT Development Center" could play an important role.

Objective	To provide proper human resources to IT companies.
Time to be implemented	2001 -
Background	There is lack of IT professionals and a gap between the curriculum of universities and the demands of IT companies.
Contents	A system of collaboration between universities and IT companies should be promoted under an "IT Development Center". The goals include: - Clarify competency of IT human resources for the IT industry in Valparaíso, as "IT Solution Providers", and - Adjust curriculums at universities to the competency of IT human resources. An "IT Development Center" would provide recurrent IT education to IT professionals. Technical colleges should be established to supply suitable human resources to "IT Solution Providers". Establishment of an "IT human resources center for Latin America" is achieved with assistance from international organizations and developed countries.
Institution responsible for Implementation	- Universities and IT companies regarding collaboration system. - The central government regarding establishment of a technical college and "IT human resource center".
Possible source of finance	- Mainly from universities and IT companies, with support from the public sector. - Assistance from international organizations and developed countries for "IT human resources center for Latin America".

Regarding an "IT human resources center for Latin America", it is desirable to receive assistance from international organization(s) and developed countries. The Inter-American Development Bank, for instance, has a fund to realize its "Connectivity Agenda and Action Plaza". In Japan, as a case of "South-south cooperation" (assistance from one developing country to another less-developed country), there is a joint program called, "Japan-Singapore Partnership Program for the 21st Century" (JSPP21), to build human resource capacity of developing countries. Total costs are borne by Japan and Singapore on a 50-50 basis. Every year, nearly 20 training courses are offered while the program also accepts trainees from neighboring countries. Eight IT-related courses will open in 2001. This example may be applied to the establishment of a human resources center in Chile for Latin America.

21.5.3.5 Increase Business Opportunities

(1) Realization of E-government at Provincial and Municipal levels

Objective	To enhance business opportunities for IT companies.
Time to be implemented	2002 -
Background	Realization of e-government at the provincial and municipal levels is behind such development at the central government level. Realization of such e-government will be a good business opportunity for IT companies.
Contents	E-government at the provincial and municipal levels should be realized by "total outsourcing", while such outsourcing should lead to business opportunities for micro and SMEs in the IT industry by introducing new bidding policies that give them preferences.
Institution responsible for implementation	The government at the provincial and municipal levels.
Possible source of finance	The government at the provincial and municipal levels.

(2) Dissolve the Digital Divide

Objectives	- To realize an IT society by dissolving the digital divide. - To enhance business opportunities for IT companies.
Time to be implemented	2002 -
Background	Dissolution of the digital divide is an imperative task towards the development of an IT society, while such changes will lead to expansion of the IT market.
Contents	- Utilize countrywide churches to provide access to the Internet, e.g. install public service kiosks in churches throughout the country, high-speed networks among churches, etc. - R&D for digital divide executed under the "National Innovation System".
Institution responsible for implementation	The public sector.
Possible source of finance	The public sector.

21.5.4 Implementation of Action Plans

21.5.4.1 Initiatives to Implement Action Plans

Several patterns are apparent that relate to worldwide IT clusters: "IT clusters promoted by the central government", "IT clusters promoted by the regional government", "IT clusters promoted by universities", and "IT clusters promoted by one IT company". The IT cluster in Valparaíso will be recognized as a "policy-led cluster" as mentioned in Chapter 13, suggesting that commitment from the central and regional governments is necessary.

As Table 21.5.4 demonstrates, all players will realize certain roles towards promotion of the IT industry, while collaboration among players will be necessary. A "Task Force" in Valparaíso should be established to promote such collaboration. Such an initiative should be a regional, autonomous organization and consist of representatives from the local government, universities and private companies with support from the central government. The "Task Force" will develop a mid-term plan to foster the IT society in the Valparaíso area. At the implementation stage, two options exist, either, the "Task Force" itself will implement the plan, or a concession will be introduced.

Table 21.5.4 Action Plans and Players towards Promotion of the IT Industry in Valparaíso Area

Action plans	Government and public sector	Municipality and Province	NPO	Private sector	Universities
Establishment of "IT Charter" by participation of all players	++	++			
IR of Valparaíso	++	++	+		
New incentive for R&D expenditure	++	++			
Restructure of public support program: "Autonomy", "Localization" and "Direction and Priority"	++	++	++		
"National Innovation system"	++			+	+
Establishment of "Science & Technology Park" and "IT Special Zone"	++	++		++	++
Improve infrastructure	++	++		++	
New incentives for MNCs	++	++			
New incentives for export business	++				
Establishment of "IT Development Center"		+	++	+	+
Strategic sister cities		++			
Increase human resources supply			++	++	++
Establishment of "a court" specializing in IT	++				
Improve living condition	+	++	++	+	
Establishment of incubation centers			++	++	++
E-government at provincial and municipality level		++			
Dissolve digital divide	++			+	+

Note: ++ - Very important role; + - Supplemental role
Source: The JICA Study Team.

21.5.4.2 Implementation Schedule of Action Plans

Table 21.5.5 demonstrates the schedule for implementation of each action plan. Major action plans, which should be implemented without delay, are "establishment of an IT Charter with participation from all players", "establishment of an IT Development Center", "establishment of a Science & Research Park", "establishment of incubation centers in the IT Special Zone", "increase supply of human resources", and "improve infrastructure".

Table 21.5.5 Implementation Schedule of Action Plans

Action plans	2001	2002		2003		2004		2005	
		first half	Second half	first half	Second half	first half	Second half	first half	Second half
Establishment of "IT Charter" by participation of all players	→	→							
IR of Valparaíso	→	→	→	→	→	→	→	→	→
New incentive for R&D expenditure		→	→	→					
Restructure of public support program: "Autonomy", "Localization" and "Direction and Priority"	→	→							
"National Innovation system"				→	→	→	→	→	→
Establishment of Science & Technology Park		→	→	→	→	→	→		
Establishment of incubation centers in IT Special Zone	→	→	→						
Improve infrastructure	→	→	→	→	→	→	→	→	→
New incentives for MNCs		→	→						
New incentives for export business		→	→						
Establishment of "IT Development Center"	→	→	→						
Strategic sister cities		→	→	→	→				
Increase human resources supply	→	→	→	→	→	→	→	→	→
Establishment of "a court" specializing in IT				→	→	→	→		
Improve living condition		→	→	→	→	→	→	→	→
e-government at provincial and municipality level		→	→	→	→	→	→	→	→
Dissolve digital divide		→	→	→	→	→	→	→	→

Source: The JICA Study Team.

22 LIST OF ACTION PLANS

No.	Strategy	Title		Implementation Body	Status as of August 2001
		Improvement of the Port of Africa			
1	North Zone		New schemes to improve facilities and services (Urgent)	The Port Company of Arica in coordination with SAE and the Ministries of Transport and Finance	In progress
		Infrastructure development in the macro-region			
2	North Zone		Study on the export corridor of Chile - Bolivia - Mato Grosso, Brazil	Joint organization between international lending agencies like IDB and related ministries of the corresponding countries or joint organization through a bilateral technical cooperation	In progress
3	North Zone		Development of the export corridor for the Port of Iquique	Ministry of Public Works (MOP)	In progress
4	North Zone		Development of inter-modal system	Port companies, railway companies, trucking companies, logistic companies	
5	North Zone		Review and study of the port development and operation system	A newly established committee composed of the members from the related government agencies and maritime companies, etc.	Can be easily implemented
6	North Zone		Improvement of procedures at entrance/exit points	Customs offices should take action in cooperation with port administrators by using the government budget.	In progress
		Development of diverse gateways functions			
7	North Zone		Chile-Bolivia-Peru Business Roundtable of Arica	Chamber of Commerce and Industry of Arica with the participation of nine business persons with visions of Arica, Bolivia and Peru (three of each country)	Can be easily implemented
8	North Zone		Arica as a Gateway City: city planning competition with citizen's participation	CORFO Tarapaca Regional Office and the municipality government of Arica	Can be easily implemented
9	North Zone		Tourism development: Link Arica with altiplanic route	SERNATUR Tarapaca Regional Office (Arica) in cooperation with Peruvian and Bolivian counterpart government agencies	In progress
10	North Zone		Research and education: Set up a macro-regional research institute at University of Tarapaca	University of Tarapaca in cooperation with CORFO and private enterprises (including multinational corporations) in the macro-region	Under preparation
11	North Zone		Medical services: Implement the health complex plan at University of Tarapaca	University of Tarapaca	In progress
		Industrial development through strategic alliances			
12	North Zone		Wood-processing: Special incentive for Bolivian investors	CORFO Tarapaca Regional Office	
13	North Zone		Mining-related industries: A pilot alliance program with CORFO's assistance	CORFO Regional Offices in cooperation with associations of mining-related industries of each region and the North Zone to be formed	
14	North Zone		Mining-related industries: Setting up associations of mining-related industries	CORFO Regional Offices of Tarapaca, Antofagasta, and Atacama	
15	North Zone		Mining-related industries: Strengthening CORFO schemes	CORFO Regional Offices of Tarapaca, Antofagasta, and Atacama	
16	North Zone		Mining-related industries: Setting up a section in local governments to promote direct investment	Regional governments of Tarapaca, Antofagasta, and Atacama	
17	North Zone		Mining-related industries: Accelerating industrial accumulation by taking advantage of the Arica Law	CORFO and Regional government of Tarapaca	In progress
18	North Zone		Mining-related industries: Establishing Macro-Region Center for Technology Development	CORFO Regional Offices of Tarapaca, Antofagasta, and Atacama, Universities in macro-region, Ministry of Economy, and Regional governments in macro-region	
19	North Zone		Automobile industry: Arica Development Committee including GM	CORFO Regional Office in cooperation with GM Arica, GM Corporation, Local governments, the Chamber of Commerce and Industry of Arica	In progress

No.	Strategy	Title		Implementation Body	Status as of August 2001
		Increase demand for the gateway			
20	Central Zone		Export promotion of trade-related services	ProChile	Can be easily implemented
		Infrastructure development			
21	Central Zone		Improvement of the north-south trunk Route 5	The widening or improvement of Route 5 will be done under a concession scheme through open bidding by MOP. The concessionaire is responsible for financing, implementation, and operation	Partly in progress
22	Central Zone		Improvement of the international corridor between Chile and Argentina	Chile and Argentina Frontier Committee. The project is planned as a concession project.	
23	Central Zone		Trunk road development to activate the regional economy	Road Department of Ministry of Public Works.	
24	Central Zone		Improvement of ports and port access	- Expansion basically implemented by concessionaires according to the contracts. -Non-profitable facilities (channels, break-waters, etc.) developed by the government. -Access roads developed by the private sector under concession, except for Coquimbo Port, to be implemented by the local governments.	
25	Central Zone		Comprehensive study on physical distribution	Implemented by SECTRA under steering by Ministry of Public Works (MOP), Ministry of Transport and Telecommunications (MTTI), and other relevant agencies.	Can be easily implemented
26	Central Zone		Feasibility study on strategic projects for transport corridor development	1) Chile and Argentina Frontier Committee, Ministry of Public Works and Ministry of Transport of the two countries. 2) Ministry of Public Works/SECTRA.	Can be easily implemented
27	Central Zone		Impact study of IT revolution on port functions and related industries	Ministry of Transport and Telecommunications (MII) and SECTRA in cooperation with established research institutes and universities.	
28	Central Zone		Study of the infrastructure investment scheme to accelerate infrastructure development of Valparaiso Port	-Ministry of Finance, Ministry of Transportation and Telecommunications, Ministry of Public Works, and the Business Management System (SAE) -These organizations possibly hire transportation infrastructure specialists from, e.g., Transportation Engineering School of University Catolica de Valparaiso.	
		Logistics sector reinforcement			
29	Central Zone		Integrated port sales	-The Port Company of Valparaiso (EPV) will take a leading role in the Port Sales Society. -ProChile will help promotion activities in foreign countries.	Can be easily implemented
30	Central Zone		Incorporation of SMEs to the logistics information system	The Port Company of Valparaiso (EPV) and Chilean Truckers Association will take leading roles.	
		Diffusion of the good image of Valparaiso			
31	Central Zone		Disseminate the image of Valparaiso as an open and dynamic international gateway city in Asia and the Pacific	The regional or provincial government or municipality coordinates all activities. ProChile is in charge of image dissemination in Asian countries.	
		Research for regional integration			
32	Central Zone		Establishment of the Joint Research Institute for Regional Integration	-Chilean government in cooperation with Argentine government. -Center of Studies of the Region of Valparaiso (CER) will support the establishment by coordinating 4 existing universities in Valparaiso.	
		Tourism development			
33	Central Zone		Transformation of tourism into integrated service industries through organizing young entrepreneurs	-SERNATUR Region V will act as a coordinator of the activities. -Fundacion Valparaiso will support the activities based on its projects and strong relationships with foreign organizations. -CPYME of University Federico Santa Maria will support the activities based on the relationship with the Italian Touring Club.	Can be easily implemented
34	Central Zone		Transformation of tourism into service-oriented industry targeting at specific customers in La Serena	-SERNATUR Region IV -Existing tourism PROFO would be the first trial group	Can be easily implemented

No.	Strategy	Title		Implementation Body	Status as of August 2001
		Valdivia: Development of eco-region cluster			
35	South Zone		Establish overall coordinating body for eco-region strategy	Municipalities, SUBDERE, private sector	
36	South Zone		Create marketing strategy for eco-basket	Municipalities, CODEPROVAL, SERNATUR	Partly in progress
37	South Zone		Create coordinating mechanism, or committee, for the development of eco-tourism	Co-ordinator selected by municipality of Valdivia and approved by other participating actors	Under preparation
38	South Zone		Establish a center of innovation for new products, processes and tourist services through an alliance between private and public sectors and the university	Center for Applied and Innovative Management at the University of Austral	Under preparation
39	South Zone		Create an incubator mechanism for strengthening micro and small enterprises under Eco-Region concept	Municipality	Partly under preparation
		Sub-action plan 1			
40	South Zone		Environmental Charter project	Regional Government and CORMEMA	Can be easily implemented
		Sub-action plan 2			
41	South Zone		Eco-regional-mark project	CORFO, ProChile, CONAMA	Can be easily implemented
		Sub-action plan 3			
42	South Zone		Tourism complex development at Antonia Samore Passage	SERNATUR with participation of private sector, regional government.	Can be easily implemented
		Sub-action plan 4: Building awareness through education of children and youth			
43	South Zone		Creation of regional sub-text	Ministry of Education, regional government	In progress
44	South Zone		Natural site visit as school event	Ministry of Education, regional government	
45	South Zone		Preferential offer of facilities in the National Parks to school children's use	Ministry of Education, regional government, CONAF and Ministry of National Goods.	
		Development of innovative industry - Case study for salmon cluster			
46	South Zone		A comprehensive study on the present situation of net workshops	SERCOTEC in cooperation with CORFO an CONAMA	Can be easily implemented
47	South Zone		Acceleration of restructuring net workshop business through financial incentive	CORFO	Can be easily implemented
48	South Zone		Basic research and development in the fields related to net workshop business	CORFO in cooperation with Fundaction Chile, universities and private sectors	Can be easily implemented
49	South Zone		Investment promotion seminar in Japan	CORFO in cooperation with ProChile	Can be easily implemented

No.	Strategy	Title		Implementation Body	Status as of August 2001
		Develop a program for SMEs to accelerate the conversion and formulation of appropriate export strategies			
50	Solution-Oriented Manufacturing		A training program	CORFO in cooperation with ProChile, ASEXMA, ASIMET and universities	Under preparation
51	Solution-Oriented Manufacturing		A consultation program	CORFO in cooperation with ProChile, ASEXMA, ASIMET and universities	Under preparation
52	Solution-Oriented Manufacturing		A managers exchange program	CORFO in cooperation with AgCI, ASEXMA, ASIMET and the chamber of commerce of each country	Under preparation
		Support for the conversion program			
53	Solution-Oriented Manufacturing		Private equity finance schemes for the conversion	CORFO (market study conducted by private consultants)	Can be easily implemented
54	Solution-Oriented Manufacturing		Information service to SMEs	ProChile	Can be easily implemented
55	Solution-Oriented Manufacturing		Promote exports to Japanese companies in the American continent	ProChile	Can be easily implemented
56	Solution-Oriented Manufacturing		A ten-year plan to consolidate Chilean products' image in human-resource-based manufacturing	ProChile in cooperation with CORFO, ASEXMA, ASIMET and industry leaders and universities	Can be easily implemented
		A development program of innovative industries			
57	Solution-Oriented Manufacturing		An alliance and integration program for material-related industries	CORFO in cooperation with ProChile, ASEXMA, ASIMET, state-owned enterprises, and industrial sectors	Can be easily implemented
58	Solution-Oriented Manufacturing		Strategic and selective investment promotion	CORFO and Foreign Investment Committee	Can be easily implemented
59	Solution-Oriented Manufacturing		A statement on "Omnibus Competitiveness Enhancement" by the government	CORFO in cooperation with Ministry of Economy, ProChile, Ministry of Public Works, Transportation and Telecommunications, Ministry of Education, ASEXMA, ASIMET, universities, and other organizations concerned	Can be easily implemented
		Vision for the future			
60	IT Industry		Declaration of IT Charter	Regional government, provincial and municipal governments	Can be easily implemented
		Strengthen R&D			
61	IT Industry		Establishment of a new institute: "IT Development Center"	Universities, ASIVA with support from the public sector (CORFO, ProChile, central and regional governments)	Can be easily implemented
62	IT Industry		New incentives	Central, regional, provincial and municipal governments	
63	IT Industry		"National Innovation System"	-A project-based organizaton -Public sector's initiative in cooperation with the private sector and universities	
		Foster export-oriented business			
64	IT Industry		New incentives	Central, regional, provincial and municipal governments	
65	IT Industry		Business support by "IT Development Center "	-A project-based organizaton -Public sector's initiative in cooperation with the private sector and universities	Can be easily implemented
66	IT Industry		Strategic sister cities	Regional, provincial and municipal governments	
		Improve IT environment and its competitiveness			
67	IT Industry		Science & Technology Park for R&D in Valparaiso	Special purpose company (SPC) with investment from the private companies and support from the public sector	
68	IT Industry		IT special zone	Special purpose company (SPC) with investment from the private companies and support from the public sector	Can be easily implemented
69	IT Industry		Infrastructure development in Valparaiso area	Telecommunication companies and the public sector	Under preparation
70	IT Industry		Establishment of a "court" specializing in IT	Central government	
71	IT Industry		Increase human resources supply for the IT industry	-Universities and IT companies regarding collaboration system -Central government regarding establishment of a technical college and "IT human resource center"	Can be easily implemented
		Increase business opportunities			
72	IT Industry		Realization of e-government at provincial and municipal levels	Provincial and municipal governments	Under preparation
73	IT Industry		Dissolve digital divide	Public sector	In progress