

17.4 Case Studies of Industrial Types Targeting the Macro-regional Market

The North Zone needs to diversify and strengthen its economic activities in order to become an internationally competitive, “first-class” gateway. The gateway functions must include not only services related to ports, e.g., logistics, finance, insurance, and telecommunications but also, in a broader sense, manufacturing, education, medical services, tourism, cultural activities, etc. This study has focused on manufacturing because the JICA Study Team believes that competitive manufacturing industries are necessary for long-term sustainable development of the zone, on which many people of the zone agreed during Phase I.

In the beginning of Phase II, the JICA Study Team hypothesized that strategic types of industries in the North Zone were the following four types, based on the information obtained during the Phase I study:

- 1) Processing of natural resources obtained from the macro-region for export to Asia, the United States, and Europe (e.g., wood-processing and soybean processing)
- 2) Manufacturing of goods specifically developed for the macro-regional market (e.g., electric home appliances)
- 3) Manufacturing and services based on minerals and other resources
- 4) Industries under alliance with strategies of multi-national corporations (e.g., supporting industries for GM, Arica)

In selecting these types to be studied, the study team took the following points into account. These points are also principles across the strategic plans formulated in this study (i.e., not only for the North Zone but also for the Central and South Zones, non-natural-resource-based industries, and the information technology industry), as presented in Chapter 16.

- 1) Chile's economy still highly depends on natural-resource-based production, though the private and public sectors make vigorous efforts to diversify the economic structure and to enhance the value added of these products and have succeeded to a large extent. Thus, priority is given to types that can contribute to further economic diversification and value added enhancement.
- 2) There are substantial disparities between the Metropolitan Region and other regions and between large sized and small and medium sized enterprises (SMEs) in Chile. The ultimate goal of the strategic plans to be formulated by this study is to realize more balanced economic development of the country. Thus, priority is also given to strategic plans that can contribute to reducing these disparities.
- 3) Due to the increase in environmental concerns throughout the world, special attention is given to possible environmental effects resulting from the plans.

The study team also focused on industrial types whose potential could be better studied by its cooperation with Chilean counterpart agencies. This decision is based on the prioritization of Groups 1 and 2 among the following three groups of possible strategic plans, which is also discussed in Chapter 16.

Group 1: Plans that need to study the market situation of Asian countries, especially of Japan, and thus the JICA Study Team's cooperation is deemed to accelerate

their formulation.

Group 2: Plans that may not need to study the market situation of Asian countries but the JICA Study Team's cooperation may be useful in their formulation.

Group 3: Plans that Chilean public or private organizations can formulate by themselves.

Therefore, types/sectors/products that can be developed by Chilean people themselves, e.g., arid agriculture in Azapa and Lluta Valleys and aquaculture along the coastal zone, were not included in the analysis, though they have potential for export and to attract foreign investment in the North Zone. The potential of such sectors and products were diagnosed in Phase I, while the results are presented in Chapter 16.

While concluding that the four types mentioned above were still strategic for the North Zone based on the study of the macro-regional market and infrastructure, the study team could not identify products to be specifically developed for the macro-regional market (Type 2). Therefore, this section presents the results of the case studies of Types 1, 3, and 4. The cases are wood-processing industries based on raw materials to be imported from Bolivia for Type 1; mining-related manufacturing and services for Type 3; and the automobile industry and its supporting industries for Type 4. In addition to the study results of these three types, this section includes a description of Arica's industrial structure because of the focus on Arica as explained in Section 17.1.

17.4.1 Wood-Processing Industry in Arica

(1) Wood-Processing Industry in Arica

Wood-based products, such as sawn wood, construction materials, furniture and paper and pulp, altogether accounted for 12% of Chile's total exports and 25% of manufacturing exports in 1998 ("wood products" and "paper and paper products" in Table 17.4.1). The wood- and paper-related products are thus the third most important category of exports for the country, following mining, and agriculture, and food products. These products are particularly important in Chile's exports to the Asian market, occupying 14% of total exports destined to Asia in 1998. One of the most rapidly growing areas within this sector is furniture, whose exports increased at an average growth rate of 10.4% per annum between 1995 and 1999.¹

However, Chile's wood-based manufacturing industries are mainly located in the South Zone, as well as in the Metropolitan Region, as indicated in the value of production by region (Table 17.4.2). While the Metropolitan Region and Region VIII are major producers of wood-based products as a whole, the production of the latter region exceeds that of the former in the areas of wood processing, i.e., construction materials, furniture, and furniture parts and components. The concentration of these industries in both regions is due to the concentration of industries in general, but also because of their proximity and better accessibility to raw materials. Chile's forestry resources, a total of 15 million hectares of native forests and forest plantations, can be mostly found in the South and Austral Zones (Table 17.4.3). These forests are characterized by temperate and cold climates. Major species of native forests are mainly *siempreverde*,

¹ ProChile, *Análisis de las Exportaciones Chilenas: Análisis General*, 2000.

lenga, and *coihue de magallanes*, and those of plantations are predominantly radiata pine and eucalyptus.

Table 17.4.1 Chilean Exports by Commodity and by Area in 1998 (US\$ millions)

| CIIU | Sector | America | Europe | Asia | Africa | Oceania | Total |
|------|-------------------------------------|---------|--------|-------|--------|---------|--------|
| 100 | Agricultural products | 1,078 | 396 | 196 | 8 | 1 | 1,679 |
| 200 | Minerals | 1,389 | 2,629 | 2,061 | 7 | 5 | 6,091 |
| 300 | Industrial products | 3,704 | 1,270 | 1,653 | 51 | 53 | 6,731 |
| 110 | Agriculture, fruits, livestock | 1,067 | 378 | 164 | 7 | 1 | 1,617 |
| 120 | Forest products | 4 | 7 | 18 | 0 | 0 | 29 |
| 130 | Fisheries | 5 | 10 | 13 | 0 | 0 | 28 |
| 210 | Natural gas and carbon | 0 | 0 | 0 | 0 | 0 | 0 |
| 220 | Copper and Iron | 1,077 | 2,118 | 1,932 | 1 | 1 | 5,129 |
| 230 | Other minerals | 311 | 511 | 129 | 8 | 4 | 963 |
| 310 | Food products, beverage and tobacco | 1,392 | 660 | 1,012 | 10 | 34 | 3,108 |
| 320 | Textile, leather goods | 163 | 17 | 3 | 0 | 1 | 184 |
| 330 | Wood-based products | 409 | 42 | 260 | 17 | 1 | 729 |
| 340 | Paper and paper products | 380 | 276 | 296 | 6 | 2 | 960 |
| 350 | Chemical products | 538 | 162 | 61 | 12 | 10 | 783 |
| 360 | Stone and cement products | 47 | 1 | 0 | 0 | 0 | 48 |
| 370 | Basic metal products | 156 | 59 | 6 | 0 | 2 | 223 |
| 380 | Machinery and equipment | 592 | 47 | 11 | 5 | 1 | 656 |
| 390 | Other manufactured products | 22 | 3 | 0 | 0 | 0 | 25 |
| | Total | 6,229 | 4,309 | 3,920 | 67 | 59 | 14,584 |

Source: ProChile, *Análisis de la Exportaciones Chilenas*, 1999.

Table 17.4.2 Production Value of Wood Products and Paper Products by Region in 1996

| Region | Wood products, including furniture (CIIU 330) | | Paper and paper products (CIIU 340) | |
|--------------|---|-------|-------------------------------------|-------|
| | (million pesos) | (%) | (million pesos) | (%) |
| I | 1,684 | 0.2 | 7,327 | 0.5 |
| II | 1,547 | 0.2 | 3,590 | 0.3 |
| III | 755 | 0.1 | 563 | 0.0 |
| IV | 5,263 | 0.6 | 1,809 | 0.1 |
| V | 17,038 | 1.8 | 27,649 | 1.9 |
| Metropolitan | 189,789 | 20.3 | 773,185 | 54.3 |
| VI | 11,081 | 1.2 | 34,520 | 2.4 |
| VII | 58,690 | 6.3 | 85,684 | 6.0 |
| VIII | 445,325 | 47.5 | 395,525 | 27.8 |
| IX | 64,134 | 6.8 | 75,618 | 5.3 |
| X | 131,482 | 14.0 | 15,193 | 1.1 |
| XI | 4,784 | 0.5 | 149 | 0.0 |
| XII | 5,484 | 0.6 | 2,119 | 0.1 |
| Total | 937,056 | 100.0 | 1,422,931 | 100.0 |

Source: INE, *Panorama Regional: Estadísticas Regional de Chile, 1990-1998*, 1999.

There are few wood-processing companies in Arica. INE's manufacturing statistics regarding companies of more than 10 employees indicates that Arica has two companies in the category of "wood production and manufacturing of wood and cork products except furniture" and two companies in "manufacturing of furniture" as of 1995-1997.² The average annual production per company in the two categories is 687 million pesos and 132 million pesos, respectively, while the average number of employees per

² INE, CORFO, and CEZADE, *La Industria Manufacturera En Chile (1995-1997)*, 1999. Also, see Table 17.4.12

company is 49 persons and 18.5 persons, respectively. According to a company that has 10 employees and manufactures wooden and metal furniture mainly for the local market (i.e., Arica), there are three other furniture manufacturing companies of similar size and eight smaller-sized, or *artisan*, companies operating in Arica.

Table 17.4.3 Area of Native and Planted Forests by Region in 1997

| Region | Native Forests | | Plantations | |
|--------------|----------------|-------|-------------|-------|
| | (hectares) | (%) | (hectares) | (%) |
| I | 7,682 | 0.1 | 24,491 | 1.3 |
| II | 0 | 0.0 | 602 | 0.0 |
| III | 0 | 0.0 | 1,723 | 0.1 |
| IV | 1,377 | 0.0 | 54,695 | 3.0 |
| V | 94,008 | 0.7 | 56,672 | 3.1 |
| Metropolitan | 93,345 | 0.7 | 12,659 | 0.7 |
| VI | 117,798 | 0.9 | 84,024 | 4.6 |
| VII | 369,708 | 2.8 | 347,349 | 18.9 |
| VIII | 785,766 | 5.8 | 761,916 | 41.5 |
| IX | 907,521 | 6.8 | 302,840 | 16.5 |
| X | 3,610,314 | 26.9 | 166,403 | 9.1 |
| XI | 4,830,743 | 35.9 | 22,561 | 1.2 |
| XII | 2,625,054 | 19.5 | 50 | 0.0 |
| Total | 13,443,316 | 100.0 | 1,835,985 | 100.0 |

Source: CONAF 1997, as quoted in CORFO Region I, "Oportunidades de Negocios con el Sector Industrial Maderero de Bolivia," 1999, p. 2 and p.7.

Among the four relatively large companies, the most successful is probably the one that provided information on the structure of Arica's furniture industry. This company produces tables, desks, chairs, beds, etc., targeting consumers of middle to lower middle classes with stable income sources, department stores, and public institutions (e.g., government offices and schools). They attract consumers by providing 30-60 days of credit. They use not only wood as a raw material, but also metals, mainly steel, based on their experience in metal work for fishmeal processing machinery. In contrast, two of the four companies were going through a restructuring process since the late 1990s, and one was negotiating for a merger or selling. One of the companies in the process of downsizing has experience in exporting doors to Venezuela and Germany and furniture to Iquique, Antofagasta, and Calama and was awarded the Prize of Better Image for their products by Madrid, Spain in 1989. However, this company has been adversely affected by the economic crisis beginning in 1997, while their products have been in severe price competition with products imported from China and Taiwan.

Raw materials for manufacturing wooden construction materials and furniture in Arica are supplied mainly from the South Zone, directly from the zone or through Antofagasta. A major wood dealer that also manufactures doors and windows in Arica explained that they used to import high-value tropical woods, particularly mahogany (*Swietenia macrophylla*), cedro (*Cedrela odorata*), and roble (*Amburana cearensis*), from Bolivia. However, it had not been able to do so since the effectuation of the 1996 Forest Law in Bolivia, which has virtually prohibited the logging of these species. Even before the introduction of the new law, it was often difficult to obtain woods from Bolivia due to problems in transport, especially during the rainy season (January – March). They also described the Bolivian wood market as "closed and complicated."

The Arica dealer is therefore more interested in wood from the South Zone, such as lenga, coihue, laurel, etc., rather than in alternative Bolivian tropical species. According to the dealer, these southern species are of better quality, are more profitable when transport costs are taken into account, and have a constant and stable supply. Some of the species are suitable for furniture manufacturing and well demanded in external markets. For example, a U.S.-Bolivian joint venture in La Paz imports lenga wood from Southern Chile and manufactures furniture for the U.S. market. The dealer, a distributor of Chile's major suppliers of wood products (inputs for further processing), e.g., MASISA, Cholguán, Trupan, etc., also exports wood boards and finger joints to La Paz (often in a smaller volume in order to evade paying Bolivia's import duties).

(2) Wood-Processing Industry in Bolivia

The study team conducted a series of interviews with Bolivian wood-processing companies in La Paz and Santa Cruz in December 2000. The main purpose of the interviews was to examine the possibility of establishing a partnership with the Bolivian industry to develop an export-oriented wood-processing industry in Arica. Such a relation is indispensable because Arica has only a few wood-processing companies, which are mostly small-sized, producing mainly for the domestic market, and do not seem to have the capacity and technology to manufacture for export immediately. In order to foster Arica's wood-processing industry into an export-oriented one, the number of companies must increase to such a degree that they can form an industrial cluster and their product quality must improve to a level at which external customers are satisfied.

In sum, the results of the interviews are mixed. The good news is that there is an increasing demand in the North American and European markets for construction materials and furniture based on certified woods (woods taken from sustainably managed forests, certified by an internationally recognized certifying institution), while the world demand for wood-based products has somewhat stagnated in recent years. Since the introduction of the new Forestry Act in 1996 for the sustainable utilization and protection of forests, major enterprises in the Bolivian forestry sector have been quickly shifting to focus on markets of certified wood-based products. Already in 1999, 700,000 hectares were certified, accounting for more than 10% of producing forests in the country.³

As shown in Table 17.4.4, the nine companies that the study team visited include Bolivia's leading exporters of wood-based products, four of which have been certified by the Forest Stewardship Council (FSC). Those companies that produce and use certified woods (species alternative to mahogany) unanimously stated that they were receiving more international orders, especially from U.S. manufacturers and distributors, than they could supply and that they could not expand their production capacity immediately due to high financial costs in Bolivia.

³ Forestry Chamber of Bolivia, Strategic Plan for the Development of the Bolivian Forestry Sector: Executive Summary, CFB-01/99 – Rev. 0, November 2000, p. 5.

Table 17.4.4 Bolivian Wood-Processing Companies Visited by the JICA Study Team

| Company Name | Location | Establishment | Forest Concession (hectares) | Products | Annual Sales (US\$) | % of Exports in Sales | Number of Workers (factory) | FSC* |
|------------------------------|------------|---------------|------------------------------|--|---------------------|-----------------------|-----------------------------|------|
| Foresta S.R.L. | La Paz | 1992 | none | doors, window frames, counter tops, planks, etc. | 1.6 million | 40 | 30 | |
| BOLHOLZ S.A. | La Paz | 1996 | none | doors, garden furniture, flooring | 1 million | 80 | 70 | x |
| Aserradero San Martin S.R.L. | Santa Cruz | 1970 | 286,000 | doors, garden furniture, flooring | n.a. | 100 | 100 | x |
| Oquiriquia S.R.L. | Santa Cruz | 1996 | 124,000 | sawn timbers | n.a. | 10 | 86 | |
| CIMAL-IMR Ltda. | Santa Cruz | 1973 | 700,000 | garden furniture, flooring | 7-8 million | 100 | 400 | x |
| "San Pedro" S.R.L. | Santa Cruz | 1967 | 200,000 | mainly doors | 2 million | 100 | 98 | |
| La Chonta Ltda. | Santa Cruz | 1975 | 220,000 | doors, flooring, boards, etc. | 4.5 million | 100 | 200 | x |
| Portal S.R.L. | Santa Cruz | 1993 | none** | mainly doors | 1.2 million | 60 | 40 | |
| Suto Ltda. | Santa Cruz | 1975 | 100,000 | sliced veneers | 1.5 million | 100 | 60 | |

*) FSC indicates companies that have obtained the certificates of Forest Stewardship Council A.C.

***) The owner of the company has a forestry concession, though legally as a different company.

One of important characteristics of the Bolivian wood-processing industry is their relatively long experience in dealing with tropical woods. The companies that were established in the 1960s-70s started as forestry concessionaires and have shifted their emphasis towards higher value-added activities, i.e., from logging through saw milling to manufacturing of construction materials and furniture. Furthermore, their products have been largely destined to external markets. Therefore, Bolivian wood-processing companies, at least those we visited, seem to be more knowledgeable about the world market of wood-based products than their counterparts in Arica. The Department (Province) of Santa Cruz, where nearly 45% of forestry concessions are concentrated, has the largest cluster of wood-based industries (e.g., sawmills, timber dealers, manufacturers of construction materials and furniture, exporters, etc.).⁴ The main goal of the Strategic Plan for the Development of the Bolivian Forestry Sector, which was recently formulated by the Forestry Chamber of Bolivia, is precisely to consolidate the existing cluster in order to improve the competitiveness of the sector in the world market.⁵

(3) Possibility of Wood Processing in Arica

Even with these positive characteristics, Bolivian wood-processing companies may not effectively participate in developing an export-oriented wood-processing industry in Arica in the near future for the following negative factors.

1) High financial costs and lack of long-term credits in Bolivia

Although two companies have shown interest in investing in Arica, their main problem is the lack of finance. It does not seem likely that they will invest in Arica any time soon unless finance on significantly favorable terms is available, which is almost impossible in Bolivia. The prevailing interest rates are 16-18% per annum and loans

⁴ Fundación Chile, Departamento Industrias de la Madera y Departamento Forestal, "Industrialización de Maderas Bolivianas en Arica: Perfil de Factibilidad," Febrero 2000, p. 9.

⁵ Forestry Chamber of Bolivia, op. cit.

are generally for working capital only, i.e., for six months at most. Even companies that have definite demand for their products, particularly those based on certified wood, are not able to expand their production capacities because of the unavailability of long-term credits for manufacturing activities. Whether or not they have an expansion plan or not, all the interviewed companies mentioned such a problem concerning their finance. The provision of financial assistance under the Arica Law will not fundamentally solve the financial problem of Bolivian investors.

2) Problems related to the procurement of raw materials

The supply of raw materials, especially those of high value, and high demanded species such as mahogany, cedro, and roble, has become scarce due to the reduction of producing forest areas since the introduction of the 1996 Forest Law. The largest wood dealer in Arica reported that they had not received any mahogany from Bolivia in the last few years. Even before 1996, insufficient transport infrastructure and drying facilities caused a seasonal fluctuation in the supply of these woods and such a situation has not been substantially improved. Bolivian wood-processing companies that do not have concessions are, therefore, often faced with difficulty in obtaining raw materials. The custom of cash-dominated transaction is another problem for procurers (especially international buyers) of Bolivian woods.

3) Uncertain availability of certified woods

Arica's wood-processing industry should target the international markets of certified wood-based products since sooner or later non-certified woods will no longer be accepted in the markets of Europe, the United States, and probably Japan and Korea. However, it is not clear whether Bolivian forest concessionaires and sawmills are willing to supply, constantly and sufficiently, such woods to dealers and processors in Arica. Naturally, Bolivian companies would like to reap as much profit as possible in the growing international markets of certified wood products. One company with certified concessions implied that it would not be easy for Chilean wood processors to be supplied with certified woods at least in the short run. One reason is that not all concessionaires can obtain certificates immediately, even if they know there is a market for certified woods, because of high costs for certification (the average cost for the formal evaluation of forest concession or property is about US\$25,000).

4) High transport costs (inland freight) in Bolivia

Bolivian logging companies tend to locate drying and milling facilities close to their forests so that they can avoid paying extra costs for transporting logs with high moisture contents (as well as a deterioration in the color and texture of woods). Because of high inland freight (from factories to ports), and certainly for higher value added, the Bolivian forestry sector has been increasingly exporting secondary industrial products (e.g., furniture and construction materials) rather than primary industrial products (e.g., sawn timbers). A study commissioned by the Forestry Chamber of Bolivia shows that high transport costs are the main factors that curtail the international competitiveness of the Bolivian forestry sector.⁶ These tendencies altogether seem to impede a stable and constant supply of Bolivian raw materials to the wood-processing industry in Arica.

⁶ Forestry Chamber of Bolivia, op. cit., pp. 16-17.

The transport costs can be, however, reduced by the improvement of infrastructure and the Bolivian transport system as a whole (e.g., more competition among transporters and less government intervention).

5) Higher labor costs in Arica

Responding to the question of whether or not they were interested in investing in Arica, most of the companies mentioned Chile's higher labor costs as one of the negative factors influencing their investment. The Bolivian minimum wage is approximately US\$50/month compared to the Chilean minimum wage of around US\$200/month, though most of them indicated that they were paying US\$100 - 120/month for normal workers and even more than US\$300/month for skilled workers. One company raised a critical question about labor productivity, that is, whether Arica's workers are as productive as Santa Cruz's workers for the same wage. They explicitly commented that the 17% wage subsidy under the Arica Law was not sufficient to induce their investment in Arica. Also, there seems to be a larger pool of potentially skilled workers, as well as competent managers, in Bolivia, especially in Santa Cruz, as it has longer experience in processing tropical woods and a larger cluster in the forestry sector. Another company has training and award programs for their workers under a policy to foster and maintain skilled workers.

(4) Strategies for an Export-Oriented Wood-Processing Industry in Arica

One thing that has become clear through this study is that long-term planning and its steady implementation are necessary to develop an export-oriented wood-processing industry in Arica. Although the Arica Law provides incentives that can attract some investors, it is not strategy but merely tactic. Probably, the same can be said about the development of most kinds of export-oriented manufacturing industries, which, with continuous effort, take at least 10 years to become internationally competitive. The following are possible strategies based on the above findings.

- 1) Prepare a long-term development plan for the industry with a timetable and concrete measures for export expansion.
- 2) Take measures to ensure constant and sufficient supply of Bolivian certified woods
 - Support the improvement of transport infrastructure and systems in Bolivia
 - Support the Bolivian Forest Certification Funds (managed by the Forestry Chamber of Bolivia and assisted by the Swedish International Development Agency)
 - Facilitate negotiations (or agreements) between the private sectors of the two countries
- 3) Help the Bolivian forestry sector to reduce its production costs (related to 2 above)
 - Provide financial assistance to implement the Strategic Plan for the Development of the Bolivian Forestry Sector (total costs = US\$500,000)
 - Support the improvement of transport infrastructure and institutional frameworks in Bolivia
- 4) Provide incentives to a few selected Bolivian investors (wood-processing

companies)

- Provide finance on preferential terms to those investors (potential core companies)
 - Establish a special fund for Bolivian investors
 - Facilitate the use of CORFO's schemes (e.g., PDP, FONTEC, etc.)
 - Support their international marketing through ProChile's export promotion
- 5) Foster managers and skilled workers for wood-processing in Arica
- Invite experts (from Bolivia, Sweden, etc.) to a few targeted companies in Arica
 - Send managers and technicians for training in Bolivia, Southern Chile, Sweden, etc.
 - Provide wood-processing courses in vocational schools (e.g., INACAP)
- 6) Develop a cluster of wood-processing industries in Arica (in the long run)
- Foster suppliers around the core company through PDP
 - Strengthen supporting industries (e.g., engineering services, machinery manufacturing, transport, etc.) and industrial linkages
 - Possibly link the cluster with those in La Paz and Santa Cruz (e.g., furniture assembling)
 - Invite investors from Southern Chile and other countries (e.g., U.S.A. and Japan)

17.4.2 Mining-related Manufacturing and Services

(1) Mining Development Situation of Macro-region

The potential for mine development in the macro-region is considerable. Peruvian mines have been developed where principal investments will amount to almost US\$9 billion (Table 17.4.5). The mines in Argentina have just been developed and production will reach about US\$11 billion taking into account only Category 1; a group of promising mines to be developed (Table 17.4.6). When including Categories 2 and 3, it will be nearly US\$20 billion (Tables 17.4.7 and 17.4.8).

Table 17.4.5 Main Investments Made and Projected of Large-Scale Mines in Peru (1992 - 2000)

| Owners | Project | Product | Investment (US\$ Million) | Period |
|----------------------|--------------------------------|---------------------------------|---------------------------|-----------|
| Quellaveco (AngloA) | Quellaveco | Concentrated Copper, Molybdenum | 800 | 1993-2002 |
| Corona | Cerro Corona | Concentrated Copper, Gold | 250 | 1994-2003 |
| Shougang | Pellet Plan | Steel Pellets | 172 | 1993-1999 |
| Cerro Verde (Cyprus) | Expansion of Cerro Verde | Copper Cathodes | 485 | 1995-1999 |
| Cerro Verde (Cyprus) | Cerro Negro | Copper | 99 | 1999-2000 |
| La Granja (Cambior) | La Granja | Concentrated Copper | 1,100 | 1994-2003 |
| BHT Tintaya | Expansion of Tintaya | Concentrated Copper | 123 | 1995-1998 |
| Ref. Cajamarquilla | Renovation, Equipment | Refined Zinc | 50 | 1995-2004 |
| Ref. Cajamarquilla | Renovation to 23,000 tons/year | Refined Zinc | 250 | 1996-1999 |
| Doe Run (Oroya) | PAMA | Copper, Zinc, Lead, Silver | 107 | 1998-2007 |
| Doe Run (Oroya) | Process Improvements | Copper, Zinc, Lead, Silver | 85 | 1998-2007 |
| Yanacocha | Carachugo | Gold | 37 | 1992-1997 |
| Yanacocha | Maqui-Maqui | Gold | 55 | 1994-1999 |
| Yanacocha | Yanacocha | Gold | 190 | 1996-2000 |
| Southern Peru | Cuajone Expansion | Copper | 245 | 1996-2002 |
| Southern Peru | Renovation Refllo | Copper Cathodes | 20 | 1995-1998 |
| Southern Peru | Renovation Equipment PAMA | Copper | 445 | 1992-1996 |
| Southern Peru | New Foundry | Copper | 700 | 1997-2006 |
| Southern Peru | Expansion of Foundry | Copper | 871 | n.a. |
| Antamina | Amtamina | Copper, Lead, Silver, Zinc | 2,265 | 1997-2001 |
| Pierina Barrick | Pierina | Gold | 316 | 1996-1999 |
| TOTAL | | | 8,665 | |

Source: Juana R. Kuramoto, Serie Desarrollo Productivo - Las Aglomeraciones Productivas Alrededor de La Minería: El Caso de Minería Yanacocha S.A

Table 17.4.6 Projection of Investment For Argentine Mines of Category 1

(US\$ million)

| Project/Operation | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Total |
|------------------------|------------|------------|--------------|--------------|--------------|--------------|--------------|------------|------------|--------------|------------|---------------|
| Alumbreira | 87 | 87 | 87 | 87 | 87 | 174 | 174 | 174 | 87 | 87 | 87 | 1,218 |
| Hombre Muerto | 10 | 10 | 10 | 10 | 20 | 20 | 20 | 10 | 10 | 10 | 10 | 140 |
| Vanguardia | 19 | 19 | 19 | 19 | 19 | 19 | 38 | 38 | 38 | 19 | 19 | 266 |
| Potasio Rio | 10 | 60 | 30 | 7 | 7 | 7 | 7 | 7 | 14 | 14 | 14 | 177 |
| Pachon | 20 | 200 | 500 | 60 | 56 | 56 | 56 | 56 | 56 | 112 | 112 | 1,284 |
| Pirquitas | 24 | 100 | 9 | 9 | 9 | 9 | 9 | 9 | 16 | 16 | 16 | 226 |
| Loma Blanca | 12 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 20 |
| San Jorge | 0 | 50 | 60 | 8 | 8 | 8 | 8 | 8 | 8 | 16 | 16 | 190 |
| Agua Rica | 20 | 80 | 300 | 600 | 100 | 70 | 70 | 70 | 70 | 70 | 70 | 1,520 |
| Veladero | 20 | 30 | 300 | 60 | 28 | 28 | 28 | 28 | 28 | 28 | 56 | 634 |
| Lama | 50 | 150 | 100 | 21 | 21 | 21 | 21 | 21 | 21 | 42 | 42 | 510 |
| Manantial Espejo | 10 | 20 | 70 | 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 166 |
| Gualil_n | 10 | 40 | 4 | 4 | 4 | 4 | 4 | 4 | 8 | 8 | 8 | 98 |
| Gualcamayo | 10 | 10 | 100 | 20 | 10 | 10 | 10 | 10 | 10 | 20 | 20 | 230 |
| Copper Salta 1 | 0 | 0 | 0 | 0 | 50 | 300 | 500 | 150 | 70 | 70 | 70 | 1,210 |
| Copper in Salta Sed | 0 | 0 | 0 | 20 | 100 | 80 | 20 | 20 | 20 | 20 | 20 | 300 |
| Copper in Hollada | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 400 | 200 | 700 |
| New Alumbreira 1 | 0 | 0 | 0 | 100 | 400 | 100 | 42 | 42 | 42 | 42 | 42 | 810 |
| Gold in Maricunga 1 | 0 | 0 | 0 | 20 | 100 | 100 | 15 | 15 | 15 | 15 | 15 | 295 |
| Gold in Famatina | 0 | 0 | 40 | 10 | 4 | 4 | 4 | 4 | 4 | 4 | 8 | 82 |
| Gold in Chepes | 0 | 10 | 20 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 50 |
| Gold in Valle Cura 1 | 0 | 0 | 0 | 20 | 200 | 30 | 18 | 18 | 18 | 18 | 18 | 340 |
| Copper in Paramillos | 0 | 0 | 0 | 0 | 50 | 150 | 14 | 14 | 14 | 14 | 14 | 270 |
| Copper in Uspallata | 0 | 0 | 0 | 40 | 160 | 14 | 14 | 14 | 14 | 14 | 14 | 284 |
| Gold in Uspallata | 0 | 0 | 20 | 150 | 30 | 14 | 14 | 14 | 14 | 14 | 14 | 284 |
| Gold-Copper in Menucos | 0 | 0 | 0 | 10 | 100 | 20 | 8 | 8 | 8 | 8 | 8 | 170 |
| Total | 302 | 867 | 1,670 | 1,288 | 1,574 | 1,249 | 1,105 | 745 | 696 | 1,073 | 905 | 11,474 |

Source: Al Estudio De Mercado: Minería Argentina, Rojas & Asociados, February 2000.

Note: Category 1 - Well-known projects showing high possibilities of being developed.

Table 17.4.7 Projection of Investment For Argentine Mines of Category 2

(US\$ million)

| Project/Operation | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Total |
|--------------------------------|------|------|------|------|------|------|------|------|-------|------|------|-------|
| Campana Mahuida | 0 | 0 | 0 | 30 | 30 | 4 | 4 | 4 | 4 | 4 | 4 | 84 |
| Diablillos | 0 | 0 | 20 | 100 | 50 | 12 | 12 | 12 | 12 | 12 | 12 | 242 |
| New Aguilar 1 | 0 | 0 | 0 | 30 | 100 | 70 | 14 | 14 | 14 | 14 | 14 | 270 |
| Silver in Antofalla | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 40 | 4 | 64 |
| New Alumbreira 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 400 | 100 | 21 | 621 |
| Copper, Molibdenun in Famatina | 0 | 0 | 0 | 50 | 400 | 400 | 150 | 70 | 70 | 70 | 70 | 1,280 |
| Nickel in San Luis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 50 | 5 | 75 |
| Gold in V. Cura 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 200 | 220 |
| Copper in Santa Clara | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 500 | 400 | 70 | 1,070 |
| Gold in San Rafael | 0 | 0 | 0 | 10 | 60 | 10 | 6 | 6 | 6 | 6 | 6 | 110 |
| Silver in San Rafael | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 50 | 70 |
| New Guardia 1 | 0 | 0 | 0 | 50 | 60 | 7 | 7 | 7 | 7 | 7 | 7 | 152 |
| New Guardia 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 100 | 20 | 140 |
| Gold in Cordova | 0 | 0 | 0 | 0 | 10 | 20 | 10 | 3 | 3 | 3 | 3 | 52 |
| Total | 0 | 0 | 20 | 270 | 710 | 523 | 203 | 316 | 1,076 | 846 | 486 | 4,450 |

Source: Al Estudio De Mercado: Minería Argentina, Rojas & Asociados, February 2000.

Note: Category 2 - Identified and well-known projects having intermediate certainty of being developed.

Table 17.4.8 Projection of Investment For Argentine Mines of Category 3

(US\$ million)

| Project/Operation | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Total |
|-------------------|------|------|------|------|------|------|------|------|------|------|------|-------|
| New Aguilar 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 150 | 150 | 14 | 364 |
| New Piquitas 2 | 0 | 0 | 0 | 0 | 20 | 100 | 50 | 12 | 12 | 12 | 12 | 218 |
| Copper in Salta 2 | 0 | 0 | 100 | 500 | 100 | 49 | 49 | 49 | 49 | 49 | 49 | 994 |
| Gold in Oncan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 30 | 3 | 43 |
| Gold in Maricung | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 30 | 100 | 150 |
| Nickel in Norwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 100 | 130 |
| Gold in Norwest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 30 | 4 | 4 | 58 |
| Copper in Neuquen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 200 | 200 | 450 |
| Total | 0 | 0 | 100 | 500 | 120 | 149 | 99 | 131 | 321 | 505 | 482 | 2,407 |

Source: Al Estudio De Mercado: Minería Argentina, Rojas & Asociados, February 2000.

Note: Category 3 - Not very well-known projects and with possibilities of being discovered in favorable areas.

Table 17.4.9 Development Cost (Infrastructure, Equipment, Services and Input) of Mines in Argentina (Categories 1, 2, and 3)

(US\$ million)

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Total |
|------------|------|------|-------|-------|-------|-------|------|------|-------|-------|------|--------|
| Category 1 | 186 | 750 | 1,540 | 1,030 | 1,290 | 750 | 500 | 150 | 100 | 400 | 200 | 6,896 |
| Category 2 | 0 | 0 | 20 | 270 | 700 | 500 | 160 | 200 | 960 | 730 | 270 | 3,810 |
| Category 3 | 0 | 0 | 100 | 500 | 120 | 100 | 50 | 70 | 260 | 540 | 400 | 2,140 |
| Total | 186 | 750 | 1,660 | 1,800 | 2,110 | 1,350 | 710 | 420 | 1,320 | 1,670 | 870 | 12,846 |

Source: Al Estudio De Mercado: Minería Argentina, Rojas & Asociados, February 2000.

Note: Category 1 - Well-known projects showing high possibilities of being developed.

Category 2 - Identified and well-known projects having intermediate certainty of being developed.

Category 3 - Not very well-known projects and with possibilities of being discovered in favorable areas.

Table 17.4.10 Running Cost (Equipment, Services, Inputs) of Mines in Argentina (Categories 1, 2, and 3)

(US\$ million)

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Total |
|------------|------|------|------|------|------|------|------|------|------|------|-------|-------|
| Category 1 | 116 | 117 | 130 | 168 | 284 | 469 | 605 | 595 | 596 | 673 | 705 | 4,458 |
| Category 2 | 0 | 0 | 0 | 0 | 0 | 23 | 43 | 116 | 116 | 116 | 216 | 630 |
| Category 3 | 0 | 0 | 0 | 0 | 0 | 49 | 49 | 61 | 61 | 65 | 82 | 367 |
| Total | 116 | 117 | 130 | 168 | 284 | 541 | 697 | 772 | 772 | 854 | 1,003 | 5,454 |

Source: Al Estudio De Mercado: Minería Argentina, Rojas & Asociados, February 2000.

Note: Category 1 - Well-known projects showing high possibilities of being developed.

Category 2 - Identified and well-known projects having intermediate certainty of being developed.

Category 3 - Not very well-known projects and with possibilities of being discovered in favorable areas.

In the case of Category 1 in Argentine mine development 2000-2010, development costs (infrastructure, equipment, services, and input) will be US\$6,896 million and the running costs will amount to US\$4,458 million, which will account for 65% of total development costs in about 10 years.

Tables 17.4.9 and 17.4.10 show that mining development projects in Peru and Argentina will be followed by large investments. After and during development, running cost occurs, which will reach a great amount. Mining development from exploration to manufacturing involves various different stages and types of work ranging from manufacturing to services (Figure 17.4.1). In Region II, a cluster of mining-related industries has been formed. The potential for mining development in neighboring countries would make this cluster in Chile larger and more competitive.

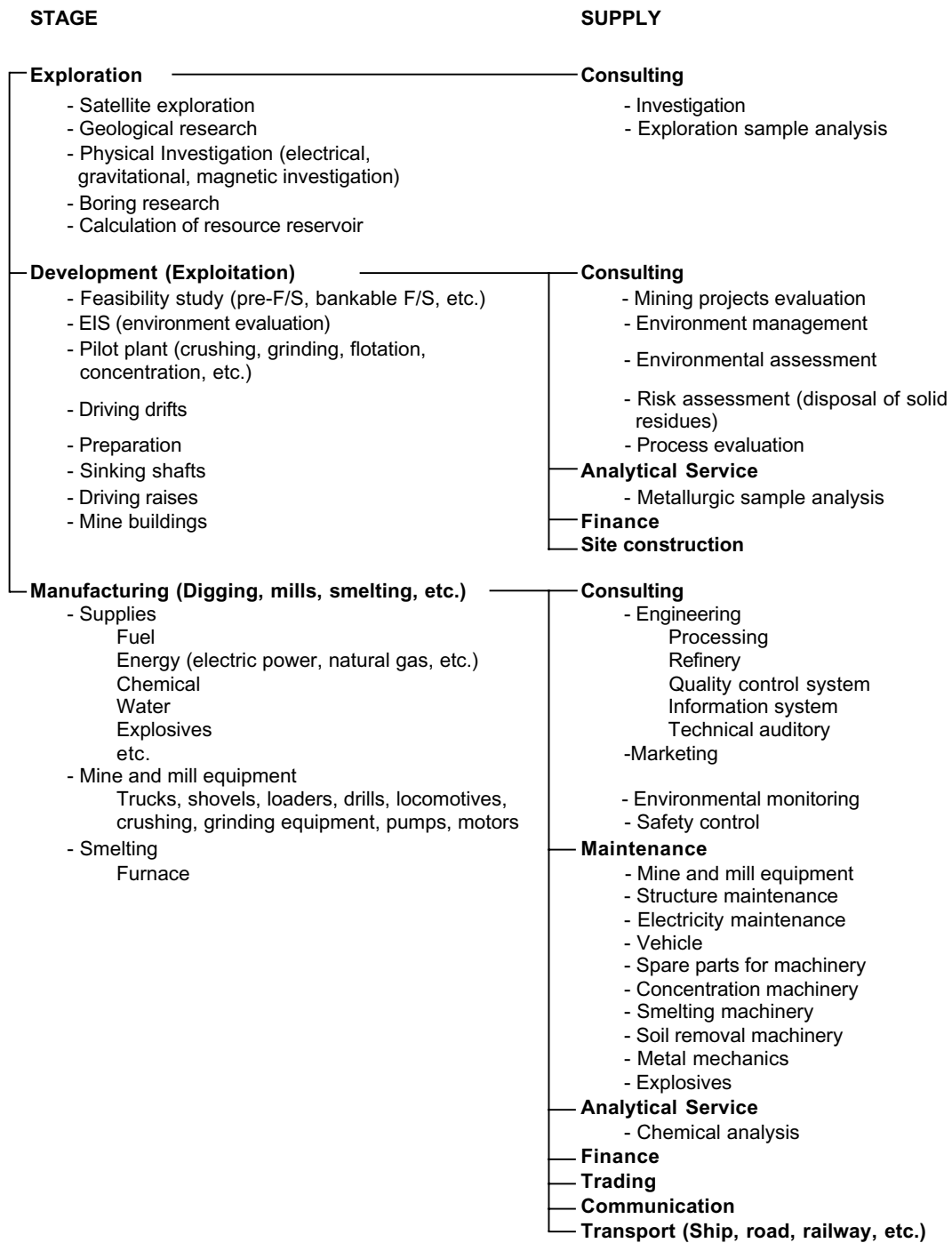


Figure 17.4.1 Supply Structure of Mining-related Industries to the Mining Industry

Source: Elaborated by the JICA Study Team.

(2) The Competitiveness of Mining-related Industries in Neighboring Countries

Mining development in Argentina does not have a long history, which means that mining-related industries have not yet accumulated. Argentine mines purchase 80% of infrastructure and equipment and 50% of services from abroad, respectively (Table 17.4.11), which indicates that Argentine mining-related industries are not strongly competitive.

Table 17.4.11 Share of Argentina Mine's National and International Purchase by Item in 1999-2000 (%)

| | Infrastructure | Equipment | Services | Inputs |
|---------------|----------------|-----------|----------|--------|
| National | 20 | 20 | 50 | 80 |
| International | 80 | 80 | 50 | 20 |

Source: Rojas & Asociados, *El Estudio De Mercado: Minería Argentina*, February 2000.

Concerning Peruvian mining-related industries, companies in Chile claim that Peruvian companies do not have efficient technology and know-how. In fact, some mining-related companies in Chile such as metal-mechanic and exploration service have exported their products and services to Peru.

As there is high potential for mining development in neighboring countries and considering they are not so competitive, this is a good opportunity for mining-related industries in the North Zone to expand their market.

(3) Mining-related Industries of North Zone and Arica

Due to the number of large-scale mines in Region II, a cluster of mining-related industries has been formed. Industrial statistics show that there are 142 manufacturing companies in Region II. Although data is not available concerning the number of companies that conduct business with mines, most of them seem to do so to some extent (Table 17.4.12).

In the region where the mining cluster is located, there is a tendency for small and medium-sized suppliers to be driven out of the long term mine supply chain due to cost down pressure from major mines and competition from larger, national and international suppliers. Therefore, companies are forced to create their own advantages by securing economies of scale, enhancing technology levels, and obtaining special know-how to integrate the supply chains and drive exportation to neighboring mines. To do so, alliances and integration with other companies are important. However, companies with no advantages cannot make any alliances or integration.

The above situation holds true for mining-related industries in Regions I and III because these companies are smaller than those in Region II in terms of the number of employees/company, as well as in productivity such as levels of production/company (Table 17.4.13). For this reason, it is more necessary that mining-related manufacturing and services in Regions I and III gain advantage through alliances and integration. For example, a metal-mechanic company in Antofagasta that repairs machine parts for mining could manufacture a truck carrier and try to obtain a KOMATSU (a Japanese truck manufacturer) certificate. The ultimately goal would be

to supply KOMATSU with parts due to the fact that it does not have a plant in Latin America. This is a kind of international alliance.

Arica also has some mining-related industries, such as metal-mechanics, that manufactures structures for mines and conducts business with large mine companies in Region II. Recently, one of them received structure-manufacturing work for a mine in Peru through a company in Santiago.

Table 17.4.12 Industrial Statistics of Production in 1997 (over 10 employees)

| | Number of Companies | | | | Production (million pesos) | | | | Number of Employees (persons) | | | |
|--|---------------------|----|----------|----------|----------------------------|---------|-----------|----------|-------------------------------|-------|----------|----------|
| | Region 1 | | Region 2 | Region 3 | Region 1 | | Region 2 | Region 3 | Region 1 | | Region 2 | Region 3 |
| | Arica | | | | Arica | | | | Arica | | | |
| 15 Elaboration of Food Products and Soft Drinks | 50 | 28 | 39 | 18 | 154,294 | 73,438 | 67,469 | 17,426 | 3,263 | 1,872 | 1,766 | 878 |
| 17 Manufacturing of Textile | 5 | 1 | | | 2,797 | 1,040 | | | 219 | 106 | | |
| 18 Manufacturing of Clothes, Fur Dressing and Dying | 8 | 5 | | | 19,870 | 19,247 | | | 1,341 | 1,283 | | |
| 20 Wood Production and Manufacturing of Wood and Cork Products, except Furniture | 2 | 2 | 2 | | 1,374 | 1,374 | 2,155 | | 98 | 98 | 127 | |
| 21 Manufacturing of Paper and Paper Products | 2 | | | | 3,619 | | | | 111 | | | |
| 22 Edition and Pressing Activities | 10 | 6 | 8 | 2 | 4,228 | 3,237 | 4,210 | 331 | 354 | 226 | 216 | 38 |
| 24 Manufacturing of Chemical Substances and Chemical products | 10 | 2 | 21 | 4 | 46,607 | 8,332 | 314,433 | 10,421 | 611 | 263 | 3,675 | 75 |
| 25 Manufacturing of Rubber and Plastic Products | 8 | 2 | 3 | | 5,169 | 1,633 | 4,281 | | 276 | 75 | 110 | |
| 26 Manufacturing of Other Non Metallic Mineral Products (Industrial Minerals) | 12 | 5 | 11 | 5 | 11,977 | 2,356 | 44,890 | 9,459 | 437 | 185 | 610 | 138 |
| 27 Manufacturing of Common Metals | 5 | 1 | 13 | 6 | 255,395 | 145 | 1,475,711 | 537,892 | 1,137 | 16 | 4,640 | 1,882 |
| 271 Basic Iron and Steel Industries | | | 2 | 1 | | | 30,975 | 59,263 | | | 84 | 384 |
| 272 Industry of Precious Metals, Primary and Non-ferrous Products | | | 2 | 1 | | | 11,609 | 53,963 | | | 167 | 233 |
| 273 Metals Foundry | 5 | 1 | 9 | 4 | 255,395 | 145 | 1,433,128 | 424,667 | 1,137 | 16 | 4,389 | 1,265 |
| 28 Manufacturing of Metal Products | 15 | 8 | 21 | 7 | 26,316 | 13,945 | 19,012 | 4,411 | 1,738 | 698 | 1,112 | 371 |
| 281 Manufacturing of Metallic Products for Structural Use, Tanks. | 13 | 7 | 17 | 7 | 22,768 | 10,418 | 16,814 | 4,411 | 1,627 | 597 | 976 | 371 |
| 289 Manufacturing Other Metallic Products | 2 | 1 | 4 | | 3,548 | 3,524 | 2,198 | | 111 | 101 | 136 | |
| 29 Manufacturing of Machinery and Equipment | 8 | 3 | 18 | 7 | 13,996 | 1,412 | 44,833 | 5,931 | 405 | 113 | 1,988 | 138 |
| 291 Manufacturing of Machinery for General Use | 3 | 1 | 6 | 5 | 9,640 | 178 | 2,056 | 5,201 | 213 | 18 | 142 | 97 |
| 292 Manufacturing of Machinery for Specialized Use | 4 | 1 | 12 | 2 | 4,175 | 1,053 | 42,778 | 730 | 178 | 81 | 1,846 | 41 |
| 293 Manufacturing of Products for Domestic Use | 1 | 1 | | | 181 | 181 | | | 14 | 14 | | |
| 31 Manufacturing of Machinery and Electric Apparatus | | | 1 | | | | 716 | | | | 50 | |
| 34 Manufacturing of Motor Vehicles, Trailers. | 2 | 1 | | | 261,703 | 260,173 | | | 676 | 663 | | |
| 341 Manufacturing of Motor Vehicles | 2 | 1 | | | 261,703 | 260,173 | | | 676 | 663 | | |
| 35 Manufacturing of Other kinds of Transport Equipment | 5 | 3 | 2 | 2 | 11,447 | 5,418 | 685 | 898 | 587 | 161 | 44 | 57 |
| 351 Construction and Repairing of Ships and Crafts | 4 | 2 | 2 | 1 | 10,507 | 4,477 | 685 | 882 | 537 | 111 | 44 | 44 |
| 352 Manufacturing of Other kinds of Transport Equipment | | | | 1 | | | | 17 | | | | 13 |
| 359 Manufacturing of Other Kinds of Transportation Equipment | 1 | 1 | | | 941 | 941 | | | 50 | 50 | | |
| 36 Manufacturing of Furniture and Manufacturing Industries | 5 | 3 | 3 | 2 | 615 | 380 | 571 | 585 | 87 | 53 | 61 | 38 |
| 361 Manufacturing of Furniture | 4 | 2 | 3 | 2 | 500 | 264 | 571 | 585 | 71 | 37 | 61 | 38 |
| 369 Manufacturing Industries | 1 | 1 | | | 116 | 116 | | | 16 | 16 | | |
| Total | 147 | 71 | 142 | 53 | 819,407 | 392,129 | 1,978,965 | 587,356 | 11,340 | 5,812 | 14,399 | 3,615 |

Source: INE, CORFO, and CEZADE, *La Industria Manufacturera En Chile (1995-1997)*, 1999.

Table 17.4.13 Industrial Statistics of Productivity in 1997 (over 10 employees)

| | Production/Company (Millions of Pesos) | | | | Production/Employee(Millions of Pesos) | | | | Number of Employees/Company | | | | |
|-----|---|---------|----------|----------|--|-------|----------|----------|-----------------------------|-------|----------|----------|-----|
| | Region 1 | | Region 2 | Region 3 | Region 1 | | Region 2 | Region 3 | Region 1 | | Region 2 | Region 3 | |
| | | Arica | | | | Arica | | | | Arica | | | |
| 15 | Elaboration of Food Products and Soft Drinks | 3,086 | 2,623 | 1,730 | 968 | 47.3 | 39.2 | 38.2 | 19.8 | 65 | 67 | 45 | 49 |
| 17 | Manufacturing of Textile | 559 | 1,040 | | | 12.8 | 9.8 | | | 44 | 106 | | |
| 18 | Manufacturing of Clothes, Fur Dressing and Dying | 2,484 | 3,849 | | | 14.8 | 15.0 | | | 168 | 257 | | |
| 20 | Wood Production and Manufacturing of Wood and Cork Products, except Furniture | 687 | 687 | 1,078 | | 14.0 | 14.0 | 17.0 | | 49 | 49 | 64 | |
| 21 | Manufacturing of Paper and Papers Products | 1,810 | | | | 32.6 | | | | 56 | | | |
| 22 | Edition and Pressing Activities | 423 | 540 | 526 | 166 | 11.9 | 14.3 | 19.5 | 8.7 | 35 | 38 | 27 | 19 |
| 24 | Manufacturing of Chemical Substances and Chemical products | 4,661 | 4,166 | 14,973 | 2,605 | 76.3 | 31.7 | 85.6 | 138.9 | 61 | 132 | 175 | 19 |
| 25 | Manufacturing of Rubber and Plastic Products | 646 | 817 | 1,427 | | 18.7 | 21.8 | 38.9 | | 35 | 38 | 37 | |
| 26 | Manufacturing of Other Non Metallic Mineral Products (Industrial Minerals) | 998 | 471 | 4,081 | 1,892 | 27.4 | 12.7 | 73.6 | 68.5 | 36 | 37 | 55 | 28 |
| 27 | Manufacturing of Common Metals | 51,079 | 145 | 113,516 | 89,649 | 224.6 | 9.1 | 318.0 | 285.8 | 227 | 16 | 357 | 314 |
| 271 | Basic Iron and Steel Industries | | | 15,488 | 59,263 | | | 368.8 | 154.3 | | | 42 | 384 |
| 272 | Industry of Precious Metals, Primary and Non-ferrous Products | | | 5,805 | 53,963 | | | 69.5 | 231.6 | | | 84 | 233 |
| 273 | Metals Foundry | 51,079 | 145 | 159,236 | 106,167 | 224.6 | 9.1 | 326.5 | 335.7 | 227 | 16 | 488 | 316 |
| 28 | Manufacturing of Metal Products | 1,754 | 1,743 | 905 | 630 | 15.1 | 20.0 | 17.1 | 11.9 | 116 | 87 | 53 | 53 |
| 281 | Manufacturing of Metallic Products for Structural Use, Tanks. | 1,751 | 1,488 | 989 | 630 | 14.0 | 17.5 | 17.2 | 11.9 | 125 | 85 | 57 | 53 |
| 289 | Manufacturing Others Metallic Products | 1,774 | 3,524 | 550 | | 32.0 | 34.9 | 16.2 | | 56 | 101 | 34 | |
| 29 | Manufacturing of Machinery and Equipment | 1,750 | 471 | 2,491 | 847 | 34.6 | 12.5 | 22.6 | 43.0 | 51 | 38 | 110 | 20 |
| 291 | Manufacturing of Machinery for General Use | 3,213 | 178 | 343 | 1,040 | 45.3 | 9.9 | 14.5 | 53.6 | 71 | 18 | 24 | 19 |
| 292 | Manufacturing of Machinery for Special Use | 1,044 | 1,053 | 3,565 | 365 | 23.5 | 13.0 | 23.2 | 17.8 | 45 | 81 | 154 | 21 |
| 293 | Manufacturing of Products for Domestic Use | 181 | 181 | | | 12.9 | 12.9 | | | 14 | 14 | | |
| 31 | Manufacturing of Machinery and Electric Apparatus | | | 716 | | | | 14.3 | | | | 50 | |
| 34 | Manufacturing of Motor Vehicles, Trailers. | 130,852 | 260,173 | | | 387.1 | 392.4 | | | 338 | 663 | | |
| 341 | Manufacturing of Motor Vehicles | 130,852 | 260,173 | | | 387.1 | 392.4 | | | 338 | 663 | | |
| 35 | Manufacturing of Other kinds of Transport Equipment | 2,289 | 1,806 | 343 | 449 | 19.5 | 33.7 | 15.6 | 15.8 | 117 | 54 | 22 | 29 |
| 351 | Construction and Repairing of Ships and Crafts | 2,627 | 2,239 | 343 | 882 | 19.6 | 40.3 | 15.6 | 20.0 | 134 | 56 | 22 | 44 |
| 352 | Manufacturing of Other kinds of Transport Equipment | | | | 17 | | | | 1.3 | | | | 13 |
| 359 | Manufacturing of Other Kinds of Transportation Equipment | 941 | 941 | | | 18.8 | 18.8 | | | 50 | 50 | | |
| 36 | Manufacturing of Furniture and Manufacturing Industries | 123 | 127 | 190 | 293 | 7.1 | 7.2 | 9.4 | 15.4 | 17 | 18 | 20 | 19 |
| 361 | Manufacturing of Furniture | 125 | 132 | 190 | 293 | 7.0 | 7.1 | 9.4 | 15.4 | 18 | 19 | 20 | 19 |
| 369 | Manufacturing Industries | 116 | 116 | | | 7.3 | 7.3 | | | 16 | 16 | | |
| | Total | 5,574 | 5,523 | 13,936 | 11,082 | 72.3 | 67.5 | 137.4 | 162.5 | 77 | 82 | 101 | 68 |

Source: INE, CORFO, and CEZADE, *La Industria Manufacturera En Chile (1995-1997)*, 1999.

Some metal mechanic companies are planning to establish plants in Arica to export products and services to Peruvian mines, thus highlighting the advantages of Arica's proximity to the mines.

An exploration company in Region III has established a company in Peru and is also planning to establish one in Argentina to conduct business related to mining development in these countries. In this way, mining-related companies in Arica could obtain work from Peru through the establishment of the Peruvian company, exemplifying a kind of commercial alliance.

Although there is a mining-related cluster in Region II, it is not significantly

competitive. For example, according to a survey on supporting industries in Chile, which was carried out in mid-2000, 21.7% of CODELCO's purchase of machinery and equipment and services is from foreign suppliers. CODELCO's bidding is large enough to interest foreign suppliers in any part of the world. In this sense, it is very important for mining-related companies in the North Zone to strengthen their competitiveness not only to direct exports to mines in neighboring countries but also to receive more orders within the zone.

(4) Strategies for Industrial Development

a. What should be done?

In light of the present situation, the following are necessary to enhance the competitiveness of mining-related manufacturing and services in the North Zone:

- Enhance the technological level of each company, especially in the sector of small and medium-sized suppliers
- Secure economies of scale through alliances and integration
- Facilitate the agglomeration of mining-related industries by taking advantage of their proximity to mines in neighboring countries
- Promote the export of mining-related products and services to mines in neighboring countries

b. Strategy

The strategy is as follows (Figure 17.4.2):

- Develop a mega-cluster¹ of mining-related industries by forming a sub-cluster² of mining-related industries and strengthening cluster in Region II through alliances and integration.
- Arica is to form a part of the sub-cluster of Region I, which is a part of the North Zone's mega-cluster.
- Promote the accumulation of mining-related industries to build up an industrial base for the future.

The first principle is to strengthen mining-related industries through alliances with companies outside the North Zone (e.g., Santiago and abroad) and within the North Zone and the inducement of investment from other regions. The second principle is to build up an industry base for the future because industrial accumulation is indispensable for regional industrial development. For example, some metal mechanic companies in the North Zone that used to repair parts of mining-related machines are now producing parts of machines and components. This perfectly demonstrates the process of industrial enhancement. This kind of industrial buildup could expand the potential of industrial development because companies could apply their technology and know-how to other fields such as automobile manufacturing, wood-processing, and so on,

¹ Mega-cluster is a coined word that means a larger and stronger cluster to be formed in terms of scale and competitiveness, including the cluster of Region II and the sub-cluster of Regions I and III than the current cluster existing in these regions.

² Sub-cluster is a coined word that means smaller cluster in Region I and III to be formed to complement cluster in Region II and to gain competitiveness through alliances and integration than the current cluster existing in Region II in terms of scale.

increasing the possibility to receive foreign investment. To some degree, this will be the first step by which the zone, characterized as being the most dependent on mining in Chile, may become less dependent as time continues.

The objectives of this strategy are as follows:

- Enhance the chance of receiving orders within the North Zone and exporting their products and services to neighboring countries.
- Promote the accumulation of mining-related industries in the North Zone.
- Enhance the technological level of companies in the North Zone.
- Spread mining-related industry know-how.
- Secure economies of scale.
- Integrate small and medium-sized suppliers into a supply chain of mines in both the North Zone and neighboring countries.
- Build up an industrial base to strengthen the industrial structure in the long run.

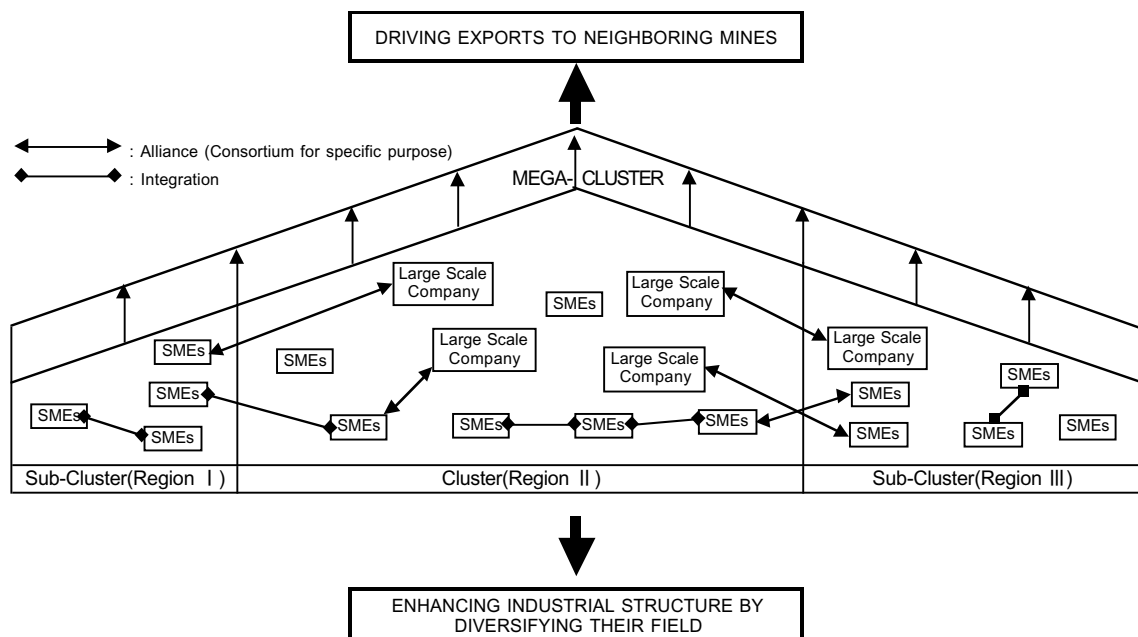


Figure 17.4.2 Image of Mega-cluster of Mining-related Industries in North Zone

Related action plans are listed in Section 17.6.

17.4.3 Automobile Industry and Its Supporting Industries

(1) Current Situation of Automobile and Supporting Industries in Arica

The General Motors, or GM, automobile company operates in Arica. Their employees are 436 as of December 2000 and the value of their production amounted to 260,173 million pesos in 1997, accounting for 66.3% of Arica's total industrial production (Table 17.4.12). The company produces around 15,000 units of pick-ups annually as of 2000, though the capacity of its annual production is 25,000 units. These products are exported mainly to Mexico (accounting for 60% of the company's total exports), Venezuela, and Colombia. One of the reasons for a decrease in the production level is that exports to Argentina have been interrupted by an economic recession in the country.

GM has three suppliers in Arica, 20 in Santiago, and one in Japan. In monetary terms, one company in Japan provides 60% of the supplies as CKD (completely knock down) and around 38% come from Santiago. In this respect, the automobile industry in Arica does not have a close industrial relation with local manufacturers.

At present, the majority of suppliers in Santiago do not intend to move their plants to Arica to supply GM with their products and services. This is because, according to them, it is not certain whether the automobile company will continue to operate in Arica. Although GM has requested its suppliers in Santiago to move to Arica before, only one seat producing company established a plant in Arica a few years ago.

Workers employed in the industry account for more than 10% of Arica's total employment, highlighting the fact that the automobile industry has played an important role in the economy of Arica, as well as of Region I. Arica and Region I expect GM to play a more significant role in their further industrial and economical development. Currently, GM is trying to improve its efficiency, but it is not clear whether GM will be able to expand its production. Such an expansion plan largely depends on the global strategy of the GM Corporation in the United States and the trade policies of other countries in South America.

(2) Present Situation of the Automobile Industry in Latin America

Automobile companies make decisions based on their global strategies. In thinking of GM's future position in Arica, one should pay attention to the trend of the automobile industry in Latin America. The current predominant strategy of Latin America's automobile industry is as follows.³

- Until recently, high tariff walls have compelled companies to maintain operations and marketing in each country, though car manufacturing has a long history in Latin America. The automobile industry is now entering a whole new era. With import barriers falling, manufactures can supply several countries from a single large-scale plant, realizing the economies of scale that have long eluded them.
- In this sense, carmakers have tended to concentrate their production in larger markets, i.e., Mexico, Brazil, and to a lesser extent, Argentina. They are spending

³ *Business Week*, October 23, 2000.

millions to renovate old plants or build new ones from scratch. In their quest for greater efficiency, manufactures have transformed their new factories in Latin America into sorts of laboratories.

- Induced by market reforms and an ever-expanding web of free-trade agreements, foreign automobile companies have invested almost US\$40 billion for new assembly plants and auto-parts factories in Latin America in the past five years alone (Table 17.4.14).

Table 17.4.14 Investments in the Automobile Industry of Latin America in 1995-2000

(US\$ million)

| Company | Investment | Time Span | Purpose |
|---------------------|------------|-------------|---|
| Fiat | 642 | 1995 - 1996 | Built a new car plant in Argentina |
| Volkswagen | 1,500 | 1995 - 2000 | Retooled plant in Mexico to launch New Beetle |
| Renault | 1,400 | 1998 - 2001 | Construction of two factories in Brazil |
| Daimler Chrysler | 825 | 1998 - 2000 | New plant and joint venture with BMW to produce engines in Brazil |
| General Motors | 600 | 1999 - 2000 | Inaugurated a new car factory in Brazil in July, 1999 |
| Ford Motors | 1,900 | 2000 - 2001 | New Brazilian plant will start operations in September, 2001 |
| PSA Peugeot Citroen | 600 | 1998 - 2000 | New factory in Brazil scheduled to be completed in December, 2000 |

Source: *Business Week*, October 23, 2000

Owing to NAFTA, Mexico's automobile industry is now virtually an extension of that of North America. Since the accord entered into force in 1994, Mexico has logged in US\$13.6 billion in auto investments. Meanwhile, U.S.-Mexico trade in vehicles and parts has increased from US\$14.6 billion in 1994 to US\$37.6 billion in 1999. And that commerce will increase when NAFTA tariffs on automobiles finally reach zero in 2003.

The automobile industries in Mexico and Brazil have been traditionally quite different from each other, though such a situation may be changing. In mid-2000, the two countries signed a one-year agreement. This allows 40,000 vehicles to be shipped back and forth with a tariff of just 8%, well below the 35% tariff that Brazil levies on imports of finished cars and the 20% that Mexico applies to imports from countries with which it does not have free trade agreements. Major automobile companies are lobbying to make the temporary Brazil-Mexico agreement permanent, not only for finished cars but also for auto parts.

(3) Industrial Development with the Automobile Industry

It is not clear whether GM will continue to operate in Arica. However, there are some factors in favor of GM's survival in this city. One of them is that GM Arica manufactures some specific cars (pick-ups). Another is that an automobile plant on the west coast of South America does not exist. Arica and Region I should make every effort to keep and involve GM Arica in regional development plans as long as the possibility exists that GM Arica will maintain and expand its production. For example, every region worldwide wishes an automobile plant to be the core actor of its industrial

development because of its direct and indirect impact on other related-industries and its ability to generate considerable employment. For this reason, many governments attempt to attract the automobile industry by providing attractive incentives as shown by the following case of Brazil.

- When Ford Motor Co.'s new US\$1.9 billion car plant opens in the State of Bahia in September 2001, about 95% of the jobs at the plant will go to locals. In this way, the factory will have a positive impact on the local economy. Local GDP is said to increase by 10%. Neither the government nor Ford will reveal the exact value of the incentives that have helped locate the plant in Bahia. However, federal tax breaks alone amount to US\$100 million a year for the next 10 years. Ford has also obtained soft loans from Brazil's Development Bank, while Bahia has offered tax breaks, free land, and infrastructure.
- Brazil's auto boom is built partially on such benefits. Incentives play a role in more than 20 auto projects announced since 1996. Rio de Janeiro paid for 34% of Peugeot Citroen's new US\$600 million factory at Porto Velho.

The above story suggests that the automobile industry is valuable for regional development. Most regions/provinces that are fortunate to have such an industry try in every way possible not to lose it. GM Arica is one of the most desirable strategic partners for the region's economic and industrial development. GM Corporation in the United States has made strategic alliances with other multinational automobile manufacturers such as ISUZU, SUBARU, SUZUKI, and DAEWOO. Products of these companies are sold in Chile. A future strategy may be formulated for GM Arica, such as manufacturing special types of automobiles by CKD under alliance with these companies (Figure 17.4.3). As stated earlier, the future of GM Arica depends on the strategy of the GM Corporation in the United States. Thus, Chile, Region I, and Arica should express their enthusiasm to GM in Arica and the United States to obtain a higher degree of their involvement in the region's economic development.

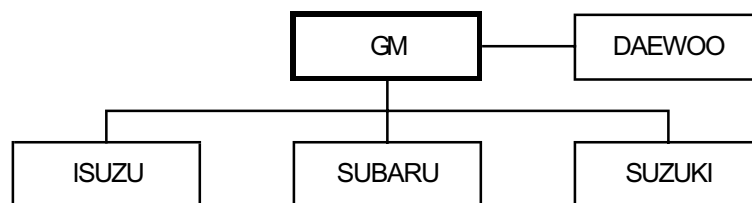


Figure 17.4.3 Binding Relation of GM with Other Auto-makers in Asia

Related action plans are listed in Section 17.6.

17.4.4 Industrial Structure in Arica

It should be noted that data concerning the economic structure by province is not available. For this reason, the JICA Study Team would like to use regional data in its place. In Region I, the commercial sector accounts for about 30% of regional GDP (Table 17.4.15). This is due partially to the existence of ZOFRI in Region I, which has activated the commercial sector of this region. In addition, the agglomeration of the manufacturing industries is small and the share of the manufacturing sector has decreased, while the share of the mining sector has increased rapidly. This indicates that mining-related industries have not accumulated substantially, compared with Region II.

Table 17.4.15 Composition of Gross Domestic Product of Region I by Sector (%)

| Sector | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|----------------------------|-------|-------|------|-------|------|-------|-------|
| Agriculture, Forestry | 1.4 | 1.2 | 1.2 | 1.3 | 1.2 | 1.1 | 1.1 |
| Fishery | 4.6 | 4.7 | 5.2 | 4.2 | 4.0 | 3.3 | 2.5 |
| Mining | 6.9 | 7.1 | 6.3 | 5.3 | 7.9 | 12.9 | 15.2 |
| Manufacturing | 23.2 | 22.8 | 24.8 | 24.9 | 25.0 | 20.7 | 17.8 |
| Electricity, Gas and Water | 1.5 | 1.6 | 1.5 | 1.6 | 1.8 | 1.7 | 1.9 |
| Construction | 4.6 | 4.2 | 5.2 | 5.7 | 4.7 | 5.5 | 7.3 |
| Commercial, Restaurant | 27.4 | 28.6 | 27.8 | 28.5 | 29.6 | 30.6 | 30.7 |
| Transport & Communication | 8.2 | 7.9 | 8.0 | 8.2 | 7.5 | 7.6 | 7.2 |
| Financial Service | 6.0 | 6.6 | 6.5 | 7.0 | 6.4 | 6.2 | 6.3 |
| Real Estate | 5.6 | 5.4 | 4.8 | 5.0 | 4.5 | 4.1 | 4.0 |
| Personal Service | 6.3 | 6.3 | 5.9 | 6.0 | 5.5 | 5.1 | 5.0 |
| Public Administration | 7.2 | 6.8 | 6.1 | 6.0 | 5.3 | 4.7 | 4.6 |
| Less: Imputed Bank Charges | -2.9 | -3.2 | -3.5 | -3.7 | -3.5 | -3.5 | -3.5 |
| Total | 100.0 | 100.0 | 99.8 | 100.0 | 99.9 | 100.0 | 100.1 |

Source: INE, Panorama Regional 1990-1998, 1999.

The fastest growing sector between 1985 and 1995 in Region I was mining, with an annual growth rate of 15.5%, while the annual growth rate of the manufacturing sector is 3.8% (Table 17.4.16). As the average annual GDP growth rate in Region I was 6.1%, the share of the manufacturing sector has decreased. On the other hand, in Region II, the annual growth rate of mining and manufacturing between 1985 and 1995 was 5.1% and 5.6%, respectively (Table 17.4.17). There has been a closer relation between the mining industry and mining-related industries in Region II than in Region I, which indicates that the current situation of mining-related industries in Region I is not strong while the agglomeration of mining-related industries is also small.

The number of manufacturing companies in Arica was 71 in 1997, compared with 142 in Region II and 53 in Region III. The manufacturing output in Region I and Arica, Region II, and Region III is equivalent to 819,407 million pesos, 392,129 million pesos, 1,978,965 million pesos, and 587,356 million pesos, respectively (Table 17.4.12). Wood production and manufacturing of wood and cork is 1,374 million pesos, which was generated by two companies.

Automobile manufacturing in Arica, i.e., GM, accounts for about 65% of Arica's manufacturing output, which means that GM has played an important role in Arica's manufacturing, though there are not extensive industrial relations between GM and local industries. In general, Arica and Region I expect GM to maintain a more important

role in regional industrial development in the future. The manufacturing of clothes, metal products, metallic products for structural use, and tanks follows automobile manufacturing. Without GM, the manufacturing output of Arica would be one-third its current total, which also indicates a low level of industrial accumulation in Arica. This suggests that Arica must build up an industrial base by increasing industrial accumulation. Some accumulation of various kinds of manufacturing in Arica is necessary to deepen relations between GM and local industries as GM will also need local supporting industries to expand its capacity.

The productivity of manufacturing companies in Arica, Region II, and Region III are 5,523 million pesos, 13,936 million pesos, and 11,082 million pesos, respectively, though GM should enhance productivity in Arica (Table 17.4.13). Labor productivity and the number of employees per company in Arica are lower/smaller than those of Regions II and III. These figures show that manufacturing companies in Arica are smaller in size, implying weaker competitiveness.

Regarding the employment structure of Arica, the wholesale and retail trade sector accounts for 20% of all employees, which is equivalent to 10,502 (Table 17.4.18). The second largest is the manufacturing sector (16%, 8,505) and the third is the transport, storage and communication sector (12%, 6,259). Manufacturing industries are more concentrated in Arica as compared with other provinces of Region I.

Factors of Industrial Agglomeration and Industrial Development in Arica

According to the new theoretical framework known as “new economic geography” or “new spatial economy” in the 1990s, the synergy of both scales of economies of production and consumption and transportation costs brings about industrial agglomeration. Under such circumstances, industrial agglomeration factors are labor costs, the level of port facilities, transportation networks (e.g., roads, railroads, ports, and airports), and logistics that affect transportation costs.

One reason for the low level of industrial agglomeration in Arica is that labor costs in Arica, and Chile in general, are significantly higher than those in neighboring countries, as shown in Table 17.4.19.

Transportation costs are not low, either, in and around Arica. As discussed in Section 17.3, this is due to delays in the improvement of the Port of Arica and to underdeveloped transportation networks. Transportation costs, especially in Region I, play a critical role in industrial agglomeration due to its small-sized and dispersed market. There is the possibility for industrial agglomeration by developing transportation networks and by changing the structure of the transportation system. For example, the development of a port and an airport in one place could create new routes between foreign and distant large cities. Such a transport hub would facilitate the trade flows that are characteristic of that area. Consequently, firms and consumers would gather around the hub, forming an agglomeration, which acts as a kind of hub effect.¹ In the hub, economies of scale work in the field of transport services.

¹ Fujita, M. and T. Mori, “The Role of Ports in the Making of Major Cities: Self-agglomeration and Hub-effect,” *Journal of Development Economics*, Vol. 49, 1996; Konishi, H., “Hub Cities: City Formation without Increasing Returns,” unpublished paper, Dallas: Southern Methodist University, 1993; and

Table 17.4.16 Gross Domestic Product of Region I by Sector

(Million pesos, 1986 constant price)

| Sector | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | Average Annual Growth Rate 1985-95(%) |
|----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------------------------------------|
| Agriculture, Forestry | 1,556 | 1,637 | 1,669 | 1,742 | 1,768 | 1,808 | 1,656 | 1,863 | 2,049 | 2,228 | 2,255 | 3.43 |
| Fishery | 9,555 | 11,686 | 7,794 | 6,958 | 9,298 | 5,900 | 6,501 | 8,189 | 6,475 | 7,323 | 6,748 | -3.11 |
| Mining | 5,417 | 6,055 | 4,805 | 5,316 | 7,174 | 8,967 | 9,690 | 9,844 | 8,242 | 14,361 | 26,470 | 15.51 |
| Manufacturing | 28,404 | 28,176 | 28,737 | 30,661 | 32,608 | 30,031 | 31,256 | 38,609 | 38,695 | 45,452 | 42,647 | 3.76 |
| Electricity, Gas and Water | 2,159 | 2,224 | 2,374 | 2,174 | 2,245 | 1,935 | 2,156 | 2,402 | 2,536 | 3,178 | 3,528 | 4.57 |
| Construction | 4,322 | 5,397 | 7,497 | 6,793 | 4,811 | 5,904 | 5,720 | 8,098 | 8,897 | 8,275 | 11,152 | 9.00 |
| Commercial, Restaurant | 21,828 | 22,075 | 25,886 | 27,021 | 31,624 | 35,496 | 39,206 | 43,343 | 44,387 | 53,065 | 62,408 | 10.02 |
| Transport & Communication | 8,126 | 8,810 | 8,950 | 9,048 | 11,078 | 10,606 | 10,872 | 12,518 | 12,960 | 13,965 | 16,209 | 6.48 |
| Financial Service (1) | 4,744 | 5,137 | 5,792 | 6,427 | 7,526 | 7,808 | 9,120 | 10,212 | 10,868 | 11,569 | 12,708 | 9.37 |
| Real Estate | 6,552 | 6,637 | 6,727 | 6,845 | 6,989 | 7,205 | 7,383 | 7,555 | 7,826 | 8,097 | 8,364 | 2.24 |
| Personal Service (2) | 7,428 | 7,580 | 7,716 | 7,827 | 7,945 | 8,192 | 8,686 | 9,251 | 9,399 | 9,997 | 10,633 | 3.31 |
| Public Administration | 8,439 | 8,605 | 8,643 | 9,360 | 9,421 | 9,337 | 9,383 | 9,548 | 9,285 | 9,658 | 9,627 | 1.20 |
| Less: Imputed Bank Charges | - 1,448 | - 1,636 | - 2,007 | - 2,755 | - 3,494 | - 3,714 | - 4,430 | - 5,437 | - 5,786 | - 6,298 | - 7,110 | 15.57 |
| Gross Domestic Product | 107,082 | 112,383 | 114,583 | 117,417 | 128,993 | 129,475 | 137,199 | 155,995 | 155,833 | 180,870 | 205,639 | 6.11 |

Source: Banco Central de Chile, *Anuario de Cuentas Nacionales 1997*.

Note : 1) Includes financial services, safety, rent of property and lent services to businesses.

2) Includes education, public and private health and other services.

Table 17.4.17 Gross Domestic Product of Region II by Sector

(Million pesos, 1986 constant price)

| Sector | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | Average Annual Growth Rate 1985-95(%) |
|----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------------------------------------|
| Agriculture, Forestry | 406 | 400 | 418 | 438 | 456 | 468 | 506 | 484 | 484 | 465 | 451 | 0.96 |
| Fishery | 1,872 | 3,171 | 3,325 | 3,213 | 3,700 | 3,099 | 1,942 | 2,728 | 3,502 | 4,603 | 4,067 | 7.31 |
| Mining | 131,794 | 127,757 | 122,793 | 132,547 | 158,510 | 163,767 | 201,434 | 194,210 | 197,815 | 214,438 | 227,408 | 5.08 |
| Manufacturing | 13,290 | 14,211 | 15,248 | 16,520 | 16,450 | 16,886 | 18,273 | 21,543 | 23,215 | 24,140 | 24,086 | 5.55 |
| Electricity, Gas and Water | 4,500 | 4,953 | 5,157 | 9,454 | 10,607 | 12,065 | 16,261 | 18,282 | 19,180 | 20,939 | 24,639 | 16.72 |
| Construction | 6,408 | 10,140 | 11,602 | 11,257 | 17,884 | 15,815 | 7,063 | 7,667 | 11,636 | 19,765 | 17,430 | 9.52 |
| Commercial, Restaurant | 8,747 | 9,324 | 10,135 | 10,767 | 11,215 | 11,611 | 12,557 | 14,905 | 15,332 | 16,024 | 18,395 | 6.99 |
| Transport & Communication | 12,867 | 12,591 | 12,978 | 13,697 | 16,735 | 17,007 | 17,552 | 19,786 | 21,056 | 22,202 | 26,830 | 6.91 |
| Financial Service (1) | 5,674 | 6,068 | 6,561 | 7,299 | 8,746 | 8,872 | 10,523 | 11,837 | 12,555 | 13,803 | 15,526 | 9.58 |
| Real Estate | 6,745 | 6,778 | 6,824 | 6,898 | 6,993 | 7,159 | 7,284 | 7,404 | 7,617 | 7,828 | 8,030 | 1.60 |
| Personal Service (2) | 12,460 | 12,990 | 13,451 | 13,987 | 14,942 | 15,749 | 16,247 | 17,092 | 17,310 | 17,791 | 18,880 | 3.85 |
| Public Administration | 5,042 | 5,142 | 5,018 | 5,045 | 5,192 | 4,951 | 4,907 | 5,058 | 4,869 | 4,923 | 5,008 | -0.06 |
| Less: Imputed Bank Charges | - 1,124 | - 1,150 | - 1,429 | - 1,594 | - 2,056 | - 2,496 | - 3,261 | - 4,466 | - 5,487 | - 6,432 | - 7,226 | 18.43 |
| Gross Regional Product | 208,681 | 212,375 | 212,081 | 229,528 | 269,374 | 274,953 | 311,288 | 316,530 | 329,084 | 360,489 | 383,524 | 5.69 |

Source: Banco Central de Chile, *Anuario de Cuentas Nacionales 1997*.

Note : 1) Includes financial services, safety, rent of property and lent services to businesses.

2) Includes education, public and private health and other services.

Table 17.4.18 Employment by Sector for Arica, Parinacota, and Iquique in 1992

| | Arica | | Iquique | | Parinacota | | Total (Region 1) | |
|--|--------|----------|---------|----------|------------|----------|------------------|----------|
| | | Share(%) | | Share(%) | | Share(%) | | Share(%) |
| Agriculture, Cattle, Hunting and Forestry | 3,459 | 6.5 | 1,972 | 3.5 | 419 | 25.6 | 5,860 | 5.3 |
| Fishing | 1,550 | 2.9 | 2,574 | 4.6 | 1 | 0.1 | 4,132 | 3.7 |
| Mine and Quarry Exploitation | 767 | 1.4 | 1,805 | 3.2 | 120 | 7.3 | 2,697 | 2.4 |
| Manufacturing Industries | 8,505 | 16.0 | 6,970 | 12.4 | 75 | 4.6 | 15,578 | 14.0 |
| Electricity, Gas and Water Supply | 381 | 0.7 | 341 | 0.6 | 17 | 1.0 | 740 | 0.7 |
| Construction | 2,856 | 5.4 | 4,237 | 7.5 | 159 | 9.7 | 7,265 | 6.5 |
| Wholesale and Retail Trade, Vehicle, Motorcycle, Personal Items and Domestic Appliance Repairs | 10,502 | 19.8 | 13,169 | 23.3 | 68 | 4.2 | 23,782 | 21.4 |
| Hotels and Restaurants | 2,061 | 3.9 | 1,885 | 3.3 | 65 | 4.0 | 4,018 | 3.6 |
| Transport, Storage and Communication | 6,259 | 11.8 | 5,806 | 10.3 | 182 | 11.1 | 12,269 | 11.0 |
| Financing | 571 | 1.1 | 815 | 1.4 | 2 | 0.1 | 1,391 | 1.2 |
| Real Estate, Offices and Rental Activities | 1,765 | 3.3 | 2,182 | 3.9 | 16 | 1.0 | 3,970 | 3.6 |
| Public and Defense Administration, Obligatory Social Security Plans | 5,085 | 9.6 | 6,437 | 11.4 | 404 | 24.7 | 11,947 | 10.7 |
| Education | 3,570 | 6.7 | 2,980 | 5.3 | 72 | 4.4 | 6,634 | 6.0 |
| Social and Health Service Activities | 1,665 | 3.1 | 1,544 | 2.7 | 19 | 1.2 | 3,234 | 2.9 |
| Other Social Community Activities | 1,266 | 2.4 | 1,227 | 2.2 | 6 | 0.4 | 2,504 | 2.2 |
| Private Homes with Home Services | 2,774 | 5.2 | 2,467 | 4.4 | 12 | 0.7 | 5,263 | 4.7 |
| Extraterritorial Organizations and Bodies | 8 | 0.0 | 5 | 0.0 | 0 | 0.0 | 13 | 0.0 |
| Total | 53,044 | 100.0 | 56,416 | 100.0 | 1,637 | 100.0 | 111,297 | 100.0 |

Source: INE, Encuesta Nacional del Empleo.

Table 17.4.19 Neighboring Countries' Labor Costs per Worker in Manufacturing (US\$)

| Nation | 1980-84 | 1995-99 |
|---------|---------|---------|
| Bolivia | 4432 | 2343 |
| Chile | 6234 | 5822 |
| Peru | 2988 | n.a. |

Source: World Bank, *World Development Indicators 2000*.

Exogenous geographical conditions, such as natural resources, are not the only factor that triggers industrial agglomeration. In addition, endogenous conditions, such as infrastructure development and economic incentives, play a critical role. In other words, when accomplishing some level of industrial agglomeration by infrastructure development through privatization and by tax reduction, an endogenous agglomeration mechanism starts working and facilitates an autonomous growth path. Improving the Port of Arica, developing infrastructure networks in the macro-region, and strengthening incentives for firms investing in the Arica area are all important for industrial development in the city.

A good example is the *maquiladola*² zone located in the vicinity of the Mexican and U.S. border. Industrial agglomeration has been promoted in Mexico near the U.S. border due to lower labor costs, accessibility to the large U.S. market, and availability of intermediate goods. Under these conditions, maquiladolas have reduced procurement costs due to bonded import goods. The electronics industry has been agglomerated west of the border, in areas such as Tijuana, Mexicali, and Ciudad de Juarez, which are geographically closer to cities in California and Texas than to Mexico's major cities. The automobile industry has been established to the east of this border, in areas such as

² The *maquiladola* zone, a bonded processing area for export, was established in the border between Mexico and the U.S.A., but the bond was abolished in November 2000.

Reynosa and Nuevo Laredo. As just mentioned, Mexico's lower labor costs compared to that of the U.S.A. has triggered such industrial agglomeration in this area. However, easier accessibility to the U.S. market and its intermediate goods are two central factors for the development of the industrial agglomeration. For these additional reasons, the agglomeration was not formed in other neighboring low-wage countries. The possibility of industrial accumulation in Arica may be examined in the same context as maquiladola, where infrastructure development for higher efficiency and extended networks is important, in addition to the provision of stronger incentives as compared with those of other regions.

Factors determining rapid industrialization in Southeast Asia during the 1980s and 1990s were also low labor costs, easy access to intermediate goods, access to large markets, and price competitiveness of products. The establishment of free trade zones in Southeast Asia has greatly improved access to intermediate goods, which resulted in direct foreign investment including Japanese capital in this region.

Arica law as an incentive for investment

Institutional incentives, such as tax reduction and infrastructure development, affect production costs, implying that regions try to attract domestic and foreign direct investment by providing such incentives. Arica also has this type of incentive, i.e., Arica Law and Arica Law 2 (Table 17.4.20).

Arica law was introduced to attract direct domestic and foreign investment in the Provinces of Arica and Parinacota. However, the provinces have not yet received much investment. Arica Law 2 was implemented to strengthen Arica Law in an attempt to accelerate investment in mid 2000. These schemes appear as though they would be attractive to potential investors. However, they have not brought about the expected results, i.e., an increase in actual investments. Arica Law did not offer enough incentive to attract investments from the viewpoint of private companies, taking into consideration factors such as production costs, availability of raw materials, access to markets, etc. The effectiveness of Arica Law 2 with respect to attracting direct investment has yet to be seen.

Several tasks must be achieved in order to make the most of Arica Law and Arica Law 2. The first is to promote the incentives that these laws provide. Every related government agency, CORFO in particular, is vigorously promoting such incentives to domestic and international companies through direct contact, economic missions, conferences, mass media, etc. Another task is to ensure the relative effectiveness of Arica Law 2. This task requires the modification of the incentives according to the needs of potential investors and other factors, such as, incentives in other regions and countries. It is necessary to modify the scheme swiftly when government agencies realize that the needs of investors and their environments are changing or different from what was expected. In this sense, flexibility of the scheme is crucial to increase its effectiveness.

There are two main reasons for achieving these tasks. First, investment conditions in a region depend on each field; and second, regional competition for attracting investment is becoming more demanding. As mentioned above, many regions and countries, such

as Tocopija, Jujuy, and Salta, try to establish schemes such as institutional incentives and free trade zones to attract investment. Such a tendency signifies that competition to obtain investment among regions and countries is becoming keener. Therefore, concerned organizations must pay attention to movements in other regions and countries and make efforts to secure the relative effectiveness of Arica Law 2.

Table 17.4.20 Main Incentives of Arica Law and Arica Law 2

| | Item | Contents |
|---|---|---|
| A r i c a L a w 1 | Tax credit to investment | 20% credit to investments destined to the production of goods and services exceeding 2,000 UTM (unidades tributaria monetaria) in Arica or 1,000 UTM in Parinacota. |
| | Export centers | Export Centers will be created in Arica and Parinacota for entrance, deposit and tax-free commercialization of national merchandises, raw material and foreign pieces from Latin American countries. |
| | Sale of real state goods to people from neighboring countries | Sale of rights of real state goods to individuals or companies in neighboring countries. |
| | VAT return on services | The industries in the duty free zone will have the right to recover VAT for used services (water, fuel, energy, etc.), in industrial processes. |
| | Devolution of taxes to foreigners | Taxes paid when buying merchandise valued over 1 UTM in Arica will be returned to foreigners. |
| | Supplies without VAT to fishing ships and international factory ships | Suppliers, reparation services, ship maintenance, storage of merchandises of fishing companies not established in Chile and factory ships that operate outside the economic zone will be considered as exports for VAT devolution matters. |
| | Devolution of the 6% | Taxpayers in the extended duty free zone could recover the 6% paid on imports. |
| | Broadening of the industrial concept | The industries in the duty free zone of Arica could make processes that incorporate national added value such as assembly, finishing, integration, manufacturing and industrial information. |
| | Exemptions to passengers | Passengers that buy merchandise in value up to US\$1,000 in the extended free trade zone could introduced merchandises bought in duty free at the airport valued up to US\$500. |
| | Coastal sailing in ports | Foreign ships with final destination the ports in Arica could make coastal sailing. |
| A r i c a L a w 2 | Tributary credit to the investment | Investments carried out in the Province of Arica will have a 30% tributary credit on fixed immobilized assets, with a term of validity until 2007 and a recovery term until the year 2030. In Parinacota Province, the tributary credit to investments is 40% for touristic investments. |
| | Allowance to the investment | It permits SMEs that invest in projects realizing their development to apply for benefits of up to 20% before beginning the investment. With maximum annual sales of 40,000 U.F., US\$1,107,200 and only for investments not superior to 50,000 U.F. (US\$1,384,000). |
| | Allowance to the recruiting of man power / Manpower recruiting terms | Allowance of 17% on taxable wages with a maximum of approximately \$130,000 (US\$230). |
| | Industrial duty free zone of Arica | Allows the entrance and export of raw material, exempt of tariffs and taxes. The earned income of the company is exempt of the wage income tax. |
| | Tariff zero | Allows the transformation of inputs entered to the industrial duty free area of Arica and the entrance to the national market, without paying tariffs. Companies installed under other conditions can request the refund of tariffs on inputs used in the process, when their products enter the national market. |

Source: CORFO Tarapacá Regional Office

Note: The list of Arica Law 1 shows major incentives of this law, while that of Arica Law 2 indicates those for the investment.

17.5 Strategy

The promotion of investments and exports in the North Zone will be greatly facilitated by regional economic integration between the zone and neighboring countries, or within the “macro-region.” Economic integration in the macro-region is expected to: 1) expand trade between the macro-region and Asia or the west coast of the United States; and 2) enhance the possibility of new industries (manufacturing, services, tourism, etc.) targeting the macro-regional market. To reap the benefits of such integration and realize its development potential, the zone must satisfy three basic requirements:

- 1) Improvement of transportation infrastructure, including ports and roads in particular;
- 2) Development of supporting industries for the gateway such as logistics, finance, insurance, telecommunications, etc.; and
- 3) Development of manufacturing industries whose main target is the macro-regional market.

When these requirements are met, one particular vision will emerge for the North Zone, which is "*Arica as a major gateway to the Pacific Ocean in the macro-region.*"

The North Zone should take the following four-point strategy to realize this vision.

- 1) Improvement of the Port of Arica;
- 2) Infrastructure development in the macro-region;
- 3) Development of diverse gateway functions; and
- 4) Industrial development by strategic alliance.

Figure 17.5.1 illustrates the relationships among the overall vision and these four points.

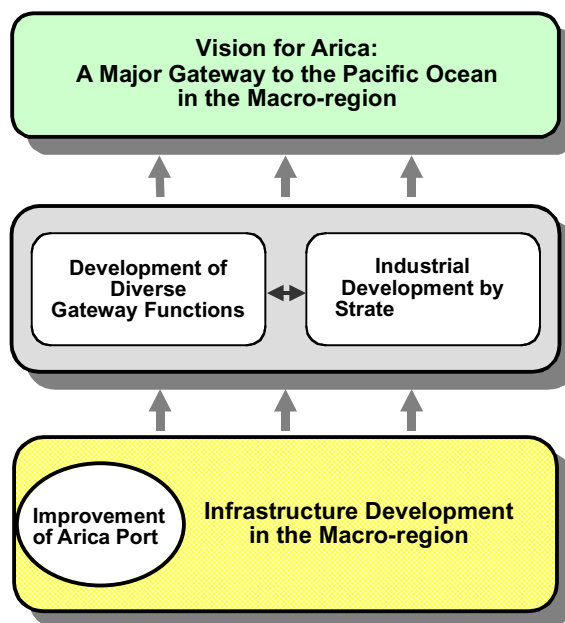


Figure 17.5.1 Vision and Strategy for North Zone

Although the strategy is supposed to be for the entire North Zone, the study has focused solely on Arica. The emphasis is placed on Arica because it is lagging behind other gateways of the zone, though it has potential to become a major gateway to the Pacific Ocean in the macro-region. In fact, the Port of Arica is traditionally the most important port for Bolivia on the Pacific Coast, while the demand for cargo handling and related services is expected to further increase. As previously mentioned, the focus on Arica does not mean that other gateways, such as Iquique and Antofagasta, are not important or do not have potential to become a major gateway in the macro-region. On the contrary, the importance of these gateways will become even greater when Arica is fully capable of functioning in a complimentary manner with the other ports.

In order to realize the vision for the North Zone, the following three principles should be pursued.

- 1) Long-term commitment to development
- 2) Coordination and cooperation
- 3) Partnership with Bolivia and Peru in Arica: “One Destiny for Three Countries”

17.5.1 Improvement of the Port of Arica

The Port of Arica is the natural gateway for Bolivian cargo, which occupies more than 60% of total cargo transferred thereby. The Arica Port Company began a bidding process during 1999 to obtain private investment directed at port facilities and to improve port operations through the granting of a concession. However, not one of the potential bidders bid for the concession. The port company, together with the authorities concerned, is currently analyzing causes for the failure, based on which the next bidding process is to be prepared. The JICA Study Team’s own investigation has indicated that the critical issue is how to minimize political risks of the concession related to treaties with Bolivia and Peru. Port improvement is a prerequisite for Arica to become a major gateway to the Pacific Ocean in the central zone of South America. This will then be complemented by its existing strengths, including geographic location, favorable climate, political stability, a pleasant atmosphere, etc.

17.5.2 Infrastructure Development in the Macro-region

In order to strengthen the gateway functions, it is highly important to improve existing deficiencies and to develop further transport systems along the export corridors. To foster such advances, efforts should be focused on the following two aspects.

- 1) Development of the physical facilities along the export corridors
- 2) Improvement of the transport operation system

The first strategy is directly related to the basic strategy for the North Zone, i.e., to strengthen the gateway function. The levels of transport capabilities differ, depending on the section of the corridors, but some of them are becoming aggravated due to lack of investment and maintenance work for long periods of time. For such reasons, they become serious transport bottlenecks of the export corridor, ultimately losing their relative advantage over, or competitiveness with, other export corridors including routes to the Atlantic ports.

By overcoming such challenges, it is expected that the corridors will have higher transport capabilities and create more transport demand. Taking the current situation into account, the following plans should be undertaken immediately.

- Infrastructure development of the Port of Arica (as mentioned in 2.1)
- Study on the export corridor of Chile – Bolivia – Mato Grosso, Brazil
- Development of the export corridor for the Port of Iquique

The purpose of the second strategy is to allow for an overall better functioning of the transport system by solving existing problems. Such problems include underlying institutional challenges in the transport system and inter-relationships among different transport modes. This strategy is vital because improved facilities may not be effectively utilized if a transport system as a whole is not adequately operated. By improving the institutional or operational system, the level of service or efficiency of the transport system may be enhanced. Based on the analysis of the current system, the following plans are deemed important.

- Development of an inter-modal transport system
- Review and study of the port development and operation system
- Improvement of the procedure at entrance/exit points

17.5.3 Development of Diverse Gateway Functions

The function of an international gateway is not merely to provide transport and other infrastructure but more importantly, to facilitate business activities through furnishing diverse services and public institutions, exactly as Singapore is doing in Asia. Such services include logistics, finance, information services, fair legal systems, public safety, higher education, social and cultural events, and tourism. Arica is already equipped with some of these services but must develop others in order to attract more cargo and foreign direct investment. Two principal strategies to strengthen gateway functions are:

- 1) Improve/develop logistical and other services related to the port activities by alliance with national and foreign investors (including shippers)
- 2) Develop services to strengthen Arica's relations with counties in the macro-region, particularly Bolivia and Peru, e.g., research and education, medical services, and tourism.

In light of current, international politics surrounding Arica, the second strategy is particularly important. These services, when developed not only for Chile but as international "public goods" to be shared by all three countries, can contribute to nurturing better understanding and promoting broader exchange among them.

17.5.4 Industrial Development by Strategic Alliance

Various services, as highlighted in Section 17.5.3, appear to adequately support Arica's gateway functions. However, these conditions are not sufficient for Arica to become an internationally competitive, "first-class" gateway. In light of high dependency on Bolivian transit cargo, moreover, Arica must diversify and strengthen its economic

activities, particularly manufacturing industries, for long-term sustainable development.

However, there are two major problems for industrial development in Arica. The first is the relatively small domestic market even when the entire North Zone is included, comprising a population of around 1 million and regional GDP of approximately US\$10 billion. A basic strategy to overcome this problem is to target export markets (including those in the macro-region) by taking advantage of the port function and the favorable geographic position within the macro-region. The second problem is Arica’s relatively weak industrial base, though the city preserves its manufacturing tradition dating to the 1950s-1960s. A basic strategy to strengthen the industrial base is to establish alliances with experienced manufacturing companies from other countries and zones.

The Arica Law’s incentives (e.g., financial assistance, subsidies for wages, workers’ training, and land purchasing, etc.) can attract certain investors. However, during the case studies conducted in this study it has become evident that, in addition to these incentives, a long-term strategy and its steady implementation are necessary in order to build a solid industrial base in Arica. Such a well-defined strategy is particularly significant in order to invite vigorously investors who have innovative technology and are willing to develop Arica’s human resources in the long run.

An important policy to invite such high-quality investors to Arica is to “select and concentrate” in providing incentives and assistance (e.g., those of the Arica Law and the instruments of CORFO and ProChile). The select-and-concentrate policy is twofold, i.e., to identify a strategic project and to target a strategic partner in line with the project. A “strategic project” can be identified by keywords, related to human capital, gateway functions and materials, as shown in Table 17.5.1.

Table 17.5.1 Key Words for Strategic Projects

| Human capital | Gateway functions | Materials |
|--|--|---|
| <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 • Diverse service • Tourism • Privatization know-how • Know-how of port management • Supporting industry • Engineering | <ul style="list-style-type: none"> • Information on species • Information on deposit • Overwhelming information on mining projects • Information on material industry • Data base • Use of materials • R&D activity • Diverse services • Primary industry and manufacturing • Engineering |

Source: Elaborated by the JICA Study Team for the “Study for the Export and Investment Promotion of Non-Natural-Resource- Based Manufacturing Products.”

A “strategic partner” should possess at least some of the following characteristics.

- Commitment to a long-term relation
- Dedication to Arica’s economic development
- A sound and innovative technological base
- Competent management
- An effective marketing strategy
- Experience in export business

The JICA Study Team has concluded that strategic types of industries in Arica are as follows, similar to that hypothesized at the beginning of Phase II, though the study results indicate that long-term commitment and planning are indispensable.

- 1) Processing of natural resources obtained from the macro-region for export to Asia, the United States, and Europe
- 2) Manufacturing of goods specifically developed for the macro-regional market
- 3) Manufacturing and services based on mineral and other resources
- 4) Industries already under alliance with multi-national corporations

Strategic partners, including potential ones, of the alliance for each industry type are as follows.

- 1) Bolivian wood-processing companies with export experience (e.g., BOLHOLZ)
- 2) Consumer goods manufacturers in Santiago (e.g., Somela) and Bolivia
- 3) Multinational mining-related engineering companies (e.g., Becthel and INDEC)
- 4) General Motors (GM) in Arica

Such “strategic alliances” will help Arica build a broad and solid industrial base and, consequently, to induce more investments and expand exports. One way to build an alliance with seriously committed investors who supply necessary technologies, is through government agencies, such as CORFO and ProChile, who then work together with local private enterprises to approach potential strategic partners. The select-and-concentrate policy does not necessarily imply that the government should provide discriminatory assistance to particular private enterprises. However, it would be necessary for the government to devote its efforts to facilitate strategic alliances in order to develop competitive, innovative industries in the North Zone.

17.6 Action Plans

17.6.1 Improvement of the Port of Arica

(1) New Schemes to Improve Facilities and Services (Urgent)

Case 1: Continue the concession process and implement one or more of the following.

- 1) Conditional concession as a solution to the problem of uncertainty of Berth No. 7
 - Provide a put option to the concessionaire regarding whether or not to continue the concession when the competition becomes substantially unfavorable due to a fundamental change in the Peruvian and/or Chilean policies for Berth No. 7; or
 - Include a term for cash deficiency support in the concession contract for the case in which the concessionaire loses a part of their expected incomes due to a fundamental change in the Peruvian and/or Chilean policies for Berth No. 7; or
 - Postpone the rent payment by a certain period as stated in Case 2).
- 2) Inclusion of the storage area in the eastern sector

It is necessary to re-consider in the concession the Bolivian cargo storage area in the eastern sector. Potential bidders for the first bidding have contended that its exclusion significantly reduced the attractiveness of the concession.
- 3) Public investment as a solution to the high investment burden demanded of the concessionaire

The government will share the investment in infrastructure and equipment required for the concession. If the investment is large enough, the government may not need to give the put option and cash deficiency support as mentioned above.
- 4) Priority given to the concessionaire in tendering other concessions of the port

The Arica Port Company shall give priority in granting the concessions of other projects that the company will implement in the future.

Case 2: Abandon the concession process and implement one or more of the following.

- 1) The Ministry of Finance shall allow the Arica Port Company to re-invest a part or all of the profit (around US\$2.4 million per annum in 1999) for the improvement of infrastructure and equipment in the port. The port company paid a dividend of around US\$2.3 million to MOF in 1999.
- 2) The Ministry of Finance shall finance necessary investments in the port from the state treasury. As a condition for such investment, the port company shall comply with certain minimum requirements, in terms of services, expressed by transfer speed and waiting time.
- 3) The Ministry of Finance shall allow the port company to obtain a loan from international lending agencies (multilateral or bilateral) under the MOF's guarantee. One possibility is to utilize the soft-loan (2-3% per annum) provided by the Japan Bank for International Cooperation (JBIC) in order to reduce the burden of interest payment on the port company. The port company shall be responsible for paying the capital and interest.
- 4) The port company shall improve its management and port operation through: 1) hiring managers from the private sector; and/or 2) becoming a semi-private enterprise by selling its shares.

17.6.2 Infrastructure Development in the Macro-region

(1) Study on the Export Corridor of Chile – Bolivia – Mato Grosso, Brazil

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|----------------------------|--|
| Objectives | <ol style="list-style-type: none"> 1) To prepare an export corridor development plan in Bolivia by analyzing the characteristics of the exporting products and transport conditions in Bolivia as well as the Mato Grosso region of Brazil 2) To generate a more competitive, major corridor in the macro region |
| Background | <ol style="list-style-type: none"> 1) The export corridor connecting Chile with Bolivia and Mato Grosso has not been well developed. Although there is a road connection from Arica to Mato Grosso, the sections in the Bolivian territory are in seriously poor condition. The railway system is also disconnected in the central part of Bolivia. Accordingly, the sections in Bolivia are the bottlenecks of this corridor. 2) It is urgent to prepare the most appropriate development plan for the export corridors, taking into account all possible solutions. |
| Contents | <p>The scope of the study may include the following contents:</p> <ol style="list-style-type: none"> 1) Analysis of current cargo flows of the products for export in Bolivia and Mato Grosso 2) Diagnosis the current conditions of the transport facilities including roads, railways and river transport in the corresponding areas 3) Analysis of the transport costs by mode and by direction 4) Identification of current transport operation problems 5) Preparation of alternative development plans for each export corridors 6) Evaluation of the alternative plans 7) Formulation of development plan (a master plan) of the export corridors with particular attention on the route connecting Arica – Bolivia – Mato Grosso 8) Implementation program including measures to finance the corridor development projects |
| Implementation Body | Joint organization between international lending agencies like IDB and related ministries of the corresponding countries or joint organization through a bilateral technical cooperation |
| Finance | Development study fund from international organizations or bilateral aid |

(2) Development of the Export Corridor for the Port of Iquique

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|-------------------|--|
| Objectives | <ol style="list-style-type: none"> 1) To develop the export corridor through the Port of Iquique by improving physical bottlenecks along the corridor 2) To generate a gateway for the macro region together with Arica |
| Background | <p>The export corridor through the Port of Iquique has two deficiencies in terms of transport infrastructure. First, the port access road connecting the port with Route 65 and further with Route 5 has become a bottleneck due to heavy vehicles that transport cargo from ZOFRI, as well as trucks parked along the roadsides. Second, though the Colchane route is given high priority by MOP, there still remain unpaved sections of the road to Bolivia, particularly on the Bolivian side.</p> |
| Contents | <ol style="list-style-type: none"> 1) Port Access <p>The port access road study was implemented by SECTRA, providing some alternative improvement plans. Among them, the project linking Arturo Prat with Circumvalación along the railway has been selected and now in the process of land acquisition. The government will finance the total cost of US\$14 million.</p> <ul style="list-style-type: none"> - Since it is located within the urban area, measures to minimize environmental impacts should be taken. - A parking area should be additionally provided, preferably near the customs office to avoid roadside parking. 2) Colchane <p>The unpaved section on the Chilean side is only 28 km, however, there are numerous holes and cracks on the surface of the paved sections due to low quality treatment. Therefore, the pavement of about 176 km including additional re-pavement will be necessary. As for the Bolivian side, the complete route to Oruro (226 km) is unpaved and is only treated with gravel. In order to accelerate the completion, bilateral discussions should be undertaken at the ministerial level, as well as at the regional government level, especially for the purpose of involving investment from the private sector.</p> |
| Finance | <p>Chile side: Development budget from the central government Bolivia side: There are some alternative resources to be considered:</p> <ol style="list-style-type: none"> 1) Loan from multilateral or bilateral lending agencies 2) Concession scheme or contribution from beneficiary companies 3) Government bond or credit 4) Creation of special funds by using a tax percentage on fuel or vehicles <p>A study should be conducted to find the most viable way of resource acquisition.</p> |

(3) Development of Inter-modal System

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|------------------------------|---|
| Objectives | To reduce total transport costs by establishing better coordination among different operators including different transport modes. |
| Background | In general, several different operators are involved in the transport from the cargo owner to the exporting port, even among railways. The transport loss time due to such an inefficient system increases the total cost of transport. Therefore, coordination among the different operators is highly important. |
| Contents | <p>1) Coordination between ports and railways Taking into account the advantages of the railway, effective coordination between port and railway operators is essential, especially for the following reasons:</p> <ul style="list-style-type: none"> - Incessant exchange of operation information so as to adjust the operation timing by using a computerized system - Increase use of flat wagon cars and box wagon cars - Installment of container handling equipment with higher efficiency at the terminal areas of the port as well as the railway <p>2) Coordination with trucks If the shipping company owns a truck company, coordination may be easy. However, since trucks generally operate individually, coordination tends to be more complicated. Accordingly, coordination between the railway and trucks should be improved as exemplified in the following suggestions.</p> <ul style="list-style-type: none"> - Promotion of door-to-door services by railway companies - Increase of special containers for bulk cargo that may be handled by both trains and trucks. - Increase of trailers that are more flexibly applicable to both box type cars and container carriers. <p>3) Development of transport logistics industries Although there are some transport logistic industries in the Metropolitan Region, few exist in the North Zone. It is important to establish a logistic industry that is reliable and responsible for cargo transport by a desired time schedule at least between the port and the inland origin/destination by means of a computerized system such as GPS. The company's service may include transport, storage, customs formalities, and final delivery. The logistic industry will be developed by:</p> <ul style="list-style-type: none"> - Extension of business by the existing logistic industries in the Metropolitan Region to the North Zone - Expansion of business by a trading company or shipping company |
| Government assistance | <ol style="list-style-type: none"> 1) Provide incentives for inter-modal transport 2) Investment support for containerization 3) Special taxation system that benefits logistic companies |

(4) Review and Study of the Port Development and Operation System

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|----------------------------|--|
| Objectives | To increase port efficiency by reviewing the current development plans and the operation system from a national viewpoint |
| Background | <p>Based on Law No. 19,542, the state ports have been individually managed and operated since 1998. The law has been helpful by ensuring that each port is more competitive by introducing private investment. However, the following issues should be discussed regarding the current development system:</p> <ol style="list-style-type: none"> 1) Since the port development plans are individually developed, coordination does not exist among them, which stimulates only competition. This may result in excessive investment when the projection is overestimated. 2) It is insinuated that all the ports should have a multi-operation system, which has accelerated the improvement of operation efficiency until now. When the handling volume reaches a certain level, the operation system should be reconsidered. This is because similar facilities and equipment are required for each operator, by which the operator can no longer enjoy economies of scale. |
| Contents | <p>The scope of the review is as follows:</p> <ol style="list-style-type: none"> 1) Review of nationwide port development plans <ul style="list-style-type: none"> - Analysis of statistical data regarding sea transportation for all the ports - Study on the future transport demand - Analysis of the port development master-plans and investment schedules - Analysis of the progress of the development master plans - Assessment of the plans and suggestion on modification 2) Study on the port alliance <ul style="list-style-type: none"> - Identification of possible fields of cooperation among specified ports - Formulation of the development plan - Study of its realization 3) Study on the port operation <ul style="list-style-type: none"> - Data collection and analysis on the current operation cost and handling efficiency of each port - Comparative study of the advantages and disadvantages on the multi-operation and mono-operation system |
| Implementation Body | A newly established committee composed of the members from related government agencies and maritime companies, etc. |
| Finance | Government budget or funds from international cooperation/aid agencies |

(5) Improvement of Procedures at Entrance/Exit Points

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|----------------------------|---|
| Objectives | To promote exports as well as cargo transit by facilitating the procedures required for international cargo transfer at the ports as well as the international borders |
| Background | Transport operators have voiced complaints regarding the unsteady or bureaucratic procedures at the customs passing. Although the custom procedures are still in the process of simplification, the unification of international transit cargo documentation has already been realized. However, there are still several issues to be improved, e.g., an unreliable way of documentation depending on the inspection officer, different working hours between two countries on the borders, long waiting time for authorized permission on the import from Chile, slow customs services, unreasonable discrimination, a manual communication system, etc. |
| Contents | <ol style="list-style-type: none"> 1) Adoption of a unified document form for export/import commonly applicable to all ports and international borders. 2) Not only including port operators and shipping companies but rather all customs offices, cargo owners, logistic companies, etc. should be connected by such a system that should be compatible with those of MERCOSUR countries. Through the system, necessary documents for international cargo are sent to all related agencies prior to the arrival of cargo, which may reduce the time required for the services at the exit/entrance points. As a first step, the EDI system should be established at least among the customs offices at the ports, the international borders and the central office in Valparaíso. 3) One-stop and full time service For the simplification of the procedure, all the documents required by related agencies such as customs, sanitary inspection offices, etc. should be accepted and completed only at one window. At the same time, the service hours should be extended as long as possible, preferably 24 hours a day. 4) Training of customs officers In order to reduce the discrepancy of checking criteria among the customs officers, a periodical training system will be necessary. If possible, a joint training system with the neighboring countries would be more desirable for creating one common checking system. 5) International discussions Some of the above programs may require bilateral or multilateral discussions. The government should make a continuous effort to facilitate international transport. |
| Implementation Body | Customs offices should take action in cooperation with port administrators by using the government budget. |

17.6.3 Development of Diverse Gateway Functions

(1) Chile-Bolivia-Peru Business Roundtable of Arica

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| Location | Arica, Region of Tarapacá |
| Time to be Implemented | 2001 and regularly after the first meeting |
| Institutions Responsible for Implementation | Chamber of Commerce and Industry of Arica with the participation of nine business persons with visions of Arica, Bolivia and Peru (three from each country) |
| Objectives | To gain a better understanding of the political and economic problems which three countries face and to share the ideas to lessen such concerns on the business level from a viewpoint of "One Destiny for Three Countries" |
| Contents of Projects / Concrete Actions to be Taken | <ol style="list-style-type: none"> 1) Establish a secretariat office 2) Start preparations <ul style="list-style-type: none"> - Drafting regulations of the Roundtable: participants, location, themes, etc. - Selection of participants 3) Hold the first meeting within 2001 |
| Finance | Chamber of Commerce and Industry of Arica and the participants |

(2) Arica as a Gateway City: City Planning Competition the Participation of Citizens

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|--|--|
| Location | Arica, Region of Tarapacá |
| Time to be Implemented | January 2002 |
| Institutions Responsible for Implementation | CORFO Tarapacá Regional Office and the municipality government of Arica |
| Objectives | <ol style="list-style-type: none"> 1) To draw a better design for the city of Arica with the participation of people living and working in Arica 2) To enhance the awareness of the citizens of Arica regarding the advantage of their city as a gateway |
| Contents of Projects / Concrete Actions to be Taken | <ol style="list-style-type: none"> 1) Prepare a detailed plan of the competition (concept, requirements, schedule, referees, eligible participants, awards, etc.) 2) Call new city designs including finance for the construction 3) Select a few candidates by the committee of referees 4) Select the best design by the ballot of the citizens of Arica |
| Finance | CORFO |

(3) Tourism Development: Link Arica with Altiplanic Route

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|--|---|
| Location | Arica and the Altiplanic Route (Arquipa – Cuzco – Puno – La Paz – Putre – Colchane – Ollague – San Pedro de Atacama) |
| Time to be Implemented | 2001-2002 |
| Institutions Responsible for Implementation | SERNATUR Tarapacá Regional Office (Arica) in cooperation with Peruvian and Bolivian counterpart government agencies |
| Objectives | 1) To increase the number of international tourists in Arica 2) To strengthen Arica's relationships with Bolivia and Peru through tourism promotion |
| Contents of Projects / Concrete Actions to be Taken | 1) Include Arica in the Altiplanic Route of Integration: Bolivia – Chile – Peru, currently promoted by SERNATUR in cooperation with ProChile and PronPeru (Distribute tourist information including maps and pamphlets) 2) Connect Arica with Arequipa in the Route 3) Schedule a coordination meeting with the Peruvian and Bolivian public and private sectors to operate international tour buses and other services |
| Finance | SERNATUR Tarapacá Regional Office and Regional Government |

(4) Research and Education: Establish a Macro-regional Research Institute at University of Tarapacá

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|--|---|
| Location | University of Tarapacá, Arica, Region of Tarapacá |
| Time to be Implemented | 2002-2003 |
| Institutions Responsible for Implementation | University of Tarapacá in cooperation with CORFO and private enterprises (including multinational corporations) in the macro-region |
| Objectives | 1) To conduct research regarding how to increase cooperation to solve various issues faced by concerned countries in the macro-region and feedback the results to political, business, and academic circles 2) To have a better understanding for the different ways of thinking among the countries of the macro-region through conducting basic research and exchanging opinions |
| Contents of Projects / Concrete Actions to be Taken | To conduct a detailed study for the establishment of the institute on: 1) Basic concept 2) Total plan: location, faculty, size, etc 3) Finance plan 4) Contribution of participating countries |
| Finance | Regional Government |

(5) Medical Services: Implement the Health Complex Plan at University of Tarapacá

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|--|---|
| Location | Arica, Region of Tarapacá |
| Time to be Implemented | 2002-2006 |
| Institutions Responsible for Implementation | University of Tarapacá |
| Objectives | 1) To increase the number of potential international customers in Arica 2) To strengthen Arica's relationships with Bolivia and Peru through the provision of affordable medical and health services |
| Contents of Projects / Concrete Actions to be Taken | 1) Design a detailed plan of the Health Complex, e.g., building, facilities, management, services, finance, etc. 2) Construct a health complex with advanced medical equipment 3) Provide medical services and health programs at a cost affordable to the Bolivian and Peruvian people |
| Finance | CORFO and Regional Government |

17.6.4 Industrial Development by Strategic Alliance

(1) Wood-Processing: Special Incentives for Bolivian Investors

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|--|--|
| Location | Arica, Region of Tarapacá |
| Time to be Implemented | 2002-2012 |
| Institutions Responsible for Implementation | CORFO Tarapacá Regional Office |
| Objectives | To develop an export-oriented wood-processing industry in Arica |
| Contents of Projects / Concrete Actions to be Taken | 1) Provide finance on preferential terms to those investors (potential core companies) 2) Establish a special fund for Bolivian investors 3) Facilitate the use of CORFO's schemes (e.g., PDP, FONTEC, etc.) 4) Support their international marketing through ProChile's export promotion |
| Finance | CORFO |

(2) Mining-Related Industries: A Pilot Alliance Program with CORFO's Assistance

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|--|--|
| Location | Regions of Tarapacá, Antofagasta, and Atacama |
| Time to be Implemented | 2002-2003 |
| Institutions Responsible for Implementation | CORFO Regional Offices in cooperation with associations to be formed by mining-related industries of each region and the North Zone |
| Objectives | To obtain know-how on coordination, technology management and financial engineering for implementation of strategic alliance and integration |
| Contents of Projects / Concrete Actions to be Taken | <ol style="list-style-type: none"> 1) Identify a project, make a preliminary proposal, and call potential participants. 2) Make a detailed plan of the pilot program among concerned parties 3) Implement the pilot program 4) Monitor the progress and evaluate the results of the program 5) Prepare a proposal for a more dynamic and comprehensive strategic alliance and integration program based on the results of the pilot program |
| Finance | CORFO and regional governments |

(3) Mining-Related Industries: Establishing Associations of Mining-related Industries

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|--|---|
| Location | Regions of Tarapacá, Antofagasta, and Atacama |
| Time to be Implemented | 2002-2003 |
| Institutions Responsible for Implementation | CORFO Regional Offices of Tarapacá, Antofagasta, and Atacama |
| Objectives | To ensure that each company understands clearly how to promote alliances and integration. One of the greatest problems obstructing such relations is the lack of information. |
| Contents of Projects/Concrete Actions to be Taken | <ol style="list-style-type: none"> 1) Construct a list of all mining-related companies and the kind of technology that each company owns 2) Provide the opportunity to exchange information to become more familiar with potential partners 3) Hold seminars regarding the promotion of alliances and integration 4) Appeal to members of the association to obtain certificates of ISO 9000 and 14000 series, by using FONTEC together with other companies 5) Obtain information of the development of mines in neighboring countries together with ProChile |
| Finance | CORFO and member companies |

(4) Mining-Related Industries: Strengthening CORFO Schemes

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|--|--|
| Location | Regions of Tarapacá,, Antofagasta, and Atacama |
| Time to be Implemented | 2002- |
| Institutions Responsible for Implementation | CORFO Regional Offices of Tarapacá,, Antofagasta, and Atacama |
| Objectives | To promote alliances and integration by using CORFO schemes, which is the first step in increasing such relations. This, and the procedures associated with obtaining an ISO certificate, will allow companies to have a better understanding for each other. |
| Contents of Projects/Concrete Actions to be Taken | <ol style="list-style-type: none"> 1) Strengthen and secure credit guarantees and low interest loans for alliance and integration within and across regions 2) Strengthen and secure CORFO schemes to obtain ISO 9000 series and 14000 series certificates for SMEs 3) Strengthen and secure CORFO schemes to promote cooperative R&D among private sector, academia, and in the public sector within and across regions to enhance technology-level and know-how of SMEs 4) Strengthen and secure CORFO schemes to support graduate education for people working in the areas of enhancing management and technology levels |
| Finance | CORFO |

(5) Mining-Related Industries: Establish a Section in Local Governments to Promote Direct Investment

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|--|---|
| Location | Regions of Tarapacá, Antofagasta, and Atacama |
| Time to be Implemented | 2002-2003 |
| Institutions Responsible for Implementation | Regional governments of Tarapacá, Antofagasta, and Atacama |
| Objectives | To strengthen systematic activities to induce external regions and nations, obtain necessary information on the needs of the companies, and show the enthusiastic attitude of the region to welcome investment |
| Contents of Projects/Concrete Actions to be Taken | <ol style="list-style-type: none"> 1) Hold seminars in other regions and abroad to induce investment, taking advantage of the close proximity to neighboring mines that will be developed in the future, existing industrial parks, and Arica Laws 1 and 2 2) Visit companies as a sales activity to introduce situations and beneficial schemes to induce investment from other regions and abroad 3) Reflect the information on private company needs for after-sales activities to generate new schemes |
| Finance | Regional Governments and CORFO |

(6) Mining-Related Industries: Accelerating Industrial Accumulation by Taking Advantage of the Arica Law

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|--|--|
| Location | Region of Tarapacá |
| Time to be Implemented | 2002- |
| Institutions Responsible for Implementation | CORFO and Regional government of Tarapacá |
| Objectives | To ensure that the Arica Law functions well and is continuously updated to guarantee its attractiveness to induce investment in the region. The local government and CORFO should be more aggressive in the promotion of this law, especially compared with the incentives of other regions in the long run. |
| Contents of Projects/Concrete Actions to be Taken | <ol style="list-style-type: none"> 1) Advertise the Arica Law by holding seminars in other regions and abroad 2) Create a plan to induce firms, including indicators showing that investment conditions in Arica are good as well as incentives such as the occupancy rate of industrial parks in Arica. CORFO and the local government should establish a prospect for the long term occupancy rate 3) Modify the Arica Law to maintain its attractiveness if there is a large gap between the reality and the future prospective occupancy rate |
| Finance | CORFO and Regional government |

(7) Mining-Related Industries: Establishing Macro-region Center for Technology Development

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|--|---|
| Location | Antofagasta |
| Time to be Implemented | 2002-2007 |
| Institutions Responsible for Implementation | CORFO Regional Offices of Tarapacá, Antofagasta, and Atacama, Universities in macro-region, Ministry of Economy, and Regional governments in macro-region |
| Objectives | <ol style="list-style-type: none"> 1) To enhance the technology level and know-how of small and medium sized enterprises because they cannot form alliances and increase integration without advantages in technology and know-how 2) Provide technological assistance such as technical guidance, incubation, and so on for SMEs 3) Provide education for management-level staff and know-how of venture business |
| Contents of Projects/Concrete Actions to be Taken | To conduct a detailed study for the establishment of the institute on: <ol style="list-style-type: none"> 1) Basic concept 2) Total plan: location, faculty, size, etc. 3) Financial plan 4) Contribution of participating countries |
| Finance | CORFO and Regional governments |

(8) Automobile Industry: Arica Development Committee Including GM

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|--|---|
| Location | Arica, Region of Tarapacá |
| Time to be Implemented | 2001 |
| Institutions Responsible for Implementation | CORFO Regional Office in cooperation with GM Arica, GM Corporation, local governments, the Chamber of Commerce and Industry of Arica |
| Objectives | To utilize the resources of GM Arica as the most important strategic partner for regional industrial development not only in the automobile industry but also regarding new industries in Arica |
| Contents of Projects / Concrete Actions to be Taken | 1) Send a delegation whose leader is the President of Chile to GM Corporation in the United States to convey Chile's enthusiasm to support GM Arica as a strategic partner for regional industrial development 2) Prepare a proposal for a strategic project to develop new industries |
| Finance | CORFO and central and regional governments |