Analysis of the Potential of IIRSA Projects for Production Integration and Development of Value-Added Logistics Services (IPrLg)

Application to Group of Projects 5 – Central Interoceanic Hub

November 2009

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INICIATIVA PARA LA INTEGRACION DE LA INFRAESTRUCTURA REGIONAL SURAMERICANA

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Introduction

Within the framework of the training in and application of the methodology for the analysis of the potential for production integration (IPr) and for development of value-added logistics services (SLVAs), developed by the Initiative for the Integration of Regional Infrastructure in South America (IIRSA), experts from the Governments of Bolivia, Chile and Peru were asked to carry out a pilot application of such methodology to Project Group 5 (GP-5) of the Central Interoceanic Hub (Figure 1).

Based on a first workshop held in Lima in December 2008, expert teams prepared reports on the characteristics of the Area of Influence (AI) that is positively impacted by IIRSA projects in each one of the countries involved.

Following the methodology guidelines, these reports provide the criteria used in delimiting the area of influence, describe this area in terms of its socioeconomic, production and infrastructure features, and gather relevant information about the sectors with potential for production integration, as selected for analysis during the workshop in Lima. The preliminary results of the characterization were presented and analyzed in a second workshop held in Arica in April 2009, on the basis of which the fieldwork was prepared.

In June 2009, in Santa Cruz de la Sierra, upon completing the fieldwork, which consisted in interviewing key actors of the selected sectors, the national teams of the three countries wrote their conclusions about the potential for IPr and development of SLVAs in this project group.

This document, which joins together the work undertaken by each national team and the results of the workshop in Santa Cruz de la Sierra, is intended to offer a unified view of the total area of influence, present the conclusions regarding the potential for IPr and development of SLVAs, and make recommendations for an action plan aimed at promoting the development of IPr and SLVAs.

It should be mentioned that the reports and presentations prepared by the national teams go into greater detail on these topics and other country-specific aspects. Such documents are available at www.iirsa.org/iprlg.asp.

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Definitions

The concepts of production integration and value-added logistics services may have different meanings. For the purposes of the application of the methodology to the evaluation of the potential for Ipr and SLVAs development in IIRSA project groups, the definition of these terms is provided below.

Regional production integration[1] **(IPr)** can be defined as the process of gaining greater production specialization by the countries that become integrated. Production integration takes place through the creation and strengthening of backward and/or forward linkages in the production chains that have links located in two or more countries of the region.

The implementation of infrastructure that increases or facilitates contact among countries may foster production integration since it brings economic spaces closer, reduces the physical barriers to trade, and increases the size of the markets.

Productions linkages are permanent commercial relationships established between two or more production units located in different countries and specialized in different stages of a production chain that generates a product family.

Value-added logistics services (SLVAs) is a set of operations that add commercial value without altering the nature of the product and that exceed transport and storage; for example, cargo consolidation and deconsolidation, labeling, classification, quality control, assembly, disassembly, splitting, packaging and conditioning, order picking, document preparation, etc.

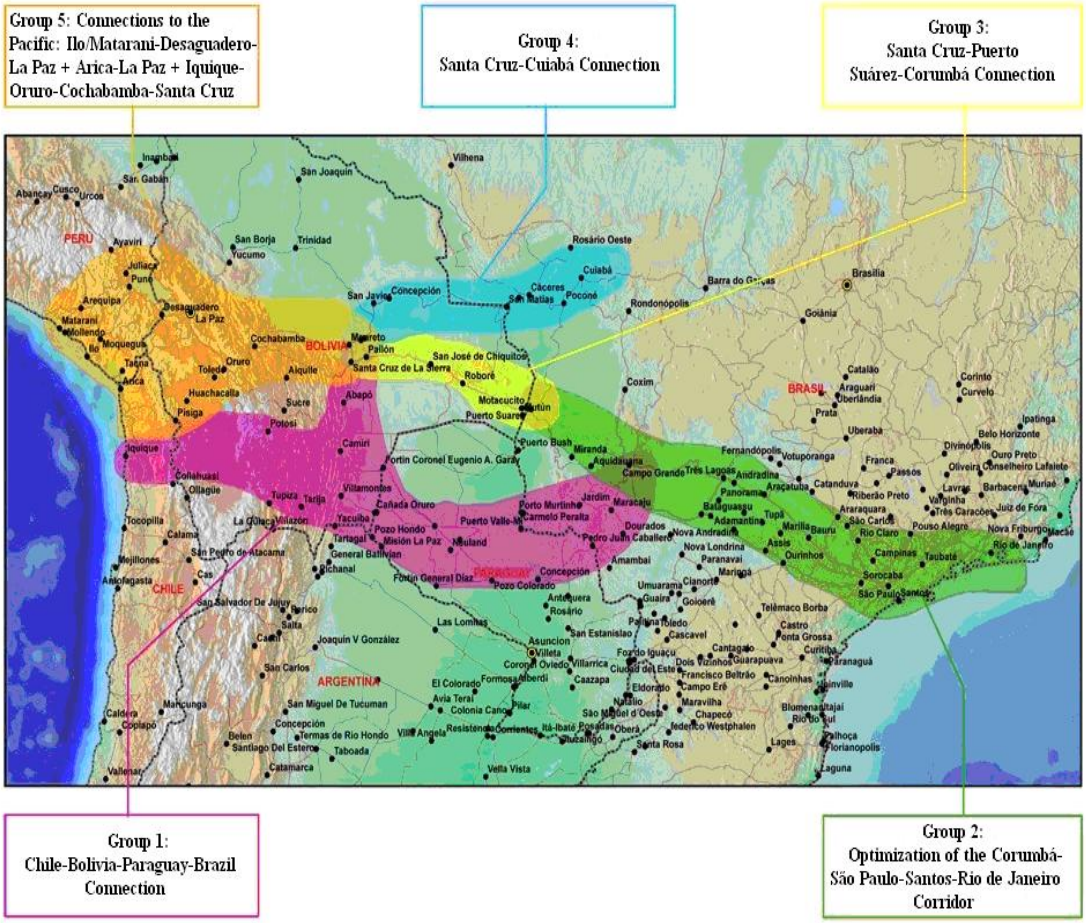
We talk of SLVAs when these operations are not inherent to the production chain (dedicated logistics) but are applied to different product families that share infrastructure and services (diversified logistics).

The term “dedicated logistics” refers to raw materials, semi-finished products and even to finished products, of mineral (iron, coal, aluminum, cement, etc.) or vegetable origin (soybean, cereals, wood, etc.) that are transported as bulk or semi-bulk cargo and subject to a dedicated logistic treatment, the structure of the production chain being relatively simple, with few actors along it and few integrations with other chains. In this case, the chain fully coincides with the logistic group, regardless of whether multiple producers or processors of a product are involved in the same corridor.

What counts for diversified logistics is that the logistics function is independent of production and is a business of interest for specialized operators. There are many examples of this, notably —due to their complexity— the chains associated with the sectors of textiles and footwear, motor vehicles, food and perishables in general, chemical products, mass consumption and household products, and paper, among others.

[1] In general, the literature refers to production integration as a tool for competitiveness based on the complementarity of the specializations of different companies or economic operators through the integration of the production processes. For the purposes of this methodology, it is of particular interest that different stages of the production processes take place in different countries linked by infrastructure projects included in IIRSA’s Portfolio.

Figure 1 – Central Interoceanic Hub Project Groups



1. The Central Interoceanic Hub Project Group 5 Area of Influence

1.1 Current Status of the Projects in the Group

The projects that make up the Project Group 5 of the Central Interoceanic Hub are shown in Figure 2. Regarding the latest update of maps of the projects available at http://www.iirsa.org//Cartera_ENG.asp?CodIdioma=ENG, three new projects were added, the records of which are not yet ready:

- Concession of Iquique Airport;
- Arequipa Logistics Platform (Distribution Area);
- Concession of the Diego Aracena Airport - Iquique Road for its Upgrade to a Four-lane Road.

As of June 2009, the status of the projects in this group was as follows:

Table 1 – Implementation Status of Group 5 Projects

Stage	Projects	Amount (US$)
Concluded	4	50,000,000
Execution	6	222,000,000
Pre-execution	4	943,100,000
Profiling	4	234,300,000
No data	3	0[2]
Grand Total	**21**	**1,449,400,000**

[2] The amounts for IOC69 and IOC71 projects are not included because they are not updated at IIRSA website. The amounts in Table 2 were supplied by the Chilean National Team.

Figure 2 – Central Interoceanic Hub Group 5 Projects

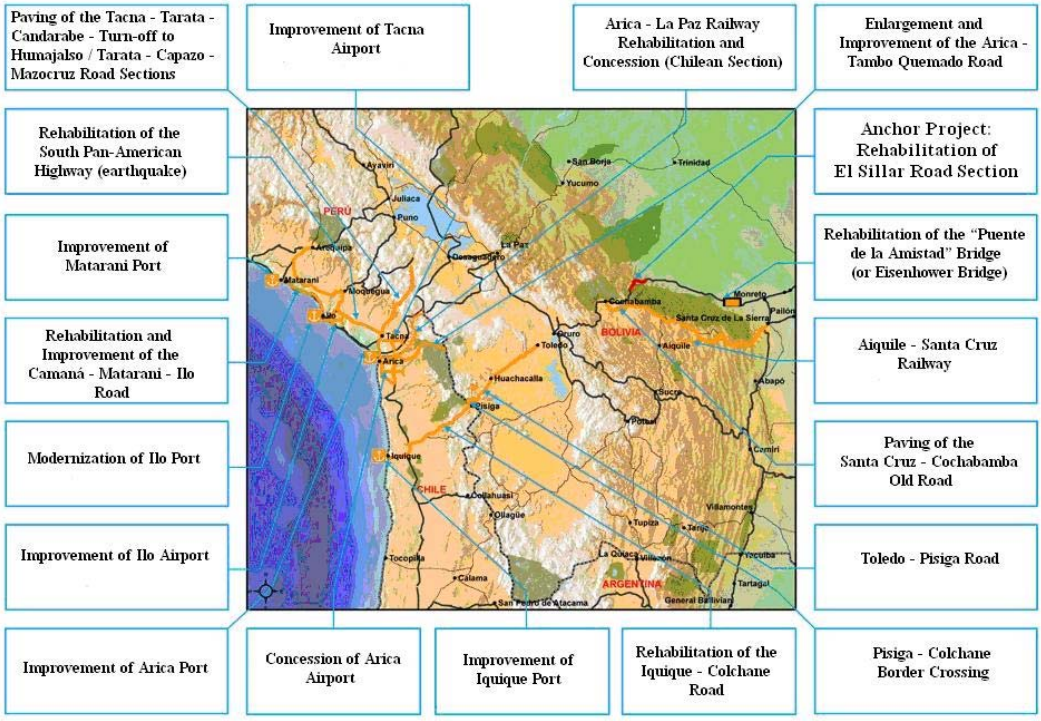


Table 2 – Current Status of Group 5 Projects

Code	Project Name	Amount (US$)	Stage	Financing	Latest Update
IOC31	Rehabilitation of El Sillar Road Section	120,000,000	Pre-execution	Not initiated	Oct-08
IOC32	Toledo – Pisiga Road	92,000,000	Execution	Execution	Sep-08
IOC33	Pisiga – Colchane Border Crossing	2,000,000	Concluded	Completed	Abr-08
IOC34	Concession of Arica Airport	10,000,000	Concluded	Completed	May-08
IOC35	Improvement of Arica Port	50,000,000	Execution	Execution	Jun-09[3]
IOC36	Rehabilitation of the Iquique – Colchane Road	29,000,000	Execution	Execution	May-08
IOC37	Aiquile – Santa Cruz Railway	700,000,000	Pre-execution	Not initiated	Sep-08
IOC38	Paving of the Santa Cruz – Cochabamba Old Road	No data	Execution	Execution	Sep-08
IOC39	Rehabilitation of the "Puente de la Amistad" Bridge (or Eisenhower Bridge)	3,000,000	Concluded	Completed	Sep-08
IOC40	Enlargement and Improvement of the Arica – Tambo Quemado Road	50,000,000	Execution	Execution	May-08
IOC41	Rehabilitation and Improvement of the Camaná – Matarani – Ilo Road	80,000,000	Profiling	Not initiated	Oct-08
IOC42	Improvement of Ilo Airport	97,000,000	Pre-execution	Not initiated	Sep-08
IOC44	Modernization of Ilo Port	4,300,000	Profiling	Not initiated	Oct-08
IOC61	Improvement of Matarani Port	100,000,000	Profiling	Not initiated	Oct-08
IOC62	Improvement of Iquique Port	35,000,000	Concluded	Completed	Oct-08
IOC65	Arica – La Paz Railway Rehabilitation and Concession (Chilean Section)	25,000,000	Execution	Execution	Sep-08
IOC66	Arica – La Paz Railway Rehabilitation and Concession (Chilean Section)	26,000,000	Execution	Execution	Nov-08
IOC67	Improvement of Tacna Airport	26,100,000	Pre-execution	Not initiated	Oct-08
IOC69	Concession of Iquique Airport	4,600,000	Concluded	Completed	Jun-09[4]
IOC70	Arequipa Logistics Platform (Distribution Area)	No data			
IOC71	Concession of the Diego Aracena Airport – Iquique Road for its Upgrade to a Four-lane Road	160,000,000	Under study	No data	Jun-09[5]

1.2 Criteria Used to Delimit the Area of Influence

The criteria used to delimit the area of influence were the following:

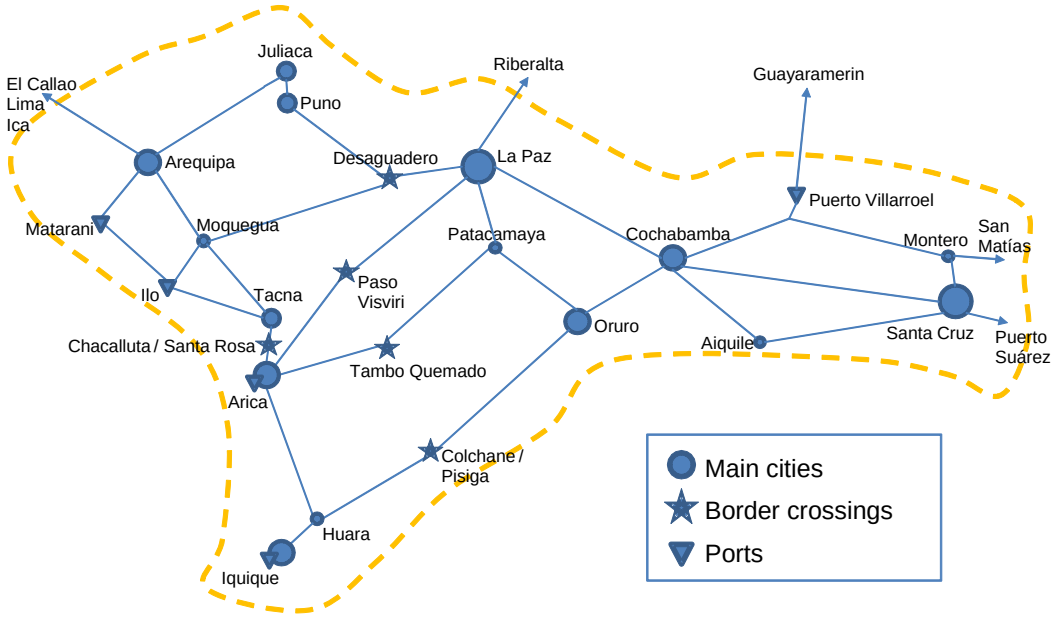
- Distance from the projects in the Group and the road network connecting them. A preliminary area was delimited approximately 100 to 150 kilometers to both sides of the main road that runs across the territory and connects the projects within the group;
- The network of urban and production centers close to the project group. The impact that important consumption or production centers may have on the economy of the area of influence was also considered;
- Administrative divisions and borders;
- Degree of aggregation of the information available. The preliminary area delimited in terms of distance to projects, cities and production centers was defined on the basis of the departments, regions, provinces, communes or municipalities, following the administrative division used in each country.

[3] Information supplied by the Chilean Team. The record of this project on IIRSA website was not updated at the time this report was prepared.
[4] Ditto footnote 3.
[5] Ditto footnote 3.

1.3 The Area of Influence

Figure 3 – Central Interoceanic Hub Project Group 5 Area of Influence

Figure 4 – Network of Cities in the Area of Influence



1.3.1 Bolivia

The main integration hub of Bolivia is the highway that connects Puerto Suárez-Santa Cruz-Cochabamba-La Paz (Figure 3), through which the country's international trade is carried on; hence, the area of influence comprises the departments of La Paz, Oruro, Cochabamba, Beni, Chuquisaca, Santa Cruz and the northern area of the department of Potosí. The Tarija and Pando departments are not included in the area of influence.

Regarding the typology of the regions comprised within the area of influence, in Bolivia there are three predominant geographical zones:

- The Andean zone;
- The Sub-Andean zone;
- The lowlands or plains.

The Andean zone accounts for 25% of the national territory, covering approximately 274,645 km^2 (106,048 square miles). This zone comprises the Volcanic or Western range and the Eastern or Real range, between which the Altiplano or Andean plateau is located. The departments of La Paz, Oruro and Potosí are situated in the Andean zone. The temperature in this zone is the lowest in the country and may fall to -20 ºC. The mean temperature is 10 ºC. The Altiplano or Andean plateau is, on average, 3,555 meters above sea level.

The Sub-Andean zone, a warm temperature area with fertile valleys, covers 175,772 km^2 (67,871 square miles), accounting for 16% of the Bolivian territory. Its mean temperature ranges from 16 ºC to 20 ºC. This zone, where the departments of Cochabamba, Chuquisaca, Tarija and part of Santa Cruz are located, is in the center of the country, and its altitude ranges from 1000 to 3000 meters above sea level.

At the bottom of the Eastern range, on its northeastern flank, the tropical lowlands spread out to the northeast, east and southeast covering 659,149 km^2 (254,516 square miles), accounting for 60% to 64% of the national territory, with a mean annual temperature of 22 ºC to 25 ºC. This zone comprises the north of the La Paz department, the eastern portion of the Cochabamba department, and the departments of Santa Cruz, Beni and Pando.

1.3.2 Chile

The Chilean road network connecting the projects within the group involves route 11 CH, Arica-Tambo Quemado, linking the city of Arica with the Bolivian border, and route 15 CH, Huara-Colchane, connecting the city of Iquique and the Bolivian border, past the town of Huara (Figure 3).

If a 100-km straight line perpendicular to both routes were to be drawn, the Peruvian border is approximately reached at the northern end of the line by route 11 CH, whereas the border between the regions of Tarapacá and Antofagasta is reached at the southern end, by route 15 CH.

The area of influence includes the two main cities located in this portion of the national territory, i.e. Arica in the north and Iquique in the south. Both cities concentrate, respectively, 98% and 97% of the population of their regions, and are the main economic centers of these regions.

From the administrative point of view, the Chilean State is organized in 15 regions subdivided into provinces, and each province is in turn subdivided into a large number of communes. Pursuant to this organization, the Chilean portion hosting the infrastructure of Project Group 5, as defined for the Central Interoceanic Hub, falls within the XV Arica and Parinacota Region in the north and the I Tarapacá Region in the south. The area of influence is bordered to the west by the Pacific ocean, to the east by Bolivia, to the north by Peru, and to the South by the II Antofagasta Region.

The information available in most databases is organized according to the political-administrative division and organization of the Chilean State described above, though sometimes these databases provide more general data concerning the entire region or they include specific details at a commune level. It is worth noting that until 2007 only the I Tarapacá Region —comprising what today is the XV Arica and Parinacota Region— existed. In 2007, the XV Region was created and a local government organization was put in place; consequently, new statistics for the region as well as other public management and planning-related instruments started to be produced. Therefore, much of the analyses and figures in this report belong to the old I Tarapacá Region, which in a way favors a more aggregate analysis since the old region falls exactly within the current area of influence.

Following the criteria above, the Chilean team defined that the Chilean portion of the area of influence included the XV Arica and Parinacota Region in the north and the I Tarapacá Region in the south, covering a total area of 59,101 km^2 and encompassing the only points of road connection with Peru and Bolivia.

1.3.3 Peru

On the Peruvian side, the area of influence was delimited by establishing a territory of 150 km on both sides of the Ilo-Desaguadero, Costanera (Ilo-Matarani) road and of the

Tacna-Candarave-Humajalso road; thus, the departments of Tacna, Moquegua, Puno, and Arequipa were defined as part of the area of influence (Figure 3).

These departments also include the main production and consumption centers in the south of the country, among which the following can be mentioned: Arequipa, Ilo, Juliaca and Tacna. Furthermore, the Matarani and Ilo ports, which are highly relevant for the import and export of goods, are included as well.

After having analyzed the economic and trade dynamics of the area, the inclusion of Lima in the area of influence of these projects was deemed important due to the impact of the city on the commercial exchange in the southern region of the country and, in particular, to its significance for the development of value-added logistics chains in the hub under study. Furthermore, the department of Ica was also considered for inclusion owing to the fact that, in this trade dynamics, it serves as a link between Lima and the southern region of the country. However, as Lima has its own dynamics, it was decided that Lima and Ica would be considered as an external area of influence.

2. General Characterization of the Area of Influence

2.1 Socio-demographic Characteristics

Table 3 – Population, Area, GDP and Development in the Area of Influence

Region	Population (Inhab.)	Area (km^2)	Density (Inh./km^2)	GDP (million US$)	HDI	Urban Population	Poverty
Bolivian Area of Influence	8,901,349	997,131	8.9	8.194	0.739	62,8%	58.5%
Santa Cruz	2,388,799	370,621	6.5	1.484	0.759	32.7%	38.1%
Beni	406,982	213,564	1.9	877	0.717	4.9%	76.0%
Cochabamba	1,671,680	55,631	30.1	1,218	0.765	18.1%	55.0%
Chuquisaca	601,823	51,524	11.7	957	0.704	4.8%	70.1%
La Paz	2,630,381	133,985	19.6	1,212	0.730	30.5%	66.2%
Oruro	433,481	53,588	8.1	1,512	0.720	4.5%	67.8%
Potosí	768,203	118,218	6.5	934	0.701	4.5%	79.7%
Chilean Area of Influence	428,594	59,101	7.3	3,960	0.731	94,1%	14.8%
XV Arica and Parinacota	189,644	16,875	11.2	3,960	0.731	93,2%	18.6%
I Tarapacá	238,950	42,226	5.7			94,8%	11.7%
Peruvian Area of Influence	2,871,058	167,454	17.1	3,690	0.604	72,3%	42.7%
Arequipa	1,152,303	63,645	18.2	1,823	0.646	90,6%	23.8%
Moquegua	161,533	15,734	10.3	309	0.644	84,6%	25.8%
Puno	1,268,441	71,999	17.6	981	0.547	49,7%	67.2%
Tacna	288,781	16,076	18.0	577	0.669	91,3%	20.4%
	12,223,329	**1,223,686**	**10.0**	**15,812**	**0.71**	**66.2%**	**42.7%**

Population: Bolivia 2005, Chile 2003, Peru 2008
GDP: million US$, Bolivia 2007, Chile 2006, Peru 2008
HDI: Bolivia 2004, Chile 2003, Peru 2008
Urban population: Bolivia 2001, Chile 2002, Peru 2008
Poverty: Bolivia 2008, Chile 2006, Peru 2008

Table 4 - GDP per Economic Sector in the Area of Influence (million US$)

Region	Agriculture	Mining	Manufactures	Services
Bolivian Area of Influence	1,214	978	1,421	2,368
Santa Cruz	557	199	518	609
Beni	110	13	60	67
Cochabamba	163	145	364	439
Chuquisaca	88	84	71	141
La Paz	209	131	335	854
Oruro	22	129	48	128
Potosí	64	276	24	131
Chilean Area of Influence	22	1,418	306	1,842
XV Arica and Parinacota	22	1,418	306	1,842
I Tarapacá				
Peruvian Area of Influence	2,103	2,117	3,054	3,691
Arequipa	1,263	906	1,882	1,824
Moquegua	113	528	551	309
Puno	585	281	431	981
Tacna	142	402	190	577
	3,339	**4,500**	**4,780**	**7,888**

Bolivia 2007, Chile 2006, Peru 2008

Figure 5 – Human Development Index in the Area of Influence

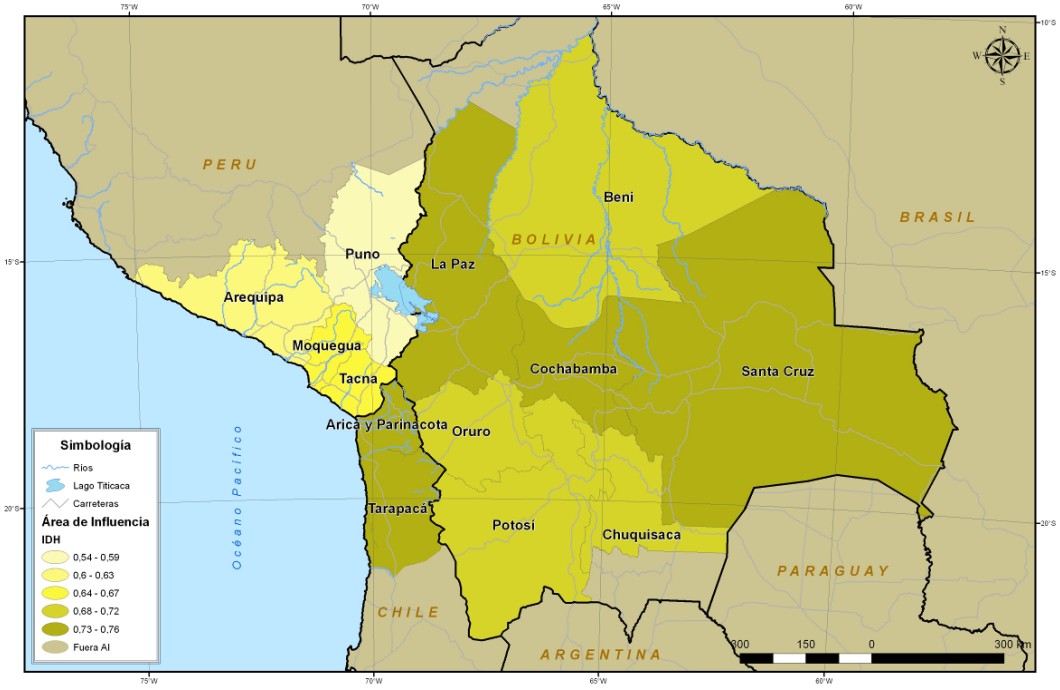


Figure 6 – Poverty Rate in the Area of Influence

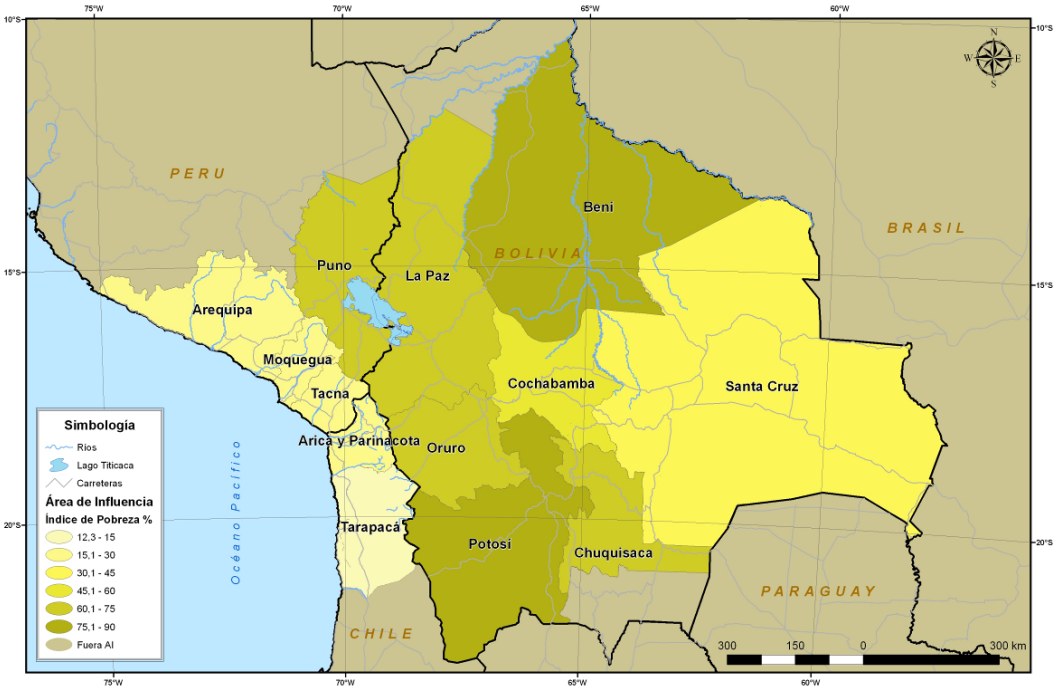
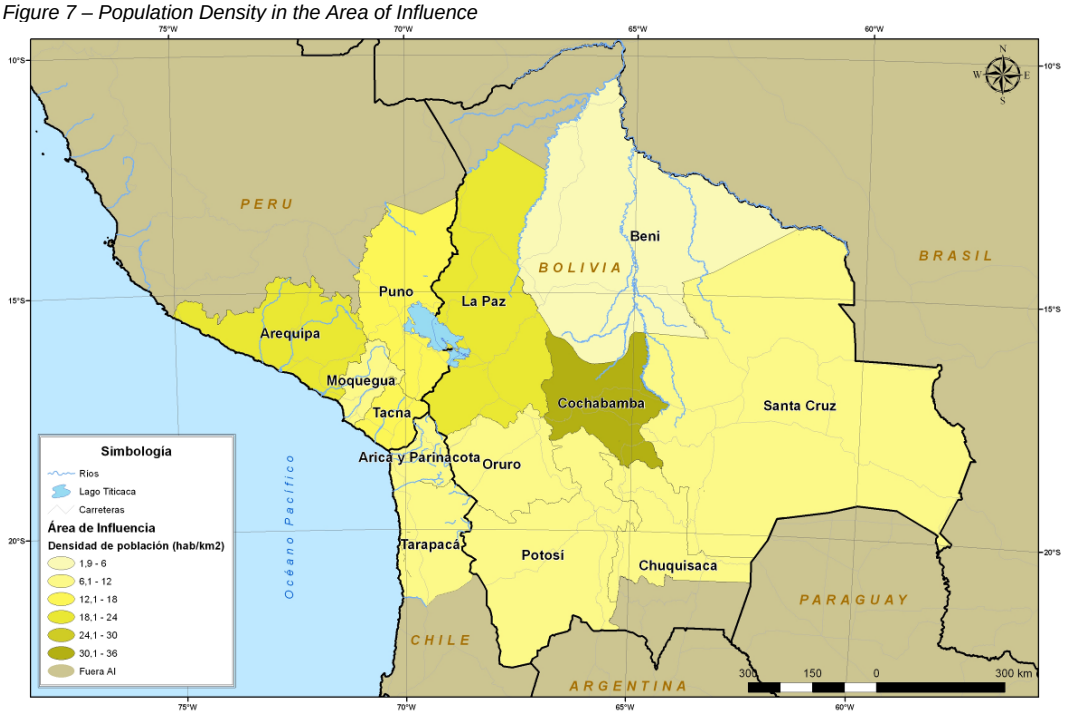


Figure 7 – Population Density in the Area of Influence



2.1.1 Socio-demographic Data of the Bolivian Portion of the Area of Influence

The poverty rate in Bolivia remained constant from 2000 to 2004, but fell considerably in 2004 and 2008.

The poverty rate is higher in the rural areas, where 80% of the population is poor, whereas in the urban areas the poor account for 50% of the population. The poverty rate has fallen in the departments of Cochabamba and Santa Cruz, but has remained high in La Paz, Beni, Oruro and Potosí.

The country still undergoes a rapid population growth, increasing at an annual rate of 2.74%. Bolivians under 15 years of age account for 41% of the total population, and the population's mean age is 20.3 (31.2% of Bolivians are 10 to 24 years old). Old people account for 4% of the total population.

2.1.2 Socio-demographic Data of the Chilean Portion of the Area of Influence

The Chilean portion of the area of influence has a population density of 7.3 inhabitants per km^2, much lower than the national average, which is 20 inhabitants per km^2.

When the data are disaggregated into the two Chilean regions in the area of influence, different trends are observed. The population density of the Arica and Parinacota region is 11.2 inhabitants per km^2. According to the prospects made by the National Statistics Institute (Instituto Nacional de Estadísticas or INE), the population in the region is estimated to amount to 164,933 people by 2020, on account of its negative population growth rate (-2,05%). Instead, the population density of the neighboring region of Tarapacá is 5.7 inhabitants per km^2, i.e. 46% lower than that of Arica and Parinacota. Its population is estimated at 385,457 inhabitants for 2020 as a result of a positive population growth rate (3.1%, on average).

As far as employment is concerned and on the basis of 2008 data, the workforce in the Tarapacá region is 50% larger than that of Arica and Parinacota —a factor that impacts on the greater economic dynamism of the former. Furthermore, unemployment rates are substantially higher in Arica and Parinacota, with an average annual rate of 11% vis-à-vis 6% in Tarapacá.

With reference to the Human Development Index (HDI), according to 1994-2003 data, the I Tarapacá Region —which at that time included today's Arica and Parinacota Region— ranked second-best in 1994, after the Metropolitan Region, the capital city of which is Santiago, but fell to the third position by 2003.

At the commune level, it is worthy to note that the HDI in the Arica and Putre communes plunged considerably vis-à-vis the last decade, which —added to the recent decline in the population growth of these communes and the region— may be interpreted as a sign of stagnation and backwardness in this sub-area of the area of influence.

2.1.3 Socio-demographic Data of the Peruvian Portion of the Area of Influence

Peru has a population of 27.4 million people, some 10% of which live in the four departments under the scope of this study, amounting to a total number of 2.9 million people.

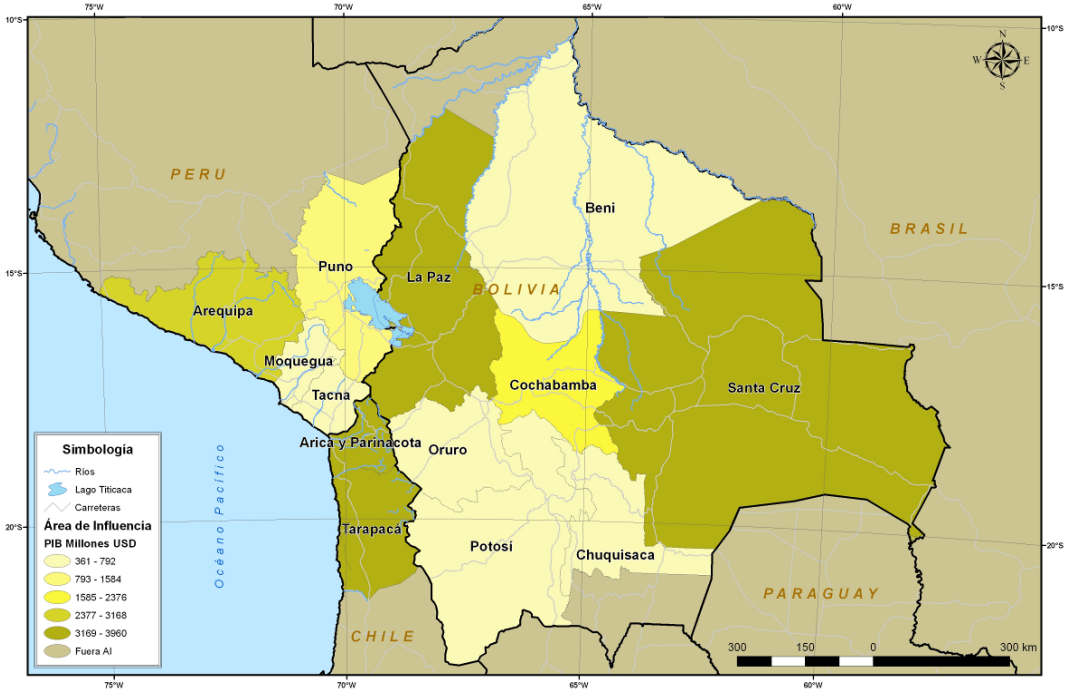
The illiteracy rate in Peru is 7.1%, with the department of Puno having a higher rate (12.2%) than the Peruvian average, whereas the illiteracy rate in the other departments is lower than the average —Arequipa 4.1%, Moquegua 4.7%, and Tacna 3.7%.

The average poverty rate in the area under analysis is 34%, i.e. lower than the national average (39.1%). The department of Puno is the only one with a higher-than-average poverty rate (69%); the poverty rate in the other three departments is lower than the average.

In general terms, the unemployed in Peru account for a low percentage of the total economically active population. In the region being analyzed, there are 1.8 million economically active people, 76,000 (4.22%) of whom are unemployed. The unemployment rate is 2.3 above the country's average (4.5%), and the department with the highest unemployment rate is Moquegua, followed by Puno, Tacna, and Arequipa.

2.2 Indicators of Economic Activity

Figure 8 – GDP Distribution in the Area of Influence

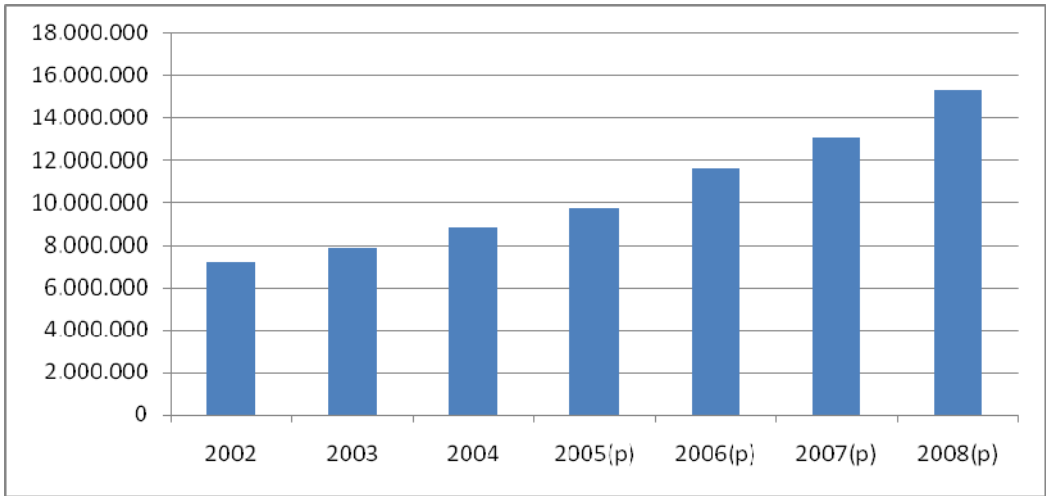


2.2.1 Bolivian Portion of the Area of Influence

Gross Domestic Product

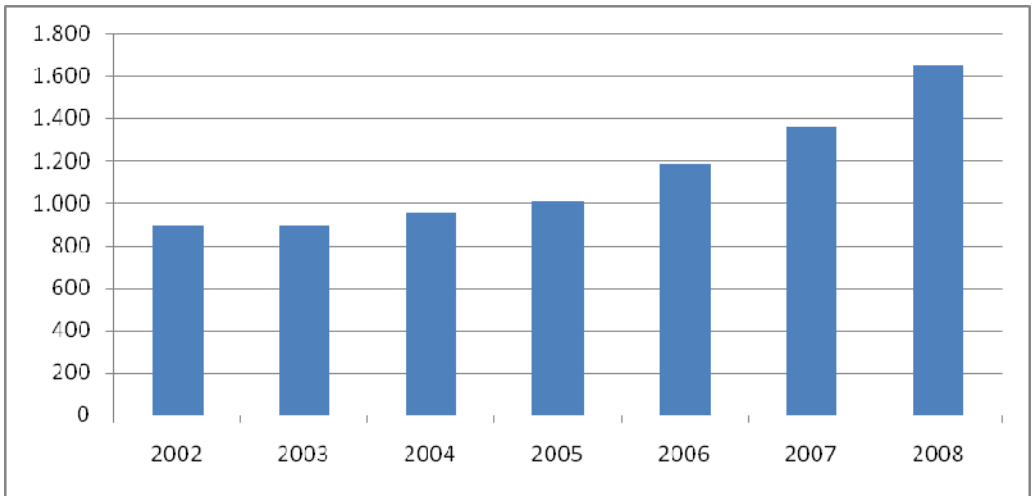
During the last years, the main economic indicators of Bolivia have been, and are still, showing positive results. The Bolivian GDP grew by 4.56% in 2007, reaching 6.7% in 2008, the highest rate in the last 30 years. It is the first time that Bolivia grows above 5%.

Figure 9 – Evolution of the GDP at Market Prices (US Dollars)



Source: Prepared by the authors based on the average exchange rate, as informed by the Central Bank of Bolivia

Figure 10 – Per Capita GDP at Market Prices (US Dollars)



Source: Prepared by the authors based on the data supplied by the National Institute of Statistics

Table 5 – Contribution of the Major Economic Sectors to the Departments' GDP (%)

ECONOMIC ACTIVITY	Beni	Chuquisaca	Cochabamba	La Paz	Oruro	Potosí	Santa Cruz
GROSS DOMESTIC PRODUCT	100%	100%	100%	100%	100%	100%	100%
1. Agriculture, forestry, hunting and fishing	38%	21%	12%	8%	5%	10%	22%
2. Mining and quarries	2%	10%	7%	6%	30%	40%	6%
3. Manufacturing industries	17%	17%	24%	19%	13%	5%	25%
4. Electricity, gas and water	1%	2%	2%	3%	2%	1%	3%
5. Construction	4%	3%	3%	3%	5%	5%	3%
6. Trade	11%	8%	9%	12%	8%	9%	9%
7. Transport, storage and communications	4%	12%	17%	12%	13%	8%	12%
8. Financial entities, insurance, real estate and other services	8%	9%	13%	20%	8%	8%	12%
9. Community, social, personal and domestic services	3%	4%	6%	7%	3%	2%	5%
10. Restaurants and hotels	3%	2%	3%	4%	3%	2%	3%
11. Public administration services	10%	14%	9%	14%	11%	11%	7%
Minus bank charges	-2%	-2%	-4%	-6%	-1%	-1%	-5%

Source: Prepared by the authors based on data supplied by the National Institute of Statistics

Table 6 – Contribution of the Major Economic Sectors to the Departments' GDP

Region	**Agriculture**	**Mining**	**Manufactures**	**Financial Services**	**Public Administration Services**
Bolivia	**1,307.02**	**1,604.15**	**1,490.29**	**1,126.76**	**1,439.15**
Santa Cruz	557.42	199.22	518.31	329.29	280.17
Beni	109.60	12.67	60.39	26.61	40.10
Cochabamba	163.33	145.18	364.38	186.56	252.17
Chuquisaca	88.27	84.07	70.61	40.20	100.66
La Paz	209.33	131.01	334.86	404.73	448.98
Oruro	21.50	129.00	48.24	37.86	89.67
Potosí	64.30	276.40	24.17	45.12	85.62
TOTAL AREA OF INFLUENCE	1,213.75	977.57	1,420.96	1,070.37	1,297.36

Source: Prepared by the authors based on the average exchange rate, as informed by the Central Bank of Bolivia
Note: Only the major sectors are included.

From 2000 onwards, unemployment rates have been within the range of 8% to 12%, and remained stable at 8% between 2006 and 2008.

Table 7 – Population Employed per Economic Activity (2001 Census)

Region	**Agriculture, Livestock, Hunting and Forestry**	**Mining and Quarries**	**Manufacturing Industry**	**Electricity, Gas and Water**	**Trade**	**Transport and Communi-cations**	**Financial Services**	**Public Admin. Services**
Santa Cruz	150,000	5,839	84,656	2,976	146,924	48,773	4,983	13,536
Beni	38,936	400	15,850	527	15,265	7,319	322	4,029
Cochabamba	171,584	1,394	57,211	1,962	80,341	28,198	2,167	10,713
Chuquisaca	57,479	292	19,326	450	17,709	6,335	614	3,616
La Paz	249,186	11,509	104,829	2,072	149,733	53,084	5,586	29,286
Oruro	52,289	5,135	12,346	375	22,114	7,182	426	3,323
Potosí	113,245	11,455	21,856	559	21,889	6,662	396	3,613
Total Area of Influence	**832,719**	**36,024**	**316,074**	**8,921**	**453,975**	**157,553**	**14,494**	**68,116**

Source: Prepared by the authors based on data supplied by the National Institute of Statistics
Note: The data concerning the population employed included in the above table have been broken down into the main economic activities chosen for the area of influence. Other activities were not considered.

The national minimum wage in Bolivia was kept constant at Bs 440 throughout fiscal years 2003, 2004 and 2005. In 2006, the national minimum wage was increased to Bs 500, and in 2007 to Bs 525, i.e. 14% and 5%, respectively. In fiscal year 2009, the minimum wage was raised to Bs 647.

The consumer price index (CPI) in Bolivia underwent variations in 2008, as shown below:

Figure 11 – CPI and National Minimum Wage Variations – Bolivia

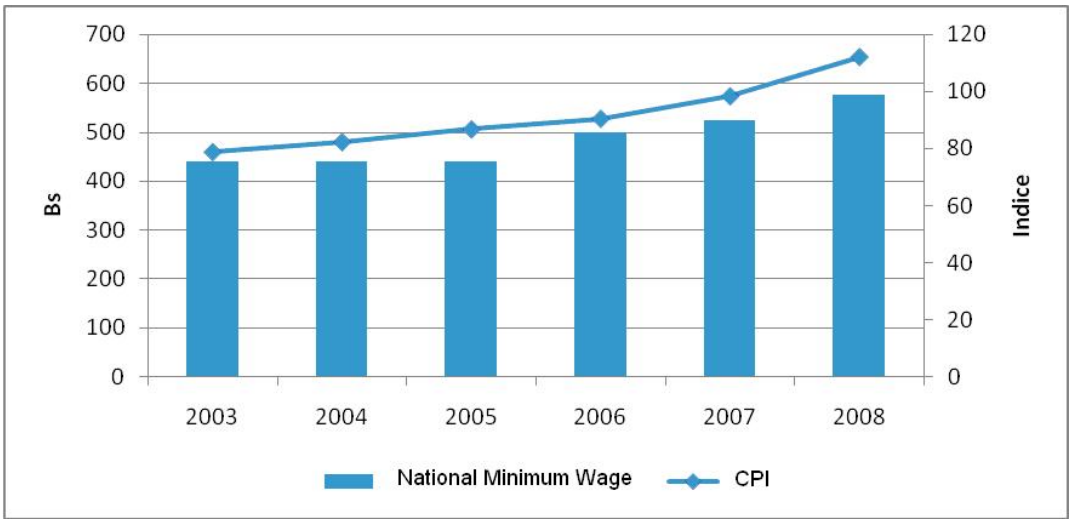


Table 8 - Main Products Exported by the Republic of Bolivia

	2000	2001	2002	2003	2004	2005(p)	2006	2007
Main Export Products (in million US$)	**1,475.0**	**1,352.8**	**1,375.2**	**1,676.7**	**2,265.2**	**2,948.1**	**4,231.6**	**4,859.3**
Tin	76.5	56.1	58.2	74.6	147.1	125.8	145.3	216.3
Silver	74.0	53.9	68.5	75.9	91.2	92.4	171.1	225.3
Zinc	170.6	118.9	112.1	124.2	151.7	200.8	548.4	692.7
Antimony	1.7	1.8	3.3	6.5	8.6	18.8	26.8	21.2
Lead	4.8	4.1	4.6	4.4	9.5	10.9	14.9	61.3
Gold	88.0	92.2	89.7	72.1	34.3	78.7	127.2	123.1
Natural gas	121.4	239.3	266.2	389.6	619.7	1,086.6	1,667.8	1,971.2
Livestock	0.2		0.7	0.1		0.0	1.0	0.0
Soy	299.2	275.0	318.6	369.8	425.6	346.6	356.0	388.0
Coffee, not roasted	10.4	5.8	6.2	6.4	9.4	11.3	13.9	13.7
Sugar	7.2	10.0	15.8	23.7	31.0	18.7	18.5	32.3
Wood	57.7	41.0	41.1	42.8	56.1	67.6	87.3	98.9
Leather	22.8	23.0	24.5	21.8	23.6	21.7	32.3	36.9
Brazil nuts	34.1	27.7	27.4	37.9	53.4	75.0	70.2	76.8
Cotton	10.6	4.6	3.6	3.7	5.3	5.1	4.9	4.9
Jewelry articles	31.8	28.0	41.5	41.5	44.5	49.3	51.2	53.4
Wearing apparel; dressing and dyeing of fur	16.5	15.0	13.6	22.5	39.8	35.1	33.4	26.6
Food products	52.1	57.2	45.2	36.1	49.7	46.5	77.6	112.2
Textile products	29.5	25.5	17.3	28.9	28.0	32.6	34.3	41.9
Subtotal	1,109.1	1,079.1	1,158.1	1,382.5	1,828.5	2,323.5	3,482.1	4,196.7
Other	365.9	273.7	217.1	294.2	436.7	624.6	749.5	662.6

Source: National Institute of Statistics

The value of mineral exports in 2007 increased vis-à-vis 2006 due to favorable international market prices and also to an increase in mineral production and export

volumes resulting from the San Cristóbal project start-up in the mid-third quarter of 2007.

Likewise, the increase in natural gas exports to Brazil and Argentina was associated with higher prices.

Bolivia's main exports to Peru and Chile per customs office of exit are as follows:

Table 9 - Bolivian Exports to Chile and Peru per Customs Office of Exit, 2007

Product	Origin	Gross Weight (kg)	FOB Value (US$)
Main Exports to Peru through Desaguadero			
Cocoa	Cochabamba	10,160	21,080
Sugar	Tarija	5,953,954	2,073,050
	Santa Cruz	42,672,364	13,673,740
Leather	Chuquisaca	17	870
	La Paz	62,815	53,279
	Santa Cruz	102,710	402,349
Wood	La Paz	1,040	1,541
	Cochabamba	40,520	14,182
	Santa Cruz	7,311,553	2,575,539
Cotton	La Paz	53,627	28,187
	Santa Cruz	1,455,103	2,204,224
Soybean	Cochabamba	1,089,087	1,028,004
Total Exported to Peru through Desaguadero		**210,252,473**	**53,865,623**
Main Exports to Chile through Iquique-Pisiga-Bella Vista			
Leather	Cochabamba	11	1,887
Wood	La Paz	38,226	34,077
	Cochabamba	17,053	8,193
	Santa Cruz	129,516	66,083
Other Minerals	La Paz	15,123	2,209
	Cochabamba	6,000	501
Other	La Paz	10,188	1,502
	Cochabamba	105,769	19,183
	Oruro	249,624	231,627
	Santa Cruz	14,430	2,304
Total Exported to Chile through Iquique-Pisiga-Bella Vista		**585,940**	**367,566**

(Continued on the following page.)

Table 9 – Bolivian Exports to Chile and Peru per Customs Office of Exit, 2007 (Cont.)

Main Exports to Chile through Arica-Charaña-Tambo Quemado			
Coffee	La Paz	160	900
Cocoa	La Paz	1,959	770
Sugar	Santa Cruz	278,598	90,460
Beverages	La Paz	1,835,204	625,418
	Cochabamba	2,121,244	692,624
Rubber	La Paz	30	51
Leather	La Paz	48,217	112,433
	Cochabamba	162,317	372,009
	Santa Cruz	190,106	1,613,627
Wood	La Paz	1,450,496	1,404,073
	Cochabamba	87,391	209,065
	Santa Cruz	586,014	455,471
	Beni	90,969	48,658
Cotton	Santa Cruz	23,985	43,400
Soybean	Cochabamba	1,877,004	1,717,889
	Santa Cruz	48,643,810	11,199,988
Tin	La Paz	7,259	56,430
	Oruro	56,483	875,137
Other minerals	La Paz	1,605,719	730,319
	Cochabamba	76,600	9,504
	Oruro	732,966	272,568
	Potosí	78,713	33,334
	Santa Cruz	928	100
Other	Chuquisaca	634	2,421
	La Paz	1,658,003	3,550,703
	Cochabamba	18,556,871	7,698,307
	Oruro	24,544	25,910
	Potosí	42,958	40,225
	Santa Cruz	52,837,193	11,925,979
Antimony	Santa Cruz	6,174	27,687
Lead	Potosí	19,663	58,655
Total Exported to Chile through Arica-Charaña-Tambo Quemado		**133,102,212**	**43,894,115**
Total Exports to Peru-Chile		**343,940,625**	**98,127,304**

Source: Bolivian National Customs Service

Attention should be drawn to the increase in non-traditional exports, particularly wood, chestnut, sugar, jewelry, preserved palm hearts, and footwear.

Relevant Economic Activities

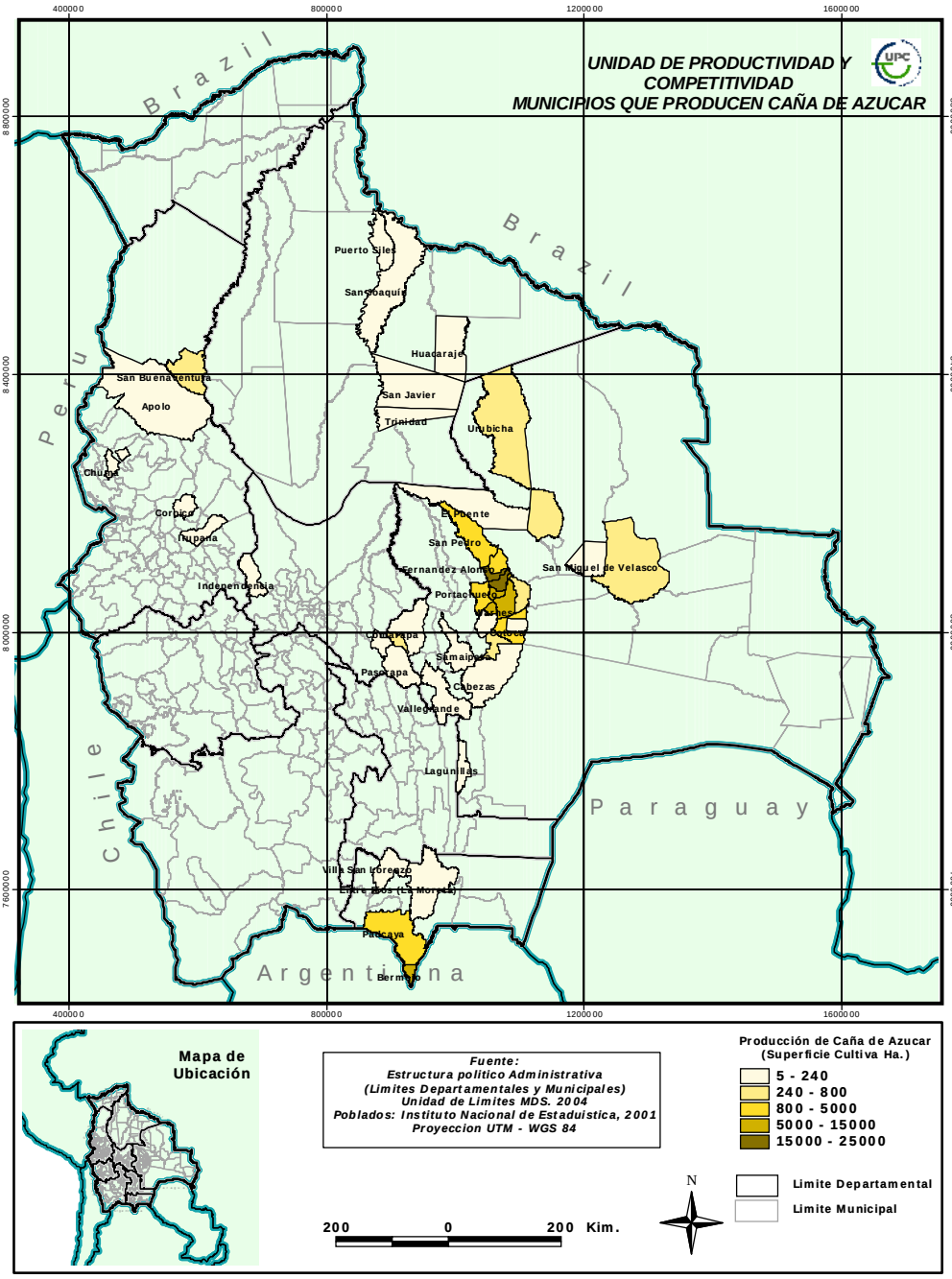
a) Sugar

The Bolivian sugar industry is concentrated in the department of Santa Cruz, where four private sugar refineries (Guabirá, La Bélgica, San Aurelio, and Unagro) are based, with a cultivated area of 75,000 hectares. The second most important area is the region of Bermejo, in the department of Tarija, where the State-run sugar refinery is located, with a cultivated area of almost 10,000 hectares.

The harvest season is between May and November.

The methods for sugar cane harvesting are manual (50%), semi-mechanized (40%) and once-over harvesting (10%). The sugar cane cultivated area is, on average, 20 km from the sugar refineries; for transport purposes, heavy duty trucks are used. The installed milling capacity is 4 million tons per year.

Figure 12 – Sugar Production Areas and Ports Used for Sugar Cane Trade



b) Cotton

Cotton has been commercially produced since 1950 in Bolivia, mainly because of its fiber, which is used as a raw material in the textile industry. However, other cotton components are used by the industry. Cotton seeds are the second source of vegetable oil in the world, and cottonseed cake is highly appreciated for its rich protein content.

The cotton seed, known as “pepa” in Bolivia, contains 24% of proteins, which are the main ingredient of cottonseed cake, used both as animal feed and as a fertilizer. The cotton seed is 15% oil. Being unsaturated, this oil is used for cooking, soap manufacturing, and other purposes. The unprocessed cotton seed contains a pigment known as “gossypol,” which is toxic for non-ruminant animals, but which —after proper processing— can produce cotton meal, rich in high-quality protein fit for both animal and human consumption.

The Bolivian cotton production sector is located in the department of Santa Cruz; its cultivated area has dramatically been reduced in the last years due to the fall of international prices and poor yields.

The technology applied to cotton production has grown outdated in competitive terms vis-à-vis that used in, for instance, Brazil, Argentina and the United States. In Bolivia, there is no tradition of genetic research on varieties to produce better and more weather-resistant crops, whose fiber features should help expand the market for domestic industries as well as add value to meet international market demands.

Cotton producers are financed by cotton gin companies, which provide them with seeds, agrochemicals, diesel oil, and funds to carry out the production activities. The resources for this funding usually belong either to the cotton gin companies themselves or to agrochemical distributors.

Cotton gin companies extract some byproducts, such as the kernel, which are traded in the domestic market, but their revenues derive mainly from cotton fiber. These companies use outdated technology if compared with that used by industries in highly competitive countries like Brazil.

Cotton production is stored in the facilities of the cotton gin companies, from where approximately 95% is exported to Peru and Colombia, and the remaining 5% is used to meet the demand for yarn of different thickness for flat-weaving.

Most spinning mills in Bolivia use old machines since they have not incorporated modern technological developments. Many of them buy their cotton abroad, particularly from Brazil, Peru, and the United States, and their production is mostly sold in the local market for flat weaving. Some of them, like Santa Mónica Cotton, export their production to the countries that make up the Andean group. Others, like AMETEX, have integrated modern spinning mills to their processing but in order to obtain yarn for their own fabrics and for their own final clothing products only.

Weaving mills or weavers’ shops in Bolivia lack the technology necessary to manufacture first quality fabrics to provide national clothing manufacturers with raw material; instead, fabrics are imported from abroad.

The Cotton-Textile Production Chain in Bolivia

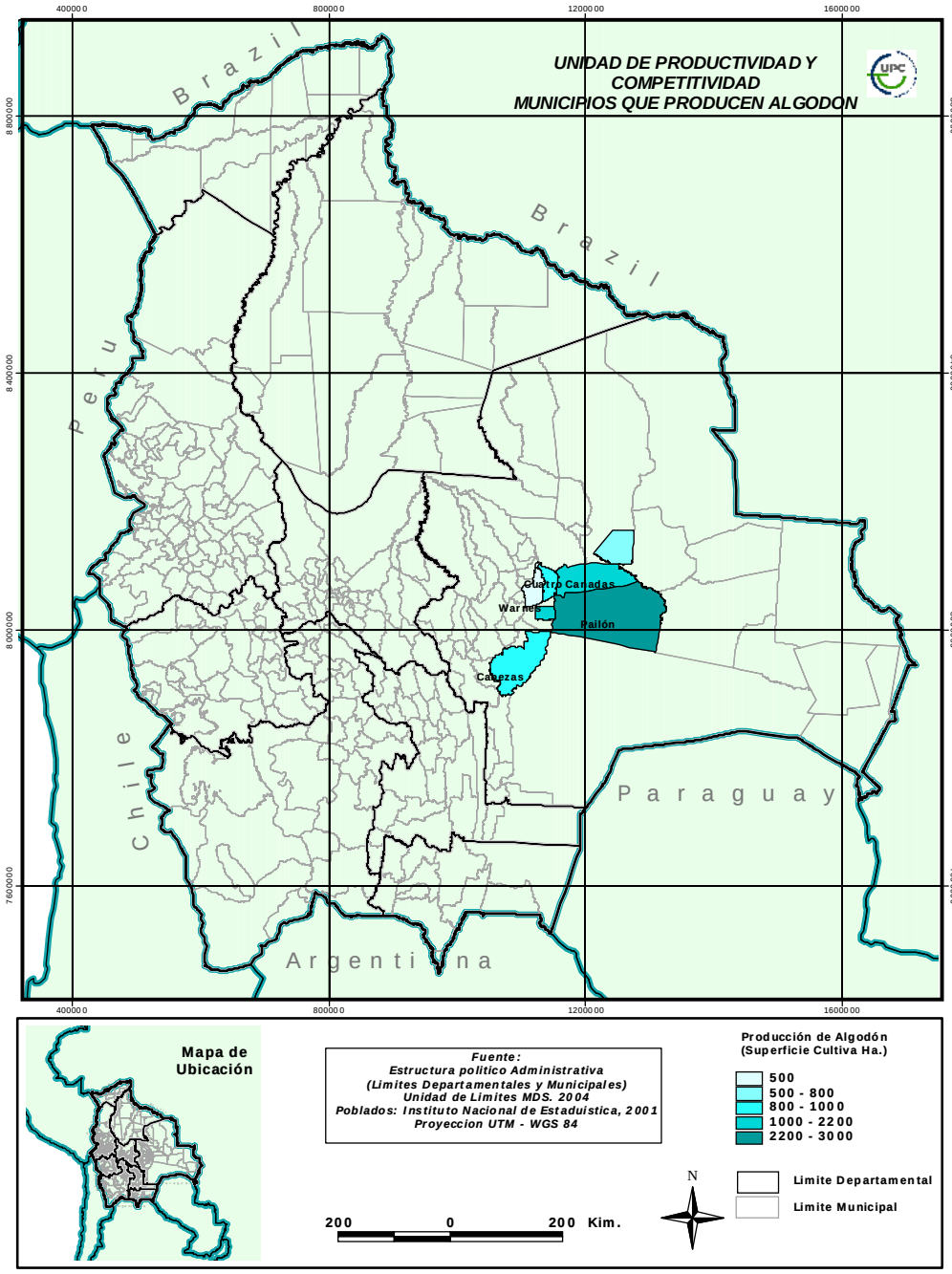
There are two production chains for cotton in Bolivia, which need to be described in detail given their potential economic significance. The first one is associated with the production of cottonseed as a raw material for oil, and the second is the production of cotton fiber for the weaving and clothing industry. The second chain, which is the most important in terms of economic aggregates, is described below.

In Bolivia, cotton is grown only in the department of Santa Cruz (although the department of Tarija may be suitable for it as well), more specifically in the municipalities of Pailón, San Julián, La Guardia, Cotoca, and on a very small scale in the municipality of Charagua, in the province of Cordillera.

Even though the reduction in the cultivated area is due to the decline in international prices, it is also the result of economic crises in Bolivia and of the pressures that banks exerted on the cotton sector, to the point that today no bank has any record of a transaction within the cotton fiber sector.

According to the FAO, Bolivian yields have been declining vis-à-vis the world's average —its yield is currently well below that of, for example, the MERCOSUR countries (1.9 metric tons per hectare), and the NAFTA countries (1.8 metric tons per hectare).

Figure 13 – Cotton Production Areas



c) Cocoa

The national cocoa production is carried out primarily in the northern area of the department of La Paz, followed by the departments of Beni, Santa Cruz, Cochabamba and Pando.

The total cultivated area in Bolivia amounts to 4,865 ha, with a production volume of 2,237 tons.

The exports of cacao and its derivatives in the 2001-2003 period amounted to more than US$1 million, equivalent to 363,000 kg.

The sales of the cacao manufacturing industry have fallen from US$3 million to US$2 million in a ten-year period. The most important market continues to be the domestic one, absorbing more than 80% of the finished product.

Cacao exports to Peru in 2007 amounted to 10,160 kg, worth US$21,080, which accounted for 2% of Bolivia's total exports to the world.

d) Soybean

The following figures characterize the soybean sector:

- Represents 90% of the production of the oilseed complex;
- Contributes 2.5% to the national GDP;
- Accounts for 27.18% of national exports, ranking second after mining;
- Contributes 30% to the GDP of the Santa Cruz department;
- Soybean meal was the first Bolivian export product in 2000, producing revenues for US$167 million;
- 75% of its exports are sold in the Andean markets;
- 74% of oilseed exports are traded through the Paraná-Paraguay Waterway.

Soybean is the most important agricultural product and soybean oil, its main derivative. The largest cultivated areas are located in the department of Santa Cruz de la Sierra, producing 93% to 97% of the total national production.

The increase in soybean production results from the growing demand for this product by vegetable oil industries and, especially, by the international market.

Bolivia's use of soybean is almost limited to the production of meal and flour, edible oil and soybean lecithin. Soybean oilcake is the main byproduct of the vegetable oil industry. This sector has recently experienced a remarkable growth, especially due to the great demand for soybean crude oil exports. The table below shows the destination of exports in the last years.

Table 10 – Exports of Crude Soybean Oil (Thousand US$)

Country of Destination	2007	2008 / 3M
Argentina	-	16,914
Barbados	491	-
Brazil	1,979	-
Colombia	42,756	5,100
Chile	-	30
Ecuador	1,883	-
Malaysia	3,810	-
Peru	2,683	3,067
Venezuela	53,457	2,213
Total	**107,059**	**27,324**

Note: The data in the table above are for tariff item 1507.10.00

Soybean oilcake is the most important revenue-generating soybean byproduct in Bolivia's foreign trade. Its destination markets and export volumes are shown in the following table.

Table 11 – Soybean Oilcake Exports (Thousand US$)

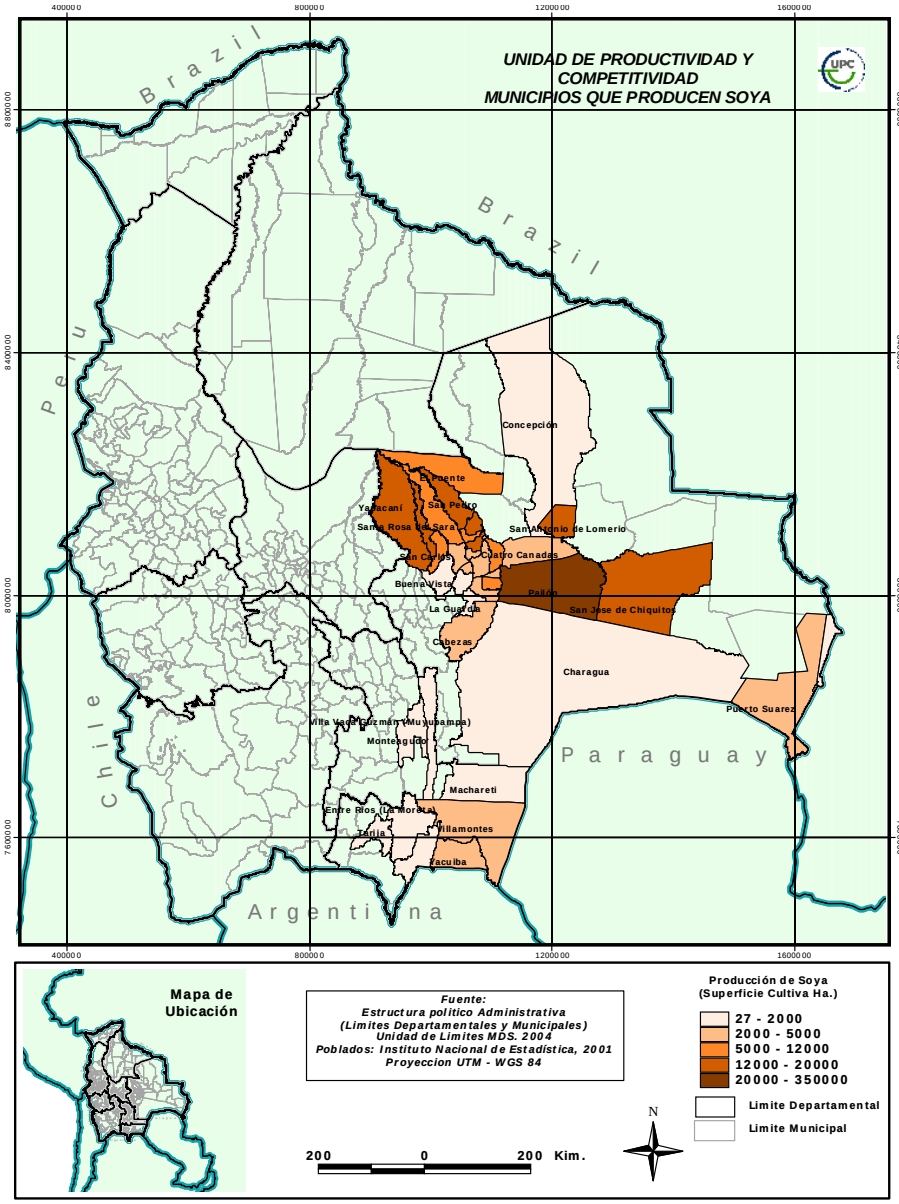
Trading Partner	2007	2008/ 3M
Argentina	5,113	27,156
Colombia	45,136	3,149
Chile	14,465	3,215
Ecuador	5,465	-
Peru	19,509	8,094
United States	0	-
Venezuela	137,963	16,858
	227,651	**58,472**

Note: The data in the table above are for tariff item 2304.00.00.

All the products exported to Peru and a little more than 10% of those exported to Chile left Bolivia through Desaguadero.

In 2007, approximately 75.3 tons of soybean meal, worth US$21.3 million, were exported to Peru also through Desaguadero.

Figure 14 - Soybean Production Areas



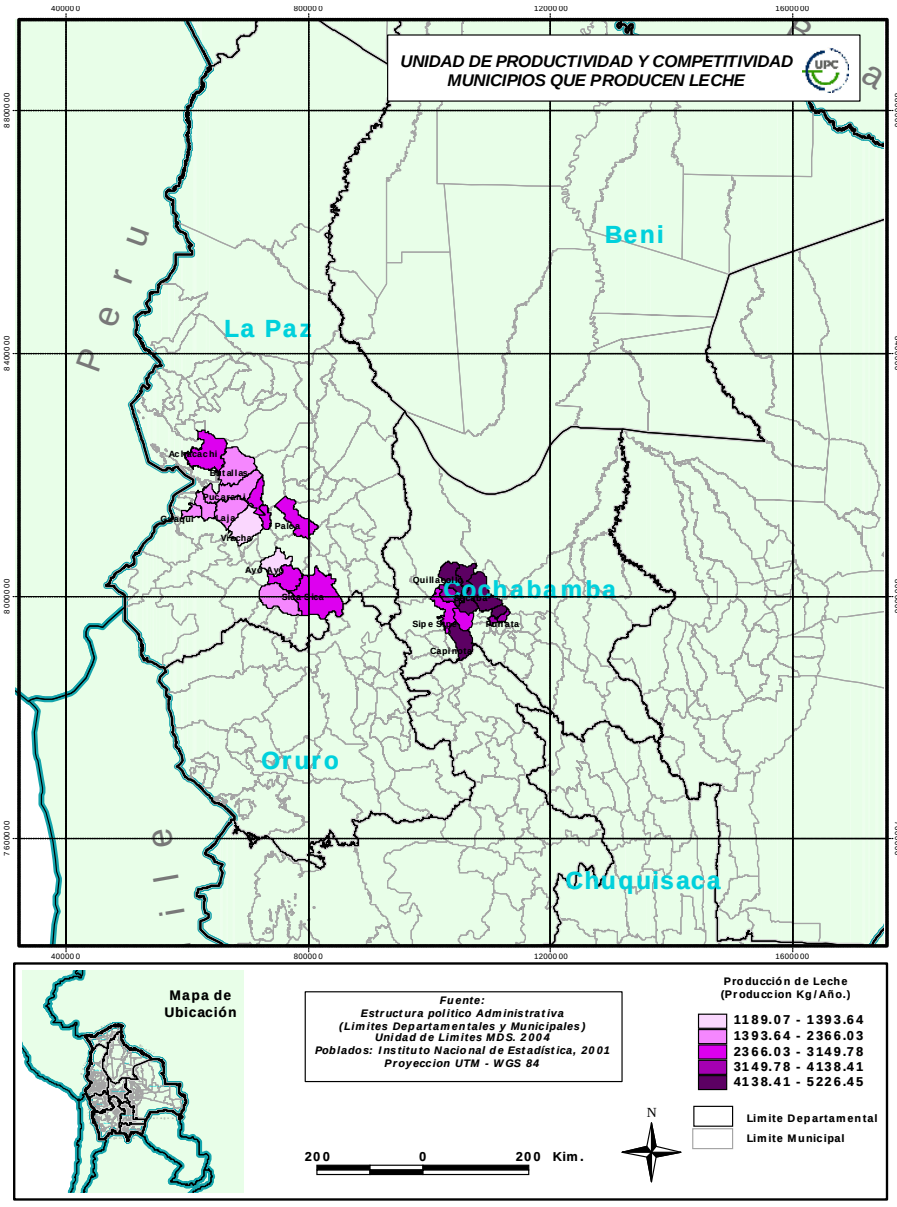
e) Milk

The national production of milk has been growing for more than ten years, with some small ups and downs caused by unusual weather conditions. The conditions of the dryland pastures of the southern regions are key for dairy cattle feeding; therefore, the Bolivian dairy production fluctuates for reasons other than the economic situation of the dairy sector.

In the dairy sector, Industrias Gloria is a monopoly that absorbs approximately 60% of production. Other companies use some 20%, and the rest is sold directly to the consumer as fresh milk or other home-made products.

In 2007, around 3,000 tons of dairy products (NANDINA heading 0402), worth US$8.3 million, were exported to Peru.

Figure 15 – Milk-Producing Areas



f) Leather

The leather production chain involves a broad set of activities that increase transformation or processing as they integrate to one another. The hides of bovine animals, sheep or lambs, goats and camelids derived from animal slaughter is the main raw material for tanneries, the product of which becomes the main input of the clothing industry.

Agricultural and Industrial Production

Livestock and Slaughter

The most important cattle-raising area is the eastern region of the country, accounting for more than 50% of the national total. The off-take rate (slaughter/total herd) is approximately 13.5% at the national level. The western region of the country (La Paz, Oruro and Potosí) has the largest camelid and sheep populations (71% of the national total).

Tanneries

There are two types of tanneries: the ones using chromium salts to produce nappa leather, shoe upper leather, suede, and nubuck; and those using natural or vegetable extracts to produce sole leather and vachetta leather. No record is kept of the number of hides or skins of any of the animals studied processed in tanneries.

Manufactures

Three important subsectors are identified: clothing, footwear, and leather goods. The production of these manufactures shows an upward trend.

Foreign Trade

Leather goods exports are mainly handicrafts with low value added by the marketing system, which is harnessed by middlemen more than by producers.

In 2007, the export of all tariff items analyzed amounted to almost US$82 million, the main destination markets being Italy, Brazil, and Hong Kong, as detailed in the table below.

Table 12 – Leather Exports, 2007 (thousand US$)

Destination	Gross Weight (kg)	FOB Price (US$)	Share (%)
Italy	2,597,963	13,022,688	**40.65%**
Brazil	810,545	3,349,989	**10.46%**
Hong Kong	602,976	3,163,281	**9.87%**
Free Trade Zone	2,135,810	2,839,957	**8.87%**
India	329,240	2,030,616	**6.34%**
Spain	419,878	1,672,660	**5.22%**
Chile	197,505	1,145,763	**3.58%**
China	393,750	1,001,936	**3.13%**
Germany	45,527	996,441	**3.11%**
Peru	791,072	661,071	**2.06%**
South Korea	98,268	572,304	**1.79%**
Argentina	76,116	406,082	**1.27%**
Mexico	367,217	379,609	**1.18%**
Paraguay	123,204	308,950	**0.96%**
France	1,134	93,129	**0.29%**
Uruguay	15,579	66,002	**0.21%**
Thailand	22,679	59,512	**0.19%**
Japan	979	56,877	**0.18%**
Portugal	64,855	57,590	**0.18%**
United States	1,359	52,236	**0.16%**
Other	806	48,142	**0.15%**
Pakistan	16,000	44,000	**0.14%**
South Africa	10,260	5,757	**0.02%**
	9,122,722	**32,034,599**	**100.00%**

Source: Bolivian National Customs Service

g) Wood

Natural forests in Bolivia comprise approximately 53 million hectares, accounting for 48% of the country's territory and almost 10% of the South American tropical rainforests. Woods are found mostly in the eastern region of Bolivia (Santa Cruz, Beni, La Paz, and Pando).

In addition to its natural forests, Bolivia has 30,000 hectares of planted forests.

There are six major forest production regions in the country (the Bajo Paraguá, Chiquitanía, El Choré, Guarayos, Preandean-Amazon, and Amazonia regions), covering a total area of approximately 29 million hectares.

The main timber stocks are located in the Amazonia, El Choré and Preandean-Amazon regions, as shown in the following table.

Table 13 – Forest Production Regions and Wood Stock

Production Region	Area		Volume (m^3/ha)(1)						
	Million ha	%	1	2	3	4	5	6	Total
Bajo Paraguá	3.8	13	1.2	16.84	9.67	6.3	11.17	5.71	50.89
Chiquitanía	6.3	22	3.55	23.63	7.92	0.64	7.2	0.45	43.39
El Choré	1.6	6	0.68	43.55	18.81	12.79	8.35	4.34	88.52
Guarayos	4.2	15	0.45	24.99	10.42	3.03	6.04	2.23	47.16
Preandean-Amazon	4.1	14	2.18	30.62	14.76	7.77	15.77	5.99	77.09
Amazonia	8.8	30	2.13	21.92	16.7	14.45	33.72	26.62	115.54
Total	28.8	100	-	-	-	-	-	-	

Notes: 1- Highly valuable species; 2- Valuable species; 3- Less valuable species, 4- Potentially valuable species, 5- Species of unknown value, 6- Non-timber forest species.
Source: Forestry Superintendence

There are 700,000 hectares of certified tropical rainforest in Bolivia, accounting for more than 10% of the forests exploited in the country. This fact turns Bolivia into the highest-ranking country in the world in terms of certified rainforest area extension —a fact that provides guarantees at the international level for the country's forest resources sustainability while opening up excellent business prospects.

Based on official data, current Bolivian log production is about 500,000 m^3/year. The department of Santa Cruz is the first producer, followed by Beni, Cochabamba, and Pando.

About 200 species are effectively used in Bolivia, and in the last years there has been a decline in the concentration of the species harvested. In 1995, the five most important species accounted for 56%, and in 1999 fell to 43% as a result of a decline in selective harvesting and an increase in the use of alternative species.

The Bolivian forest industry is based almost exclusively on solid wood products. Most companies are small- or medium-sized. This industrial sector is basically made up of sawmills, plywood and veneer manufacturers, reconstituted wood product mills, and higher value-added product facilities. Thus, the products manufactured by the Bolivian forest industry are highly diversified in relative terms.

This industry is mainly located in the departments of Santa Cruz, Cochabamba and La Paz. Its installed capacity is very limited vis-à-vis the potential that the forest resources available in the country hold.

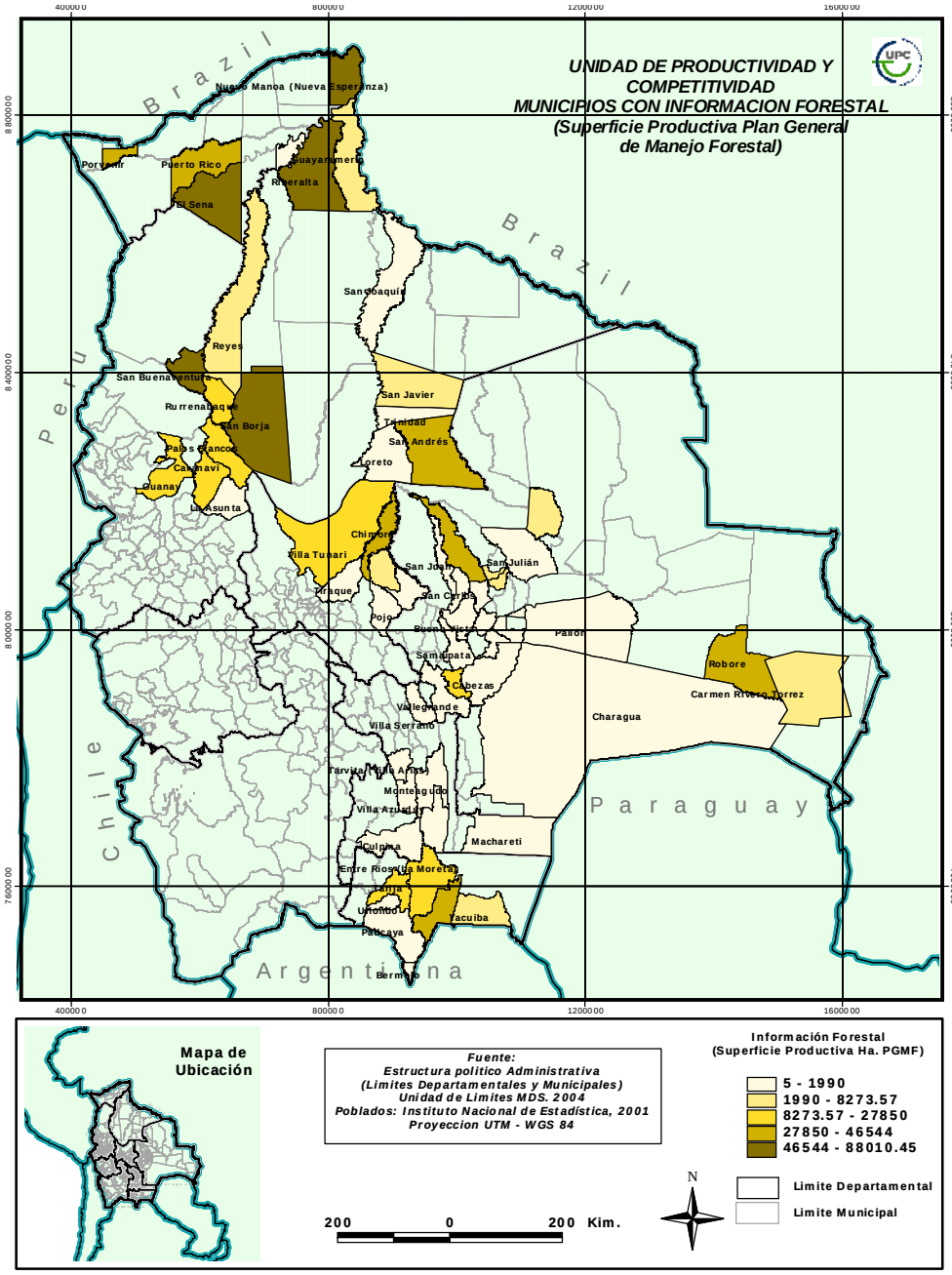
Table 14 – Installed Capacity of the Forest Industry (m^3/year)

Product	Factories	Installed Capacity(1)	
		Total	Average
Sawn wood	308	1,500,000	4,900
Veneers			
• Sliced	3	8,400,000	2,800,000
• Rotary cut	2	61,000	30,500
Plywood	2	41,000	20,500
Particleboard	1	30,000	30,000
Hardboard	1	45,000	45,000
Higher Value-added Products(2)	700	220.000	315

(1) Operating under two shifts
(2) Sawn wood processing capacity
Source: Bolivian Forestry Superintendence and the International Tropical Timber Organization (ITTO)
Updated and adapted by STCP

In 2007, total forest exports to Peru amounted to US$2.6 million, equivalent to 7,311 tons.

Figure 16 – Forest Production Area



h) Meat

The department of Beni has historically been the main cattle producer at the national level. As of 2004, it concentrated around 50% of the country's livestock activity, and its cattle production accounted for 25% of the department's agricultural GDP. The livestock sector is made up of more than 5,800 livestock breeders from Beni, including

large-, medium- and small-sized establishments, and is one of the most important employment-generating sectors in the region.

The annual off-take rate, according to information supplied by the Beni Federation of Livestock Breeders (FEGABENI), is estimated at 13%, which means that Beni supplies the national market with more than 350,000 head per year.

Of the total cattle stock in the department of Beni, 19% is raised in the province of Ballivián, followed by the provinces of Yacuma and Cercado, with 18% and 17%, respectively, and then by Moxos, Mamoré, Marbán and Iténez, which contribute 10% or 11% to the total. Vaca Díez is the province in the department with the fewest number of head (some 2%). Although livestock rearing is Beni's main economic activity, its development has been poor and, to date, its exploitation results from a vegetative growth process under almost natural conditions rather than from a plan designed for exploitation purposes; thus, livestock is managed under a significantly extensive production system that has shown little progress over time in terms of technology incorporation. This lack of technological progress accounts for the current stocking rate of one head per four to five hectares vis-à-vis higher stocking rates (2 ha/animal unit) in Argentina, Brazil, Uruguay and Paraguay, for instance, or even in some agricultural establishments in the department of Santa Cruz.

In the last years, however, livestock producers in Beni have been hit by a dramatic decrease in their purchasing power that, given the technological backwardness of their production, has pushed them into a vulnerable position from the economic and financial point of view, making them victims of the oligopoly strategies of traders and middlemen, which greatly undermined their potential for growth and put them at risk vis-à-vis other similar producers from inside or outside the country.

The poor infrastructure and development of the livestock sector and the growing demands of the international market have restricted Beni producers' business opportunities to the domestic market, mainly to the departments on the central axis (La Paz, Cochabamba, Santa Cruz). Marketing mechanisms vary according to the region —slaughter-ready livestock is sold in La Paz and Santa Cruz, whereas growing stock is sold in Santa Cruz.

When analyzing the cattle market in Beni, it is important to consider its business relationship with the department of Santa Cruz and their traders, who complete the production cycle of live cattle from Beni. Cattle's genetic value is of great importance for Santa Cruz producers, who are willing to pay higher prices in the hope of higher yields per head in terms of kilograms. However, the marketing methods used do not rely on any accurate parameter to measure or determine the genetic value or production potential of the cattle traded.

Characteristics of the Cattle Production System in Beni

The department of Beni is divided into two distinct production regions: the first one, to the south-west, is formed by highlands fit for grazing on cultivated pastures or for semi-intensive production systems, where the cattle production cycle can be completed; the other region is a wet savanna east of the Mamoré river, which is a lowland area where producers tend to specialize in the livestock-rearing process, for which reason there are fewer establishments that complete the animal production cycle; rather, animals are marketed when 1-2 years of age to finish this cycle in the fattening areas of the department of Santa Cruz.

Table 15 –Production Systems

Description	Traditional System	Improved System
Stocking rate	5 ha/head	3.55 ha/head
Hanging weight	170 kg	210 kg
Birth rate	0.55	0.7
Slaughter age	32-36 months	28-32 months
Cut-off rate	0.13	0.18

Source: FEGABENI, 2004

Table 16 –Production Costs

Male beef cattle development	Health	Maintenance	Genetics	Reproduction	Total
Steer calves	3.60	4.9	9.25	26.52	44.32
Steers, 1 year of age	3.60	9.9	5.00	0.00	18.51
Steers, 2 years of age	3.60	11.5	5.00	0.00	20.14
Steers, 3 years of age	3.60	9.9	5.00	0.00	18.48
Feeder steers	3.60	9.9	5.00	0.00	18.48
Total	17.98	46.18	29.25	26.52	119.94
Percentage of total cost	15.0%	38.5%	24.4%	22.1%	100.0%

Source: FEGABENI, 2004

Domestic Beef Cattle Market in Bolivia

The Bolivian domestic market may be divided into two key branches, both concentrated mainly in the departments of the central axis (La Paz, Cochabamba, and Santa Cruz). Beef production is undertaken in the eastern and western areas of the country and is determined by its market destination. The La Paz department is deemed the major center in the western region, where fat stock demanded and beef cattle, therefore, is sent directly to slaughter. The demand from the department of La Paz accounts for 22% of national production and is met primarily by the northwestern region of Beni.

The major center of the eastern region is the city of Santa Cruz, which partially supplies the city of Cochabamba and the rest of the country, accounting for 78% of national consumption. This region is characterized by two types of trade: a final market of fat stock ready for slaughter and an intermediate market of feeder cattle, which is taken for grazing on Santa Cruz pastures and which accounts for a large share of the live cattle sold in Beni.

The department of Beni ranks first among Bolivia's livestock production areas, accounting for almost 50% of the country's total production. The second position is occupied by Santa Cruz, the production of which (27% of the country's total) cannot meet its own beef demand. The department of Chuquisaca, with 8.4% of the national production, ranks third. The remaining 18.6% is supplied by all the other departments, which, except for Tarija, do not produce enough to meet their own consumption needs.

In 2007, beef exports to Peru amounted to US$2 million, equivalent to approximately 762 tons that left Bolivia through Desaguadero.

i) Tourism in Bolivia

Bolivia has a huge tourism potential. Some places have been declared World Heritage Sites by UNESCO.

Natural sights in the Andean range, national parks, historic cities, Inka ruins, archaeological treasures, Jesuit missions, and many other interesting sites have increased tourist interest in the country.

2.2.2 Chilean Portion of the Area of Influence

Gross Domestic Product

The GDP of the Chilean portion of the area of influence has constantly grown at an average pace of 13% in 2003-2006, as shown in Table 17. The table also shows that this region has contributed about 3.5% to the national GDP and a nominal value of US$3.96 billion in 2006.

Table 17 – Gross Domestic Product at Constant Prices, 2003-2006 (Million US$)

Region	2003	2004	2005	2006
I Tarapacá (Area of Influence)	2,763	3,261	3,506	3,960
% of the national total	3.7	3.7	3.4	3.5
National Gross Domestic Product	73,990	88,998	102,297	112,674

Source: Central Bank of Chile

Table 18 shows the composition of the GDP, a high share of which (35.8%) is represented by mining. Other important sectors involve trade, restaurants and hotels, contributing 16.6%, [6] personal services, with 8.1%, and transport and telecommunications, with 8.0%. Agriculture and forestry rank last, with only 0.57%, while fishing contributes only 2.9% to the total GDP.

[6] Tourism falls under this category, according to the classification used by the Chilean Internal Tax Revenue Service.

Table 18 – Gross Domestic Product per Economic Activity, Tarapacá Region (1)
(Million 2006 US$)

Activity	2006	%
Mining	1,418	35.8
Trade, Restaurants and Hotels	656	16.6
Personal Services (2)	315	8.1
Transport and Communications	329	8.0
Manufacturing Industry	306	7.8
Public Administration	250	6.4
Financial and Business Services (3)	214	5.5
Construction	153	3.9
Owner-occupied Dwellings	149	3.8
Fishing	114	2.9
Electricity, Gas and Water	78	2.0
Agriculture - Forestry	22	0.57
Minus bank charges	-45	(1.2)
Area of Influence's GDP	**3,960**	**100**

Source: Central Bank of Chile
(1) This information relates to the former Tarapacá Region, which included today's XV Region of Arica and Parinacota.
(2) Including private and public education and health, and other services.
(3) Including financial services, insurance, real estate rentals and other services rendered to enterprises.

These figures help characterize the area of influence, particularly the Tarapacá Region, but it should be made clear that the regions comprised in the area of influence have their own peculiarities, especially the recently created XV Region of Arica and Parinacota, which contributes 76.8% to the regional GDP through the trade, services and tourism, industry and public sector categories (Table 19). On the contrary, mining —in this case, non-metal mining— contributes only 4.2% to the GDP. Agriculture and fishing rank last, as in the Tarapacá Region.

Table 19 also shows the relationship between each sector's contribution to the GDP and to employment. The first three contributors to the regional GDP account for 73.9% in terms of employment generation. Mining, with a secondary role in this region, accounts for only 1.8% of employment. Agriculture, a less relevant sector in terms of its contribution to the GDP, has a share of 6.1% in employment generation, since traditional crops in the region are labor-intensive.

Table 19 – XV Region of Arica and Parinacota GDP and Related Employment Broken Down per Economic Sector

Sector	% of Regional GDP	Employment (%)
Trade, Services and Tourism	34.3	38.9
Industry	22.6	8.2
Public Sector	19.9	26.8
Transport	8.9	10.9
Construction	5.4	5.5
Mining	4.2	1.8
Agriculture	3.1	6.1
Fishing	1.7	1.8

Source: "Informe Nº 1, Caracterización," by the Regional Agency for Production Development (Agencia Regional de Desarrollo Productivo), 2008

Relevant Economic Activities

This section presents the economic activities identified as a priority for the development of the area of influence as well as of the regions involved. These activities have been identified as such primarily within the framework of the private-public discussion and agreements carried out by the Regional Agencies for Production Development,[7] an initiative launched by the Government of President Michelle Bachelet and implemented in all Chilean regions. This idea is basically aimed at reaching an agreement between the private and public sectors over a shared vision of production development in each region of Chile, with a view to building a Regional Agenda for Production Development and selecting at least three sectors to implement competitiveness enhancement programs. Even though the analysis required for this project group within IIRSA's Central Interoceanic Hub should go far beyond this, such process, backed by a broad political and business consensus, validates the decisions adopted and should be regarded as highly relevant, since private and public investments will be allocated against what is defined in the context of such initiative.

a) Mining

The features and importance of mining varies depending on the region. The Arica and Parinacota Region devotes primarily to non-metal mining, namely borax, diatomite and bentonite. This sector is not very relevant among the regional economic activities, accounting for only 4.2% of the GDP and 1.8% of employment (Table 19). Even though it is pointed out[8] that there are important metal mining deposits, three factors inherent to the mining sector and to the region's own reality may explain the poor development of this sector:[9] low-grade deposits coupled with low market prices that discourage investment; conservation laws and regulations that restrict the access to resources in environmentally protected areas; and finally the lack of clear rules in the legal system governing concessions in Chile.

In contrast to it, mining is the most important economic sector in the Tarapacá Region, accounting for 35.8% of the GDP (Table 18), and 35.6% (an almost identical

[7] Other regional planning exercises, such as the Regional Strategy for the Development of the former Tarapacá region, 2001-2006, the Strategy for Infrastructure Development in the regions of Tarapacá and Arica and Parinacota, launched by the Ministry of Public Works, or Vision 2020, also launched by the Ministry of Public Works, have identified almost the same strategic sectors for the development of the regions involved.

[8] Fundación para el Desarrollo, Universidad de Tarapacá, "Informe Nº 1 de caracterización regional," 2008, commissioned by the Regional Agency for the Production Development of the Arica and Parinacota Region.

[9] "Síntesis Económica, Región de Arica y Parinacota: Propuesta de ejes estratégicos de desarrollo para la nueva región de Arica y Parinacota," Regional Ministerial Secretariat of Economy, not dated.

percentage) of foreign investment. Furthermore, this sector ranks first in regional exports (78.6%), copper being the leading product.[10] According to the studies commissioned by ProChile to identify regional clusters, mining was identified as one of the sectors with the greatest potential, since it is made up of a complex and well-developed network of large-, medium- and small-sized enterprises concerned with the exploitation of mineral deposits or with the provision of services or equipment required for this activity.

b) Port Activity

The Chilean portion of the area of influence hosts the Arica and the Iquique ports, located in the cities of the same name. These icons of the economic activity of both regions and cities act as a trade hinge connecting the region to the rest of Chile and to its South American neighbors, and as the exit doors for trade with the Asia-Pacific market.

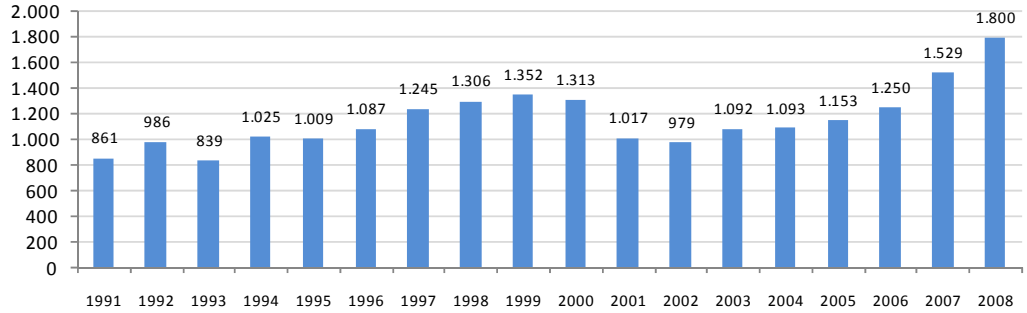
The strategic location of both ports in the northern end of the country and their condition as entry and exit doors for Bolivian goods, particularly the Arica port, explain why their prospects are closely related to this trading partner, as well as to other potential partners, such as Brazil, in the Central Interoceanic Hub.

The Arica port, managed by Empresa Portuaria de Arica (EPA), is located 2,051 km north of Santiago and connected by road and railway to Bolivia and Peru.

This port supports Chile's commitments to Peru and Bolivia, pursuant to international agreements entered into with these partners. Chile has undertaken to keep Dock No. 7 available for Peru, as well as to provide Bolivia with free storage services for its exports during 60 days, and for its imports during a one-year period.

Figure 17 presents Arica port's historical movements, which show a progressive increase that amounts to almost 2 million tons.

Figure 17 – General Volume of Cargo Movement at Arica Port (thousand tons)

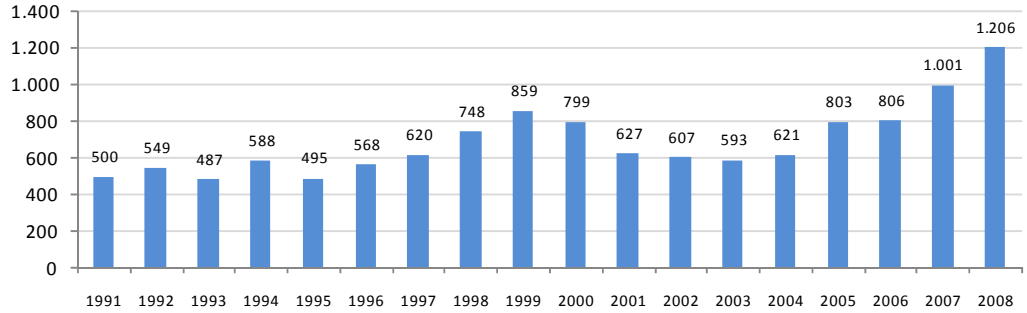


Source: EPA, 2008

Figure 18 below shows Bolivian cargo movement evolution, evidently resulting from the role assigned to this port in the international agreements described above. According to data supplied by EPA, 67% of the cargo moved through Arica as of 2008 goes to or comes from Bolivia.

[10] "Identificación de clusters exportadores en la Region de Tarapacá," by Paris Salgado, 2006, a study commissioned by ProChile.

Figure 18 –Volume of Bolivian Cargo Movement at Arica Port (thousand tons)



Source: Empresa portuaria de Arica, EPA, 2008

According to the information supplied by the same source, when comparing the Bolivian cargo volume moved through Arica, Iquique, Antofagasta, and Matarani ports, the significance that the former port has for Bolivia's international trade becomes evident, since of the total cargo moved through all such ports that serve Bolivia, 70% goes through Arica. This figure reveals an increasing trend, since it amounted to only 58% in 2007. Such increase in the operations of Bolivian cargo through Arica has been to the detriment of the Matarani port in Peru and of the Antofagasta port in Chile.

In this milieu, the cargo moved through Arica port is mainly Bolivian —soybean meal, timber, oil, sugar, sunflower cake, mining products, edible products, wheat, corn, industrial products, fish meal, minerals (ulexite) and vehicles. Historical movements, broken down in large categories, are as shown in the following table.

Table 20 – Historical Cargo Movement at Arica Port, per Type

Year	Type (in metric tons)			Total
	General	Containerized	Bulk	
1997	251,412	746,656	246,450	1,244,527
1998	282,782	706,089	267,089	1,305,090
1999	314,629	766,560	331,119	1,352,308
2000	354,107	672,829	286,266	1,313,202
2001	140,565	595,706	280,591	1,016,862
2002	150,886	620,820	207,774	979,480
2003	114,303	675,823	301,872	1,091,998
2004	76,514	737,490	278,591	1,092,595
2005	68,027	729,130	356,332	1,153,489

Source: EPA

Finally, the list of categories of goods loaded to and unloaded from different destinations at Arica port is as shown in Table 21.

Table 21 – Categories of Goods Loaded and Unloaded at Arica Port, 2005

Loaded	Metric tons	Unloaded	Metric tons
Fish and seafood	2,116	Fruits, vegetables and legumes	2,020
Fruits, vegetables and legumes	21,832	Cereals and flours	62,780
Fish meal and other meals	179,817	Solid and liquid fuels	14,291
Salt	63	Chemical products in general	17,539
Minerals, metals and scrap	127,549	Fertilizers	6,535
Sodium nitrate and fertilizers	42	Rubber and plastics	33,066
Timber, logs and chips	31,524	Textiles	15,363
Paper and cellulose	42	Metals and manufactures thereof	30,487
Copper ore	440	Vehicles	15,536
Other goods	780,818	Other goods	140,402
Total	**1,144,243**	**Total**	**338,019**

Source: "Infraestructura para la competitividad, regiones de Arica-Parinacota y Tarapacá," National Planning Directorate, Ministry of Public Works, Government of Chile, 2007

As regards **Iquique port**, the main cargo moved is formed by industrial products imported primarily to the free trade zone, copper cathode exports from mining companies such as Cerro Colorado, Quebrada Blanca, and Doña Inés de Collahuasi, and fish meal and oil. The evolution of cargo movements through this port, as measured in metric tons, is as shown in Table 22.

Table 22 – Historical Cargo Movements at Iquique Port, per Type

Year	Type (in metric tons)			Total
	General	Containerized	Bulk	
1997	381,004	726,647	119,433	1,227,084
1998	475,142	708,555	67,789	1,251,486
1999	691,882	341,711	138,648	1,172,241
2000	351,616	814,567	167,094	1,333,277
2001	396,009	833,237	143,645	1,372,891
2002	394,539	916,966	241,073	1,552,578
2003	401,535	1,163,400	214,809	1,779,744
2004	354,080	1,295,290	234,694	1,884,064
2005	368,136	1,627,178	231,137	2,226,451

Source: "Infraestructura para la competitividad, regiones de Arica-Parinacota y Tarapacá," National Planning Directorate, Ministry of Public Works, Government of Chile, 2007

The list of products loaded and unloaded at Iquique port in 2005 is included in Table 23.

Table 23 -Products Loaded and Downloaded at Iquique Port, 2005

Loaded	Metric tons	Unloaded	Metric tons
Fish and seafood	1,284	Fruits, vegetables and legumes	8,414
Fruits, vegetables and legumes	890	Cereals and flours	6,076
Fish meal and other meals	228,228	Solid and liquid fuels	121,232
Salt	1,600	Chemical products in general	61,679
Minerals, metals and scrap	7,404	Fertilizers	56,698
Sodium nitrate and fertilizers	25,698	Rubber and plastics	67,597
Timber, logs and chips	3,438	Textiles	145,568
Paper and cellulose	291	Metals and manufactures thereof	70,733
Copper ore	243,356	Vehicles	188,393
Other goods	118,912	Other goods	375,522
Total	**631,101**	**Total**	**1,101,912**

Source: "Infraestructura para la competitividad, regiones de Arica-Parinacota y Tarapacá," National Planning Directorate, Ministry of Public Works, Government of Chile, 2007

c) Activity in Free Trade Zones

Thirty-two years ago, Executive Order No. 1,055 created the Iquique free trade zone in the I Region of Tarapacá, whereby companies' operations and goods in such area were tax- and duty-free. This free trade zone was originally administered by a Management and Surveillance Board, which ended its tasks with a new law passed in 1989 instructing the Chilean State and the Corporación de Fomento de la Producción (Production Promotion Corporation or CORFO) to create a corporation under the name of Zona Franca de Iquique S.A., or ZOFRI S.A., governed by and subject to the Listed Corporations Law. This new company was awarded the 40-year concession of the free trade zone in consideration of an annual 15% of its gross revenues, which would be for all the municipalities in the region[11] to be exclusively allocated to investment projects.

Given its condition as a listed corporation, ZOFRI stock equity is divided as follows: CORFO, a State-run organization, 71.27%; a group of 11 private shareholders, 16.12%; and 725 private minority shareholders, the remaining stock (12.6%).

ZOFRI conducts its operations mainly on lands granted on concession in Iquique, Alto Hospicio and Arica.

In Iquique, its premises comprise 175 hectares, hosting 1,000 facilities rented to customers as warehouses, a 16,000 m^2 logistics center for customers having no warehouse of their own and relying on ZOFRI for the management of their goods, and a retail mall with 400 stores on a 33,000 m^2 area. In another commune known as Alto Hospicio, in the same city of Iquique, new facilities are being constructed in order to overcome current bottlenecks.

In the city of Arica, ZOFRI S.A. has also been awarded the concession of the Chacalluta Industrial Park, an area of more than 123 hectares devoted to commercial and industrial activities.

[11] Today such revenues are allocated to the municipalities of both the I Region of Tarapacá and the new XV Region of Arica and Parinacota.

ZOFRI S.A. business involves the following:

- A real estate department, which rents lots of land for the building of warehouses and showrooms for wholesaling. This business branch operates in the so-called "walled precinct," located in Iquique, and in the industrial district of such city, or in the 128.7 hectares projected as an enlargement in the Alto Hospicio commune and mainly targeted for the automobile industry. This department is also in charge of managing the Chacalluta Industrial Park in the city of Arica.
- The ZOFRI mall, also run as a real estate department offering stores for rent, hosts more than 400 stores.
- Logistics services, to deal with the physical operation of goods and to handle relevant documents for customers who do not have warehouses of their own. This is one of the most modern logistics centers in the macro-region since it provides remote management services, real-time inventory controls, and is fully automated. It comprises an area of 16,000 m^2 and has a storage capacity of 35,000 m^3, some 98.2% of which was fully occupied in 2007.
- A remote visa service provided by ZOFRI, whereby corporate users may connect to a central system to have the required documents approved by the surveillance authorities for the entry of goods.
- A ZOFRI portal, www.zofri.cl, which brings the different services closer to all customers and users. In 2007, it received 776,000 visits, half of them interested in the mall.

According to fiscal year 2007 data,[12] ZOFRI's leading markets are Chile, accounting for 50% of its sales; Bolivia, 28%; Peru, 9%, and Paraguay, 8%. Domestic sales amounted to US$1,309.6 billion, distributed as follows: 73.5% to Regions I and XV, and 26.5% to the rest of Chile. International sales amounted to US$1,334.0 billion, broken down as follows: Bolivia, 56%; Peru, 18%, and Paraguay, 16%.

The goods purchased by the users of the free trade zone originate mainly in China (42%) and other Asian countries, such as Hong Kong, Taiwan and Japan. In global terms, the Asian market supplies 63% of the goods purchased by ZOFRI's users, followed by the Latin American countries, which supply 18% of the goods, North America, 13%, and the European bloc, 4%.

d) Tourism

Tourism has been identified as one of the strategic sectors for the development of the Chilean portion of the area of influence, as has happened with many other Chilean regions. The Strategic Councils of the Regional Agencies for Production Development of both regions —Arica and Parinacota, and Tarapacá— have identified tourism as one of the thrusts of their development.

According to the Arica and Parinacota Regional Ministerial Secretariat of Economy,[13] this destination is apt for the development of special interest tourism as an emerging and innovative production activity especially focused on the natural environment, including landscapes and activities associated with its attractive ecosystems, and on indigenous culture, including both archaeological remains and live culture as expressed in local customs.

[12] ZOFRI S.A. 2007 Annual Report.
[13] "Síntesis Económica, Región de Arica y Parinacota, Propuesta de ejes estratégicos de desarrollo para la nueva región de Arica y Parinacota," Regional Ministerial Secretariat of Economy, not dated.

Tourism in the Tarapacá Region focuses on the region's heritage associated with its mining past, represented by many abandoned saltpeter offices turned into national monuments. There is a growing tourism interest in the sea cost as well, where investments are made in hotels, real estate and restaurants by the private sector, or in road construction and sea coast enhancement works by the public sector.

In the high plateau of both regions, there are a series of National Parks and Protected Wild Areas, which preserve valuable natural resources, represented by lakes, lagoons, salt flats and wetlands, as well as a considerable number of birds and animal species, such as vicuñas, South Andean deer (*huemules*) and flamingoes, among other.

e) Agriculture

According to data from the VII National Agricultural and Forest Census carried out in 2007,[14] the total cultivated area of the Chilean portion of the area of influence involves 10,129 hectares, distributed as follows: 34% in the Tarapacá Region and 66% in the Arica and Parinacota Region (Table 24). These figures evince that these regions have a different agricultural potential; hence, as far as this specific economic sector is concerned, they have varying degrees of development potential.

Agriculture in the Chilean portion of the area of influence involves four large categories of crops, namely vegetables, 36.28%; fruits, 21.93%; fodder plants, 17.01%, and cereals, 13.73%.

Table 24 – Cultivated Area per Main Categories of Crops(1) in the Chilean Portion of the Area of Influence (hectares)

Crops	I Region of Tarapacá		XV Region of Arica and Parinacota		Total Area of Influence	% of the total
	Total	%	Total	%		
Vegetables	582.8	16.92	3,092	46.25	3,674	36.28
Fruits	393.2	11.41	1,828	27.35	2,221	21.93
Fodder plants	154.2	4.48	1,569	23.48	1,723	17.01
Cereals	1,378.7	40.02	12	0.18	1,391	13.73
Forest plantations	825.2	23.95	11	0.16	836	8.25
Other	110.8	3.22	173	2.58	284	2.80
Total	**3,445.0**	**100.00**	**6,684**	**100.00**	**10,129**	**100.00**

Source: VII National Agricultural and Forest Census, INE, 2007
(1) Prepared by the authors based on the source above mentioned

When the analysis of agriculture is narrowed down to each one of the regions that form part of the area of influence, it may be concluded that Tarapacá specializes in cereals, with 40.2% of its cultivated area, and according to the source, more than 90% of it is used to grow quinoa, followed by vegetables (16.92%), and fruits, mainly citrus, mangoes and olives (11.41%). This region also has an important plantation of tamarugos, occupying a 23.95% of the total cultivated area.[15]

The neighboring Region of Arica and Parinacota cultivates mainly vegetables (46.25%) —the predominant ones being corn and tomato for fresh consumption— and fruits, primarily olives, followed by an important area of fodder species and meadows (23.48%).

[14] INE, at http://www.ine.cl.
[15] VII National Agricultural and Forest Census, 2007, INE (http://www.ine.cl).

Several diagnoses carried out for the agricultural sector point to some big challenges for its development: the availability of water, not only in terms of quantity and irrigation technology but also as to the competition for other uses of this resource (mining, drinking water, etc.); the incorporation of technology with a view to reaching a "technological agriculture;" the change of the current traditional crops towards more value-added crops; and, finally, a concerted action by farmers aimed at the development of associations.

With a view to enhancing Chile's production integration with Peru and Bolivia, this segment could be oriented to producing greater volumes of ideally higher value-added crops such as olives for Peru or quinoa for Bolivia. However, this possibility, given the little impact that agriculture has on the GDP of the area of influence (indeed, the smallest contributor), requires a thorough study and, especially, an integration agreement with one or the other country.

Foreign Market

Currently, the exports of the area of influence are mainly made up of mining-related products. Table 25 shows that 11 out of the 16 tariff items, accounting for 94.04% of exports in the first quarter of 2008, focus on metal and non-metal mineral products. Going further in the analysis, we conclude that 88.06% of the basket of exports is made up of metal products, two of which have the highest share: copper ore and concentrates, and copper cathodes and cathode sections. It is worth mentioning that this basket of exports does not include any agricultural product.

Based on the GDP of both regions, these exports suggest that part of the tariff items including light trucks, non-metal minerals, fish meal, distillate and fuel oils may originate in the Region of Arica and Parinacota.

Table 25 – Main Exports from the Area of Influence(1)

Summarized Tariff Items	Exports, April 2008 (FOB US$)	%
Copper ores and concentrates	684,672,835	44.31
Copper cathodes and sections of cathodes	669,907,105	43.35
Iodine	56,991,312	3.69
Fish meal	49,603,748	3.21
Boric acids	16,221,811	1.05
Rock salt, saltern salt, sea salt	13,364,530	0.86
Light trucks	4,287,689	0.28
Other aluminum waste and scrap	4,196,991	0.27
Other cathodes and sections of cathodes	3,441,609	0.22
Distillate fuel oils (diesel oil)	3,257,280	0.21
Non-roasted molybdenum concentrates	2,734,443	0.18
Lithium carbonates	2,496,259	0.16
Stencil correctors and other correcting fluids of a density of less than 0.94	2,364,638	0.15
Nitrates containing more than 98 percent by weight of potassium nitrate	1,938,445	0.13
Activated natural mineral products	1,041,193	0.07
Natural ulexite	275,042	0.02
Other	28,433,167	1.84
Total	**1,545,280,825**	**100.00**

Source: National Customs Service, 2008
(1) Prepared by the authors. The tariff items chosen are those above US$1 million.

Given the significance of knowing what is exported to every destination, particularly to the neighboring countries within IIRSA's Project Group 5 of the Central Interoceanic Hub, it was deemed important to specify the region of the Chilean area of influence in which they originate.

Thus, the tables below show the ten main tariff items exported per region, the ten main destinations, and the ten main tariff items exported to Bolivia and Peru.

Table 26 shows that the three main tariff items exported by Arica and Parinacota are boric acids, distillate fuel oils, and copper ores and concentrates, all of which account for 67.17 % of the total.

Table 26 - Ten Main Products Exported by the XV Region of Arica and Parinacota to All Destinations

Summarized Tariff Items	Exports, 2008 (FOB US$)	% of total exports
Boric acids (1)	57,287,794	39.20
Distillate fuel oils (diesel oil) (2)	27,538,810	18.84
Copper ores and concentrates (2)	13,341,040	9.13
Other aluminum casks, drums, cans, boxes and similar containers, for any material (other than compressed or liquefied gas), of a capacity not exceeding 300 liters, not fitted with mechanical or thermal equipment	10,867,993	7.44
Fish meal with a protein content of 66% or more but not exceeding 68% by weight (prime) (1)	5,507,025	3.77
Activated natural mineral products (1)	4,533,648	3.10
Fish meal with a protein content exceeding 68% by weight (super prime) (1)	3,220,387	2.20
Other ferrous waste and scrap, other than turnings, shavings, chips, milling waste, sawdust and filings (1)	3,145,204	2.15
Cherries, fresh (2)	2,808,553	1.92
Siliceous fossil meals (for example, kieselguhr, tripolite and diatomite) and similar siliceous earths, whether or not calcined, of an apparent specific gravity of 1 or less (1)	1,698,705	1.16
Main 10 Total	**129,949,163**	**88.92**
Regional Total	**146,146,622**	**100.00**

Source: General Directorate of International Economic Relations, 2009
Notes: (1) Products manufactured in the XV Region of Arica and Parinacota; (2) Products not manufactured in the XV Region of Arica and Parinacota. Oral communication with the Regional Directorate of ProChile.

Table 27 presents the main destinations. Bolivia and Peru rank first and second, respectively, followed by exports to China, the United States and Germany, all of them trading partners under free trade agreements entered into with Chile, which shows the potential for joining efforts, particularly with Bolivia, in order to capture these markets.

Table 27 – Ten Main Destinations for Exports from the XV Region of Arica and Parinacota

Country	Exports, 2008 (FOB US$)	% of the regional total
Bolivia	29,714,698	20.33
Peru	22,890,021	15.66
China	22,223,216	15.21
United States	14,778,204	10.11
Germany	13,098,052	8.96
Brazil	11,838,498	8.10
Japan	6,486,686	4.44
Colombia	3,485,384	2.38
Italy	2,569,778	1.76
Malaysia	2,228,739	1.53
Main 10 Total	**129,313,279**	**88.48**
Regional Total	**146,146,622**	**100.00**

Source: General Directorate of International Economic Relations, 2009

Table 28 presents the main tariff items exported to Bolivia from the Arica and Parinacota Region, the most important being distillate fuel oils (diesel oil), which account for 92.68% of the total exported to this nation. Of all these products, only

activated natural mineral products are manufactured in this region. All the other products are manufactured in other regions or they are nationalized and subject to some minor transformations before being exported to Bolivia. According to an oral communication with the Regional Directorate of ProChile, there are no statistics allowing the traceability of such processing.

Table 28 – Ten Main Products Exported to Bolivia by the XV Region of Arica and Parinacota

Summarized Tariff Items	**Exports, 2008 (FOB US$)**	**% of total exports**
Distillate fuel oils (diesel oil)	27,538,810	92.68
Activated natural mineral products (1)	808,525	2.72
Road tractors for semi-trailers, with a diesel engine exceeding 200 HP	232,108	0.78
Levelers	208,000	0.70
Motor vehicles for the transport of goods, with compression-ignition internal combustion piston engine (diesel or semi-diesel), of a net load capacity exceeding 2,000 kilos	98,803	0.33
Front-end shovel loaders	65,500	0.22
Flat-bed semi-trailers	63,589	0.21
Other chewing gums	54,270	0.18
Other synthetic staple fibers, carded, combed or otherwise processed for spinning	41,947	0.14
Track laying bulldozers	38,000	0.13
Main 10 Total	**29,149,554**	**98.10**
Regional Total Exported to Bolivia	**29,714,698**	**100.00**

Source: General Directorate of International Economic Relations, 2009
Note: (1) Products manufactured in the XV Region of Arica and Parinacota

To conclude this analysis of the exports from this region, Table 29 presents the main tariff items exported to Peru, among which copper ores and concentrates rank first, accounting for 58.28% of total exports, followed by metalworking products.

Table 29 – Ten Main Products Exported to Peru by the XV Region of Arica and Parinacota

Summarized Tariff Items	Exports, 2008 (FOB US$)	% of total exports to Peru
Copper ores and concentrates (1)	13,341,040	58.28
Other ferrous waste and scrap, other than turnings, shavings, chips, milling waste, sawdust and filings (2)	3,028,020	13.23
Lead-acid electric storage batteries, using liquid electrolyte, spent (1)	1,444,785	6.31
Other waste and scrap of alloy steel (2)	675,000	2.95
Siliceous fossil meals (for example, kieselguhr, tripolite and diatomite) and similar siliceous earths, whether or not calcined, of an apparent specific gravity of 1 or less (2)	591,525	2.58
Sausages and similar products, of meat, meat offal or blood; food preparations based on these products (2)	464,988	2.03
Other aluminum casks, drums, cans, boxes and similar containers, for any material (other than compressed or liquefied gas), of a capacity not exceeding 300 liters, not fitted with mechanical or thermal equipment (2)	382,382	1.67
Compression-ignition internal combustion piston engines (diesel or semi-diesel engines) for vehicles under heading 87.04 (1)	350,360	1.53
Bottles for beverages, of a capacity exceeding 0.33 liter but not exceeding1 liter (1)	335,550	1.47
Activated natural mineral products (2)	292,047	1.28
Main 10 Total	**20,905,697**	**91.33**
Regional Total	**22,890,021**	**100.00**

Source: General Directorate of International Economic Relations, 2009
Notes: (1) Products not manufactured in the XV Region of Arica and Parinacota; (2) Products manufactured in the XV Region of Arica and Parinacota. Oral communication with the Regional Directorate of ProChile.

Table 30 – Ten Main Products Exported by the Tarapacá Region to all Destinations

Summarized Tariff Items	Exports, 2008 (FOB US$)	% of total exports
Copper ores and concentrates	2,012,471,400	44.40
Cathodes and sections of cathodes, of refined copper	1,828,424,485	40.34
Iodine	159,399,466	3.52
Fish meal with a protein content of 66% or more but not exceeding 68% by weight (prime) (1)	101,400,176	2.24
Rock salt, saltern salt, sea salt	68,766,109	1.52
Distillate fuel oils (diesel oil) (1)	47,192,628	1.04
Fish meal with a protein content exceeding 68% by weight (super prime) (1)	40,474,636	0.89
Fish meal with a protein content not exceeding 66% by weight (standard) (1)	32,185,910	0.71
Motor vehicles for the transport of goods, with compression-ignition internal combustion piston engine (diesel or semi-diesel), of a net load capacity exceeding 500 kilos but not exceeding 2,000 kilos, of a gross vehicle weight not exceeding 5 tons (1)	26,640,533	0.59
Fish oil, raw	20,381,101	0.45
Main 10 Total	**4,337,336,444**	**95.70**
Regional Total	**4,532,370,997**	**100.00**

Source: General Directorate of International Economic Relations, 2009
Note: (1) Products not manufactured in the I Region of Tarapacá

Table 30 shows the main tariff items exported by the Tarapacá Region, among which copper mining stands out, since it accounts for 84.74% of total exports. Fish derivatives, although no longer with the great weight of the past, account for 4.29% (four products) of the amount exported.

As for the main destinations, Table 31 shows the list ranked in descending order. Based on the information available, the Asian bloc countries account for 52.38% of exports, China being the main destination (22.20%). Bolivia and Peru are not listed, because they rank in the 12th and 18th positions, respectively.

Table 31 – Ten Main Destinations for the Products Exported by the I Region of Tarapacá

Country	Exports, 2008 (FOB US$)	% of the regional total
China	1,006,327,992	22.20
Japan	586,306,367	12.94
Italy	584,146,650	12.89
Germany	341,388,800	7.53
India	312,083,989	6.89
The Netherlands	310,486,045	6.85
Taiwan	281,730,422	6.22
Spain	225,610,087	4.98
South Korea	187,157,337	4.13
United States	107,114,501	2.36
Main 10 Total	**3,942,352,190**	**86.98**
Regional Total	**4,532,370,997**	**100.00**

Source: General Directorate of International Economic Relations, 2009

Regarding the exports from the I Region of Tarapacá to Bolivia, distillate fuel oils (diesel oil) rank first (as in the case of the Arica and Parinacota Region), revealing how important these products are in the trade relationship with the other two nations in the area of influence. The other tariff items relate to machinery and equipment, which shows the need that Bolivia has for this type of products.

Table 32 – Ten Main Products Exported to Bolivia by the I Region of Tarapacá

Summarized Tariff Items	Exports, 2008 (FOB US$)	% of total exports to Bolivia
Distillate fuel oils (diesel oil)	47,192,628	63.27
Excavators with a 360° revolving superstructure	10,642,845	14.27
Track laying bulldozers	7,213,292	9.67
Other machinery, apparatus and equipment used for preparing or making plates, cylinders and other printing components	2,076,000	2.78
Other compression-ignition internal combustion piston engines (diesel or semi-diesel engines), stationary	1,000,000	1.34
Motor vehicles for the transport of goods, with compression-ignition internal combustion piston engine (diesel or semi-diesel), of a net load capacity exceeding 500 kilos but not exceeding 2,000 kilos, of a gross vehicle weight not exceeding 5 tons (1)	839,214	1.13
Other plates, sheets, film, foil and strip, of plastics, non-cellular and not reinforced, laminated or supported, of polymers of ethylene, having a specific gravity of less than 0.94	455,735	0.61
Other plates, sheets, film, foil and strip, of plastics, non-cellular and not reinforced, laminated or supported, of polymers of ethylene, having a specific gravity of 0.94 or more	419,811	0.56
Front-end loaders	389,042	0.52
Levelers	286,893	0.38
Main 10 Total	**70,515,460**	**94.53**
Regional Total	**74,593,370**	**100.00**

Source: General Directorate of International Economic Relations, 2009

Table 33 lists the main tariff items exported to Peru, among which fish oil ranks first (24.07%), followed by potassium nitrates (9.56%), in the total exported to this nation.

Table 33 – Ten Main Products Exported to Peru by the I Region of Tarapacá

Summarized Tariff Items	Exports, 2008 (FOB US$)	% of total exports to Peru
Fish oil, raw	6,557,000	24.07
Nitrates of potassium, containing 98% or less by weight of potassium nitrate	2,603,153	9.56
Other plates, sheets, film, foil and strip, of plastics, non-cellular and not reinforced, laminated or supported, of polymers of ethylene, having a specific gravity of 0.94 or more	2,007,973	7.37
Other waste and scrap, other than turnings, shavings, chips, milling waste, sawdust and filings	1,911,895	7.02
Other plates, sheets, film, foil and strip, of plastics, non-cellular and not reinforced, laminated or supported, of polymers of ethylene, having a specific gravity of less than 0.94	1,635,010	6.00
Airplanes for passenger transport, exceeding 8 seats, of an unladen weight exceeding 2,000 kg but not exceeding 15,000 kg	1,600,000	5.87
Southern jack mackerel (*Trachurus murphyi*), whole, fresh or frozen, excluding livers and roes	946,962	3.48
Other reception apparatus for television, color, with liquid crystal display	938,113	3.44
Light trucks of a net load capacity of 500 kilos or more but not exceeding 2,000 kilos	769,900	2.83
Made-up fishing nets, of man-made textile materials	707,754	2.60
Main 10 Total	**19,677,760**	**72.24**
Regional Total	**27,239,820**	**100.00**

Source: General Directorate of International Economic Relations, 2009

Domestic Market

If the GDP of the old Taparacá Region, comprising the two recently created regions and hence the entire area of influence, is analyzed, we may conclude that there are three categories giving rise to products that are traded in the rest of the country: trade, manufacturing industry and agriculture.

If the commercial exchange within the area of influence is left aside, trade involves primarily the selling of products from the Iquique free trade zone —amounting, according to the information supplied by its administrators, to CIF US$347,100,000— to the rest of the Chilean regions.

As far as agriculture is concerned, the area of influence meets the demand for counter-seasonal products by the central area of Chile and also nearby cities, such as Antofagasta and Calama. The products traded in the domestic market are basically vegetables, among which fresh tomatoes account for 17% of the cultivated area of vegetables in the area of influence, followed by onions and garlic. The agricultural production of this kind originates, primarily, in XV Region of Arica and Parinacota.

The information obtained for the Arica and Parinacota Region[16] points out that its manufacturing industry is undergoing a critical situation as a result of the recent closure of the General Motors plant, which brought about a dramatic fall in the Index of Regional Economic Activity (INACER, in Spanish), which fell by 15.1%. Yet, we may assume, although this assumption needs to be verified through a more thorough study of the statistics available, that the manufacturing industry is oriented to the export

[16] Infrastructure Plan for Competitiveness, 2007-2012, Arica and Parinacota Region, National Planning Directorate, Ministry of Public Works, 2009.

markets, since the companies located in the region have chosen this site to benefit from the advantages offered by the free trade zone.

2.2.3 Peruvian Portion of the Area of Influence

Gross Domestic Product and Other Indicators
The variables considered in measuring the situation of the country's economy are inflation, GDP and imports/exports.

The national GDP shows that the more representative sectors are services, manufactures, agriculture and mining; the area under study contributes 8% to services, 11% to manufactures, 15% to agriculture and 21% to mining. It should be noted that the agricultural and mining sectors are important production hubs in the area.

Table 34 – Departmental GDP per Economic Activity, in US$

Main Economic Activities	Arequipa	Moquegua	Puno	Tacna
Agriculture, Hunting and Forestry	402,135,350	35,859,554	186,261,783	45,293,631
Fishing	16,948,408	14,355,414	4,631,847	9,004,777
Mining	288,472,930	168,020,701	89,444,268	127,904,140
Manufactures	599,270,701	175,369,427	137,373,567	60,507,643
Electricity and Water	49,271,019	52,799,363	21,685,669	5,131,529
Construction	295,071,953	85,418,961	60,771,330	58,831,136
Trade	418,274,522	36,089,490	140,688,217	101,162,102
Transport and Communications	246,838,535	22,238,535	122,837,580	95,871,975
Restaurants and Hotels	78,211,783	7,571,338	29,851,911	25,186,943
Governmental Services	115,610,828	28,937,898	121,248,408	46,685,032
Other Services	465,168,153	69,364,650	191,070,701	136,985,032
Total GDP	**2,975,274,183**	**696,025,330**	**1,105,865,279**	**712,563,939**

Source: National Institute of Statistics and Information Technology (INEI) - 2008

In 2006, Peru was in the 59th position in the world ranking of exporting countries. Its main export products are raw gold, cathodes, copper ores, and fish meal, the latter traded mostly by the southern region. In the south of the country, exports amount to US$7,542 million, i.e. it is the second exporting region after the central region, which exports twice that amount.

The country's imports grew by 52.1% in the last year, led by capital goods, construction materials, raw materials, and intermediate products. At the regional level, the central region takes the lead —in 2007, its imports were above US$17 billion. In the southern region, imports amounted to US$1,396 million, a figure similar to the one in the northern region: US$1,156 million. The export index in the southern region is almost five times that of imports, whereas in the central region imports exceed exports.

In general, it is worth mentioning that Peru is the first world producer of fish meal, asparagus and paprika; the second world producer of artichokes, and the sixth world producer of coffee. In the mining sector, Peru is the second world producer of silver; the fourth world producer of copper, zinc and lead, and the fifth world producer of gold. In addition, the country has large iron, tin and manganese deposits as well as gas and oil fields. It is also the first world producer of alpaca wool and the most important exporter of cotton clothes in Latin America.

The consumer price index (IPC) is an indicator of the continuous and generalized price increase of the goods and services consumed by households, which in the case of Peru amounted, on average, to 7.1% during the last year (February 2008 – January 2009). In the area of influence, this index rises above the average: 8.54% in Arequipa, 8.47% in Moquegua, 6.16% in Puno, and 9.32% in Tacna.

Relevant Economic Activities

Given the peculiarities of the departments that make up the area of influence, the economic conditions in each one of them will be analyzed.

a) Arequipa

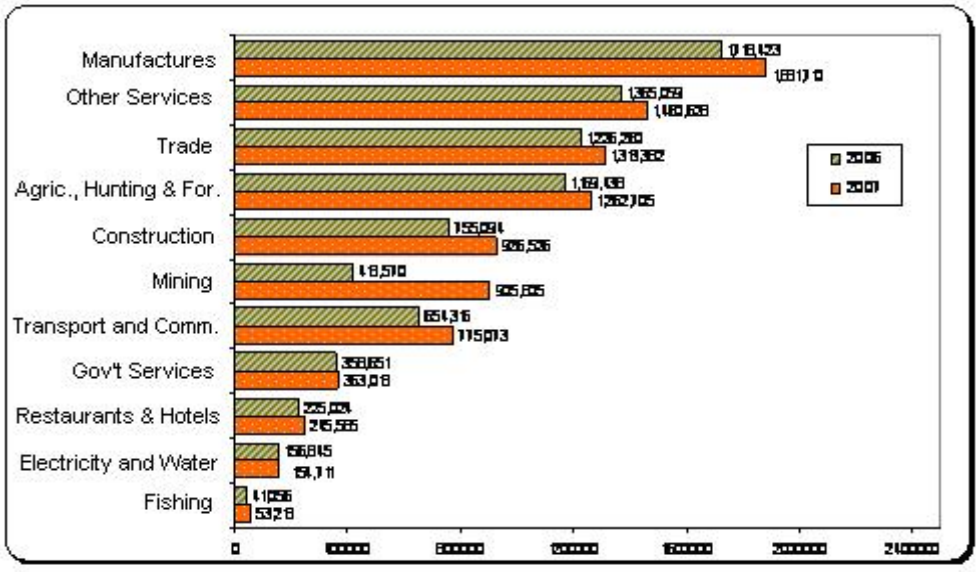
The main economic activities of this department are agriculture and mining. The most important products are garlic, alfalfa, onions, sour cherry, sweet lemon, grain sorghum, carrots, tangelo and elderberry, as well as the mining of (expressed as a percentage of the national total) lead (0.3%), silver (7.1%), zinc (0.1%), gold (9.3%), and copper (9.7%).

Arequipa's GDP accounts for 5.9% of the national GDP —it is the second department with the highest GDP. Its composition is as follows: services (61%), manufactures (20%), and agriculture (11%).

This department has the most important agricultural GDP share among the Peruvian departments. In spite of this, its agricultural crop area covers only 5.7% of its total area, which shows the high productivity of its cultivated land. In addition, it is the regional leader in mineral mining and industrial production.

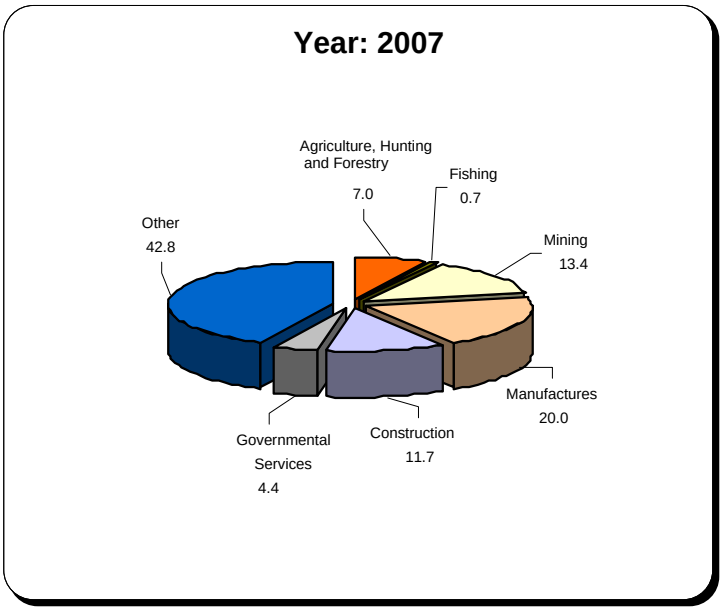
As regards the value added by the department to goods and services, manufactures take the lead with 20%, while the least important sector in this respect is electricity and water (1.9%), although the department hosts the Charcani hydroelectric power plant, which exploits the waters of the Chili river.

Figure 19 – Gross Value Added at Constant Prices (thousands of new soles)



Source: Prepared by the authors based on "Compendio Estadístico 2008," INEI

Figure 20 – Percentage Structure of the Gross Value Added



Source: Prepared by the authors based on "Compendio Estadístico 2008," INEI

Exports[17]

The goods exported by this department account for 7.4% of all Peruvian exports. At the regional level, exports derive primarily from mineral mining and manufactures thereof (59% of the total exports).

The most important components of exports are the products resulting from mineral extraction, as well as from metallurgy. Within the industrial sector, textiles and hides and skins take the lead, followed by food and beverages.

Table 35 – Main Export Products from Arequipa

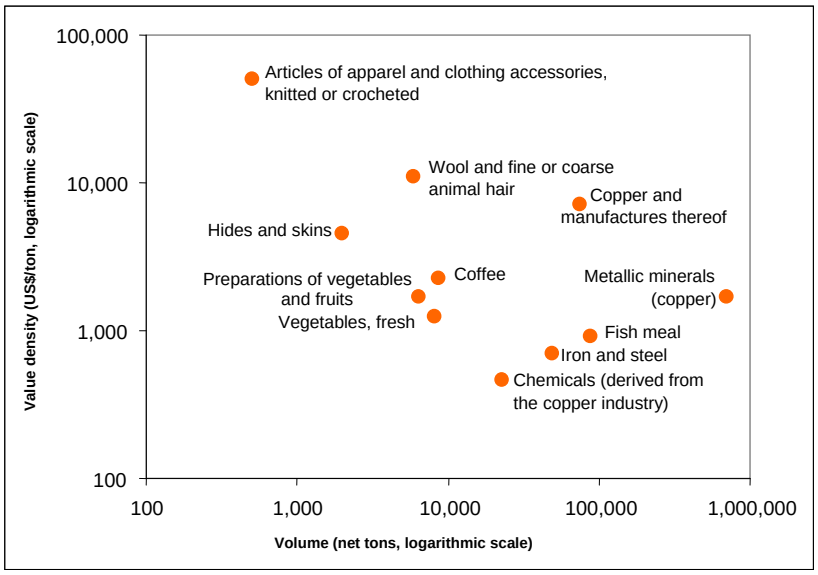
Items	FOB Value (US$)	Net Weight (tons)	US$/tons
Metallic minerals	1,201,379,750	701,602	1,712
Copper and manufactures thereof	528,455,289	74,080	7,134
Fish meal	81,947,693	88,104	930
Wool and fine or coarse animal hair	65,018,613	5,921	10,981
Iron and steel	33,684,486	48,200	699
Articles of apparel and clothing accessories, knitted or crocheted	25,509,200	499	51,121
Coffee	19,595,508	8,650	2,265
Preparations of vegetables and fruit	10,717,946	6,301	1,701
Chemicals (derived from the copper industry)	10,490,783	22,640	463
Vegetables, fresh	10,213,077	8,149	1,253
Hides and skins	9,107,966	1,971	4,621
Other	73,902,491	104,406	
Arequipa Total	**2,070,022,802**	**1,070,523**	**82,881**

Source: ALG

[17] Taken from the ZAL SUR (South Logistics Activity Zone) Survey, Module 1, prepared by ALG.

When the main export products are analyzed in terms of their relative position, it can be observed that the articles of apparel and clothing accessories, knitted or crocheted, account for the smallest volume (net tons) but also for the highest value (US$ per ton), unlike chemicals, fish meal and metallic minerals.

Figure 21 – Matrix of the Relative Position of Main Exports



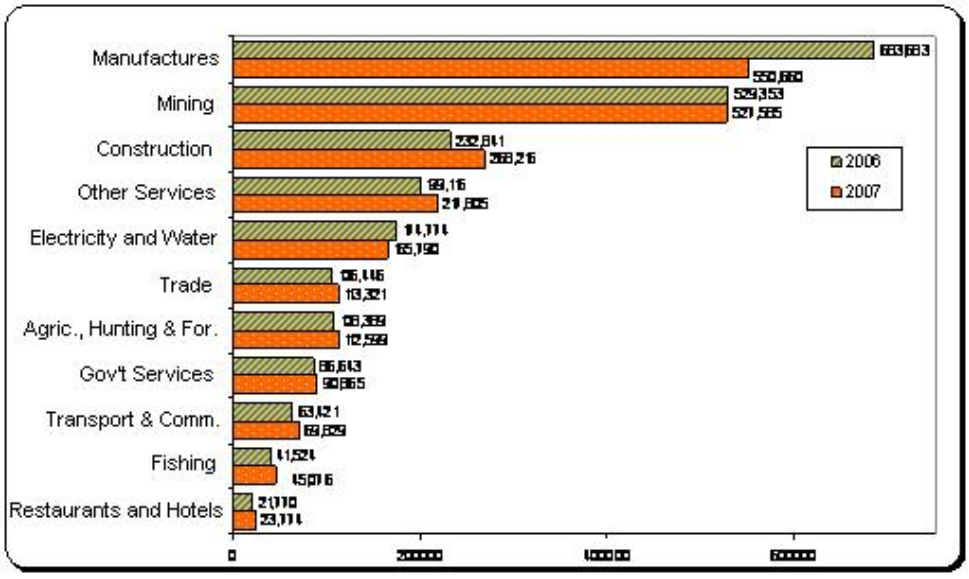
b) Moquegua

Moquegua's share in the national GDP accounts for 1.4%. Its main activity is mining (silver, gold and copper), representing 24% of the departmental GDP. Copper mining is relevant in Cuajones (a mine exploited by Southern Copper Perú, together with the Toquepala mine in the department of Tacna), located 30 km from the city of Moquegua. The manufacturing industry is another major sector contributing to the departmental GDP (20%), whereas agriculture contributes only 9%.

With regard to the agricultural sector, the main crops are olives in Ilo, avocados in Samegua, and fruits (lemon, lime and apricot) in Omate. Cattle and sheep farming, both of them significant activities, take place in the hilly region. Additionally, there are important salt deposits in the coastal area.

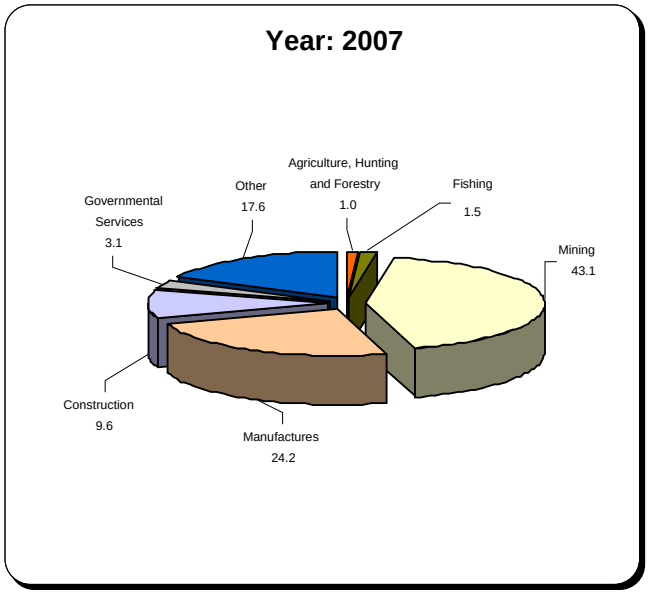
As far as the composition of the gross value added is concerned, mining ranks first (43.1% of the total), followed by manufactures (24.2%). Even though agriculture is the main activity in terms of employment, its value added is one of the lowest: 1%.

Figure 22 – Gross Value Added at Constant Prices (thousands of new soles)



Source: Prepared by the authors based on "Compendio Estadístico 2008," INEI

Figure 23 – Percentage Structure of the Gross Value Added



Source: Prepared by the authors based on "Compendio Estadístico 2008," INEI

Exports[18]

Since high value-added products constitute a significant portion of its exports, Moquegua is the second most important department in the region as far as exports are concerned. The share of Moquegua in national exports is 8.6%, mostly concentrated in the metallurgical sector, which contributes 62% of all the department's foreign sales, and mineral products and their derivatives, which account for 32%.

[18] Taken from the ZAL SUR Survey, Module 1, prepared by ALG.

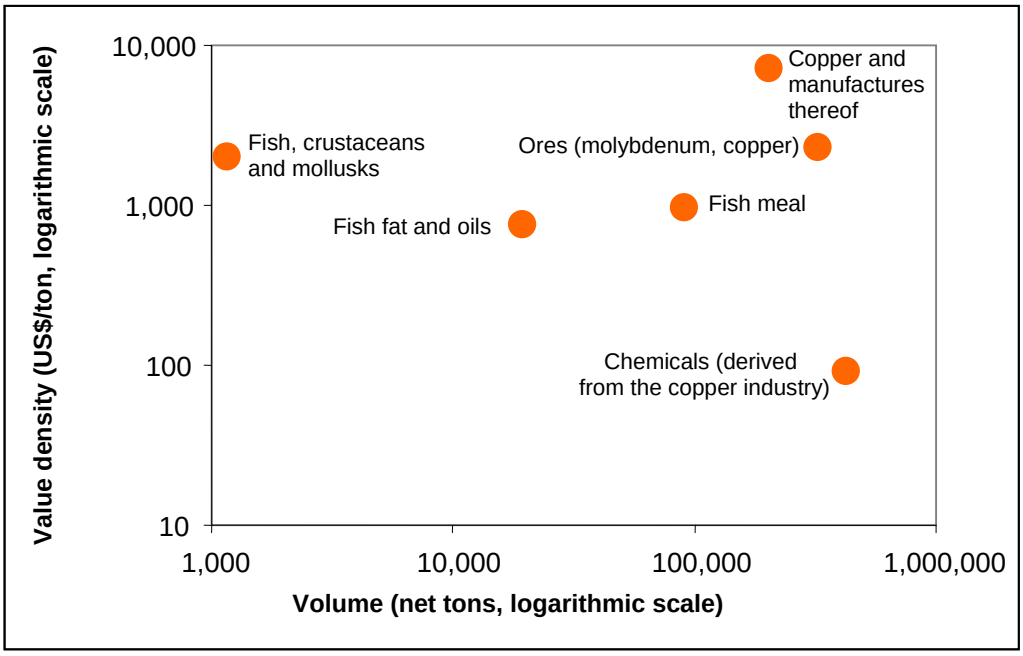
Other relevant products in export terms are fishery-derived products such as meals and oils, although their average per-ton values are among the lowest: US$961 per ton and US$772 per ton, respectively. For its part, the port of Ilo is a major trading center, where the country's largest fish meal and oil factory is located.

Table 36 – Main Export Products from Moquegua

Tariff Item	FOB Value (US$)	Net Weight (tons)	US$/ton
Copper and manufactures thereof	1,478,825,066	202,278	7,311
Ores (molybdenum, copper)	758,454,712	325,461	2,330
Fish meal	86,394,731	89,929	961
Chemicals (derived from the copper industry)	38,671,489	424,517	91
Fish fats and oils	14,987,217	19,420	772
Fish, crustaceans and mollusks	2,330,365	1,145	2,035
Other	1,772,833	2,991	
Moquegua Total	**2,381,436,413**	**1,065,741**	**2,235**

Source: ALG

Figure 24 –Matrix of the Relative Position of Main Exports



Source: ALG

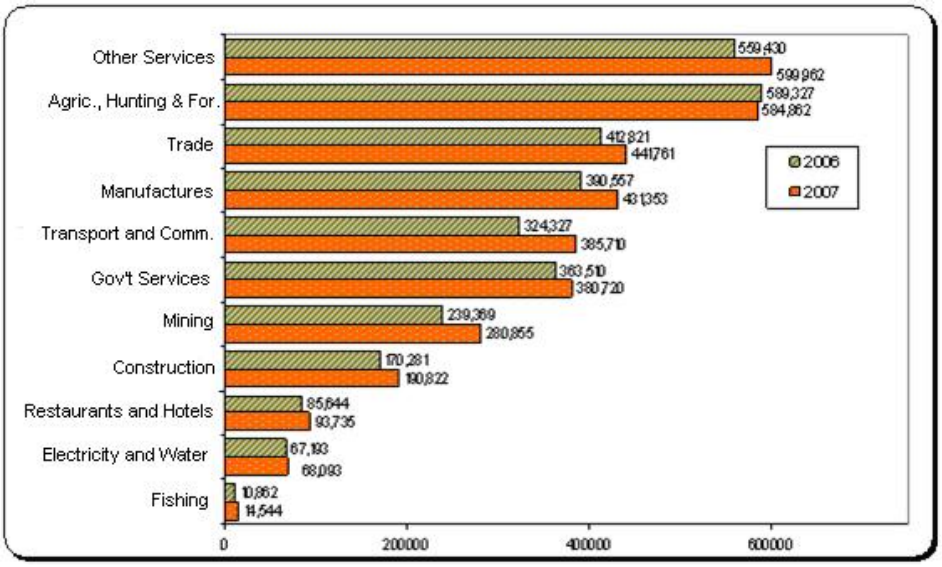
c) Puno

The department of Puno accounts for 1.6% of the national GDP, with services explaining 67% of the department's GDP, and agriculture —which holds the second largest share— contributing 18% with crops such as potato, beans, barley and quinoa. The sectors contributing least to the GDP are fishery and mining.

Agriculture is the main activity in the department, as well as the largest employer, with a gross value added of 11%. Agriculture presents excessive land fragmentation, use of obsolete technology and prevalence of dry land crops as, in spite the abundance of water resources (Lake Titicaca), few irrigation projects are in place.

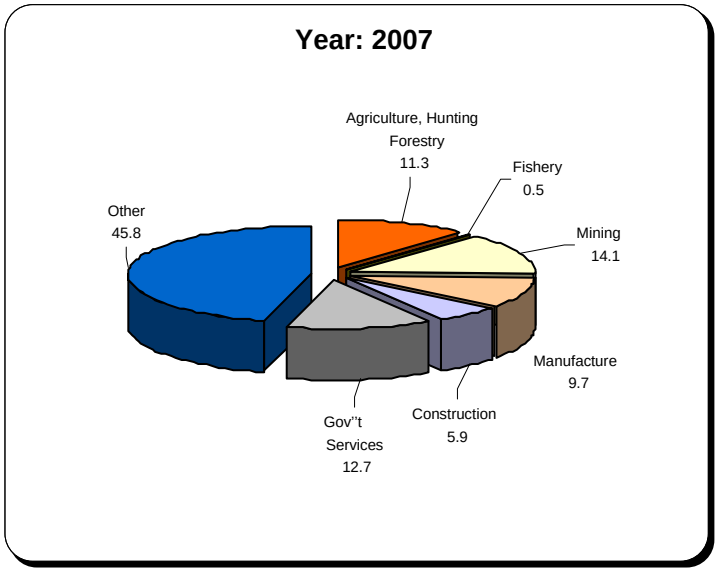
Mining includes products such as tin, silver and gold, its gross value added standing at 14%. This department is the largest sheep and Andean camelids and, hence, wool producer nationwide. Tourism is an economically significant activity, mainly in the areas of Puno and Lake Titicaca. The department's energy is generated by the San Gabán hydroelectric plant.

Figure 25 – Gross Value Added at Constant Prices (thousand new soles)



Source:

Figure 26 – Percentage Structure of the Gross Value Added



Source:

Exports[19]

The exports from the department of Puno are almost entirely mining-related (95%). Apart from metal ores, coffee and wool are significant exports.

The department of Puno conducts trade with Bolivia via the Desaguadero border crossing. In the rainforest areas, due to the lack of an adequate road network, the connection from production to consumption centers is neither agile nor economical.

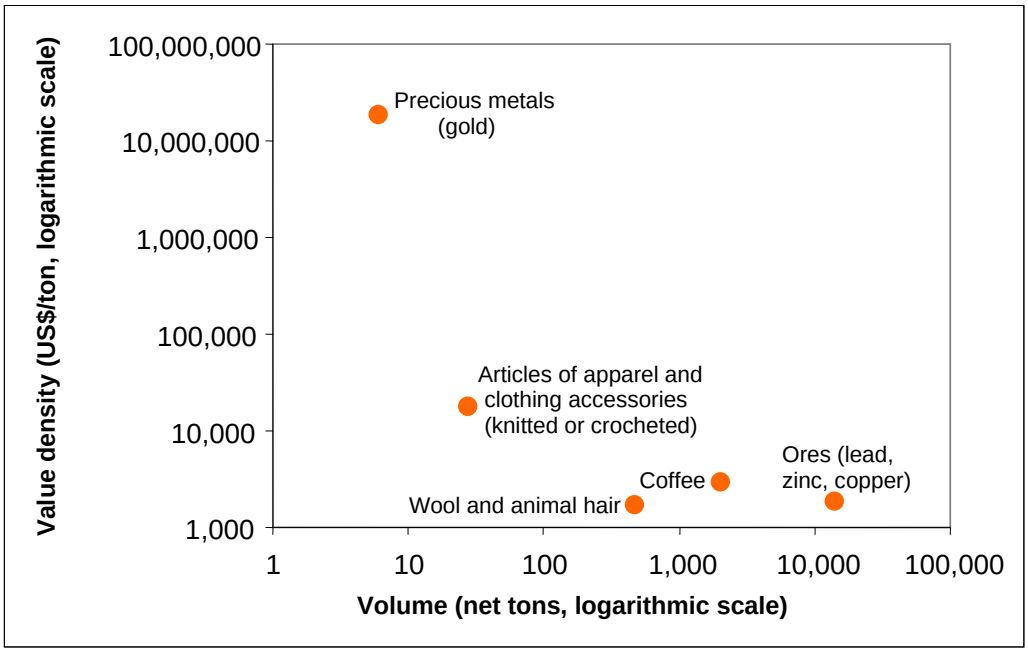
Coffee is the export product with the heaviest net weight (2,000 tons), although its per-ton value is US$3,000, while exports of articles of apparel and clothing accessories, knitted or crocheted, amount to 27 tons for a total value, however, of US$18,000 per ton.

Table 37 – Main Export Products from Puno

Tariff Item	FOB Value (US$)	Net Weight (tons)	US$/ton
Precious metals (gold)	112,265,115	6	18,710,853
Ores (lead, zinc, copper, gold)	26,410,961	14,150	1,866
Coffee	6,089,818	2,013	3,025
Wool and animal hair	797,934	465	1,716
Articles of apparel and clothing accessories, knitted or crocheted	484,655	27	17,950
Other	241,623	80	
Puno Total	**146,290,106**	**16,741**	**8,738**

Source: ALG

Figure 27 – Matrix of the Relative Position of Main Exports



Source: ALG

[19] Taken from the ZAL SUR Survey, Module 1, prepared by ALG.

d) Tacna

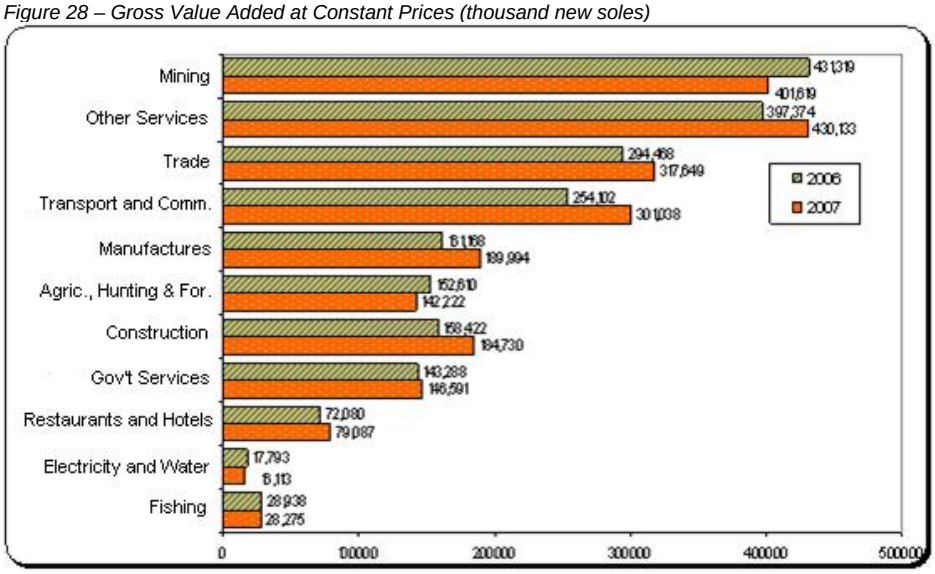
The national GDP share of the department of Tacna is 1.4%. The department's GDP is mainly composed of services, accounting for 59% of the total, followed by mining (22%). Manufacturing and agriculture make a meager contribution to the GDP (8% and 4%, respectively).

The economy of Tacna revolves around the primary sector, although the share in the economy of commercial activities is on the rise. The development of the department of Tacna is heavily conditioned by the scarcity of water resources and, hence, its electric power production capacity is limited, with 95% of it being generated by the Aricota I and II hydroelectric plants, and the rest, by the thermal facility of Calana.

Mining is the sector with the highest gross value added (38.5%), with open-pit copper mining at the Toquepala mine —copper being later refined at Ilo for export— impacting significantly. Toquepala is one of the two mines operated by the Southern Copper Perú company.

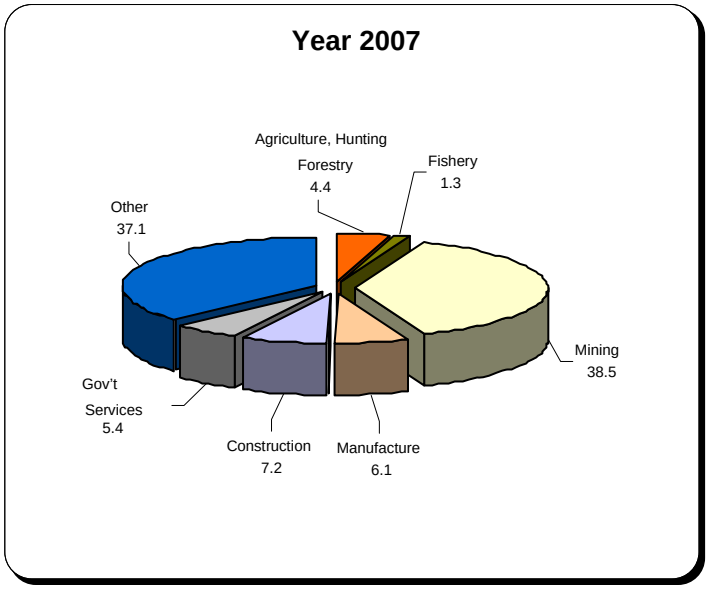
Agriculture (with a gross value added of 4.4%) in the Tacna and Tarata valleys is devoted to the production of vine, sugar cane, potato, cotton, wheat, alfalfa, garlic, and fruit trees, with olive tree crops having gained impetus in recent years and yielding 53% of the country's olives. Other crops include flour corn and oregano.

Figure 28 – Gross Value Added at Constant Prices (thousand new soles)



Source: ALG

Figure 29 – Percentage Structure of the Gross Value Added



Source: ALG

Exports[20]

As is the case with almost all departments in the south of Peru, Tacna's main exports are related to the mining and manufacture of copper and other minerals (69%), metallurgy ranks second among exports, accounting for 24% of them, and the agricultural sector represents only 4% of the total.

Of all the department's exports, ores such as copper and molybdenum have the highest FOB value (US$527 million) as well as the highest net weight (113,428 net tons). The opposite occurs with selenium, which has a FOB value of US$1.6 million and the exports of which are 28 tons, although, as can be seen in the following figure, selenium is the tariff item with the best relative position, as its value per exported ton is the highest of all products: US$56,000/net ton.

[20] Taken from the ZAL SUR Survey, Module 1, prepared by ALG.

Figure 30 – Matrix of the Relative Position of Main Exports

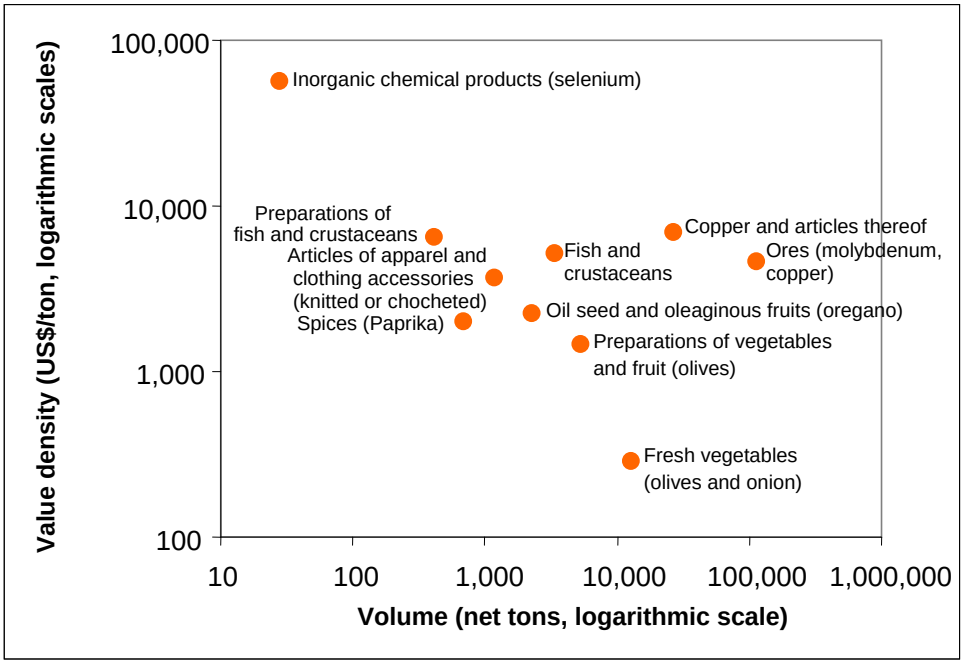


Table 38 – Main Exports from Tacna

Tariff Item	FOB Value (US$)	Net Weight (tons)	US$/ton
Ores (molybdenum, copper)	527,245,016	113,428	4,648
Copper and articles thereof	184,489,512	26,361	6,999
Fish and crustaceans	17,020,755	3,306	5,148
Preparation of vegetables and fruit (olives)	7,719,539	5,270	1,465
Oil seeds and oleaginous fruits (oregano)	4,983,534	2,236	2,229
Articles of apparel and clothing accessories, knitted or crocheted	4,324,414	1,165	3,712
Fresh vegetables (olives and onion)	3,627,515	12,558	289
Preparations of fish and crustaceans	2,728,373	415	6,574
Inorganic chemical products (selenium)	1,600,578	28	57,164
Spices (paprika)	1,396,152	686	2,035
Other	6,235,994	4,810	
Tacna Total	**761,371,382**	**170,263**	**4,472**

2.3 Infrastructure in the Area of Influence

Figure 34 – Road, Rail, Port and Airport Infrastructure in Area of Influence

Figure 35 – Road Network Standard in the Area of Influence

Figure 35 – Road Network Status in the Area of Influence

Figure 37 – Road Freight Flow in the Area of Influence

2.3.1 Bolivian Road Infrastructure

The infrastructure development priority is road and logistics infrastructure, with emphasis being placed on production linkages as well as on the consolidation of export corridors.

Bolivia has serious domestic transport interconnection gaps. Several regions lack fast and safe interconnections, as a result of which they are practically isolated from the rest of the country, their major economic ties being with neighboring countries rather than with the rest of Bolivia. This relative seclusion of some parts of the country jeopardizes the development of competitive production clusters (production linkages) within Bolivia. All this is due to higher implicit transportation costs and longer response times between national links of one same chain.

Table 39 – Bolivian Road Network by Type of Road

Description	Paved	Gravel	Dirt	Total
Fundamental Road Network	4,513	6,455	5,060	16,028
Departmental Network	207	11,102	8,739	20,048
Municipal Network	61	10,325	26,680	37,066
Total	**4,781**	**27,882**	**40,479**	**73,142**
Percentage Structure by Type of Network				
Fundamental Network	28%	40%	32%	100%
Departmental Network	1%	55%	44%	100%
Municipal Network	0%	28%	72%	100%

The Fundamental Road Network, run by the national government through the Bolivian Highway Administration (ABC, in Spanish), is made up of the following national integration corridors, allowing the flow of persons and trade in goods and services:

- East-West Corridor, linking Bolivia with Peru, Chile and Brazil;
- West-North Corridor, connecting Bolivia with Brazil and Peru;
- North-South Corridor, linking Bolivia with Paraguay;
- West-South Corridor, connecting Bolivia with Peru, Chile and Argentina.

Each departmental network is managed by the Departmental Road Service reporting to the Prefect's Office of the pertinent department, and each municipal network is under the care of the municipal government having jurisdiction over it.

2.3.2 Chilean Road Infrastructure

The Chilean road network in the area of influence encompasses a total 5,346 km: 2,140 km are paved (including 722 kilometers of roads that have been treated with a salt or bischophite solution), 477 km are gravel roads, and 2,729 km are dirt roads.

The road network backbone is composed of four major highways: route 5 or Northern Longitudinal Route, which runs along the region from south to north; route 1, which connects the city of Iquique with the II Region of Antofagasta following the coastline, and the highways connecting with Bolivia: route 11 CH, Arica-Tambo Quemado, and route 15 CH, Huara-Colchane.

Route 11 CH, Arica-Tambo Quemado, begins at the intersection with route 5 or Northern Longitudinal Route, Lluta roundabout (km 0), and stretches parallel to the Lluta river valley, crosses the Altiplano or Andean plateau and reaches up to the Chungará lake, Chungará border crossing (km 192).

It is currently paved with asphalt of varying thickness and different traveled-way and subgrade widths. It has been designed with a minimum traveled-way width of seven meters and varying shoulder widths. The average state of conservation of the route by the end of 2009 is expected to be good. The condition of certain sections, however, has been rated as bad, although they are under repair.

There are also several projects underway basically linked to conservation initiatives consisting in the application of an asphalt leveling course on granular bases, the construction of road shoulders, and the implementation of road safety measures, among others. Future projects include engineering, replacement and conservation studies. Worth mentioning among these initiatives is the construction of the 170-192 km section up to the Bolivian border. The total planned investment is US$80,325,926, of which US$9,435,185 are allocated to projects underway and US$70,890,741, to future investments.

Route 15 CH, Huara-Colchane, starts at the intersection with route 5, in the village of Huara (km 0), and stretches toward the Altiplano or Andean plateau up to the village of Colchane, where a border crossing to Bolivia is located (km 163).

In its present condition, this road features different geometries and surfaces along its 163-kilometer span, ranging from asphalt surfaces with a seal coating (single or double surface treatments) to unpaved (dirt) sections. The route will be paved in its entirety by 2010, thanks to the projects currently in progress.

Projects underway for route 15 CH basically include the replacement of a 48-kilometer stretch, while future projects involve conservation initiatives. The total planned investment is US$64,083,333, of which US$39,990,741 have been allocated to projects underway and US$24,092,593 are to be used in future investments.

2.3.3 Peruvian Road Infrastructure

According to the new Peruvian road classification system, the national road network of Peru covers a total 23,965 kilometers, 11,423 of which are paved. The area of influence features 2,849 km of paved roads, accounting for 58% of its total road network.

Table 40 – Type of Road Finish in the Peruvian Portion of the Area of Influence

Department	Paved-Asphalted	Unpaved-Surfaced	Unpaved-Non-surfaced	Dirt	Total
Arequipa	1,020.48	644,19	28,59	101,94	1,795.21
Moquegua	394,84	73,31	179,91		648,06
Puno	1,015.38	611,53	86,47	110,16	1,823.53
Tacna	418,46	90,80	114,58	14,60	638,44
Area of Influence Total	**2,849.16**	**1,419.83**	**409,54**	**226,70**	**4,905.24**
Peru Total	**11,423.05**	**7,569.48**	**2,946.14**	**2,026.68**	**23,965.35**

Prepared by the authors

The road infrastructure in the Southern Region shows that the departments have a good share of paved roads and certain poorly serviceable road sections. As a result of this variation in road conditions, some urban centers have difficulty transporting their merchandise to ports or consumption centers.

From the table with the current road network classification according to the type of surface, it appears that the department of Arequipa is the most fit in terms of road infrastructure, with 1,021 kilometers of paved roads. The department of Puno has also more than one thousand kilometers of asphalted roads, thanks to the recent improvement of the inter-oceanic highway.

Freight flows within the Southern Region are concentrated on the South Pan-American Highway up to the city of Arequipa and on the Arequipa-Juliaca section. This highway is the main pathway supplying all the markets in the southern portion of the country, in relation to both imports and the vigorous production of Lima. Likewise, it is the exit route for all the region's export cargo using the port of Callao.

Another major freight route is the Arequipa-Juliaca stretch, which is used for transporting the cargo between these two cities as well as the cargo between Juliaca-Puno and Lima. Freight flow along this main corridor is remarkably higher than on the rest of the routes, particularly on the highland roads.

2.3.4 Bolivian Railway Infrastructure

The Bolivian rail system is made up of two networks that are not interconnected: the Andean network and the Eastern network.

The Andean network spans 2,274 kilometers, linking the departments of La Paz, Oruro, Potosí, Chuquisaca and Cochabamba. It has connections with the neighboring countries' railroads that reach the ports of Matarani, in Peru, Arica and Antofagasta, in Chile, and Rosario and Buenos Aires, in Argentina. This network features four junctions —the most important being Oruro and Viacha— and serves the cities of La Paz, Cochabamba, Sucre and Potosí, as well as the Argentinean and Chilean borders in Villazón, Abaroa and Charaña.

The Eastern network is 1,424 kilometers long, joining the departments of Chuquisaca, Tarija and Santa Cruz. It has a railway junction in Santa Cruz and two other major

stations, since they are border crossings to Argentina and Brazil, in Yacuiba and Columba, respectively.

In late 1995, the National Rail Company (Empresa Nacional de Ferrocarriles or ENFE) was privatized and, in early 1996, all its assets —mainly the rolling stock, communication equipment and the spare part stock— where transferred to private operators.

Table 41 – Characteristics of the Bolivian Rail System

Detail	Andean Network	Eastern Network
Operational track length (km)	1,868	1,253
Number of operational locomotives	8	28
Number of wagons, carriages, etc.	500	750
Number of tons transported	450,000	1,000,000

2.3.5 Chilean Railway Infrastructure

The railway that links Arica with La Paz (FCALP, its acronym in Spanish) is one of the highest railroads in the world, created as a result of the peace, friendship and trade treaty signed by the governments of Chile and Bolivia on October 20, 1904. It covers a total distance of 457 kilometers, 206 of which make up the Chilean section. In November 2005, the FCALP was adjudged bankrupt and the machinery was left under the custody of the Empresa Portuaria Arica (a State-run company that serves as the port authority), until its transfer to a private operator via a public bid. Today, the Empresa Portuaria Arica, in cooperation with the regional government and the Ministry of Public Works, is working on the rehabilitation of this rail, which should be operational by December 2011.

2.3.6 Peruvian Railway Infrastructure

The rail network of Peru has an extension of 2,020 km and its infrastructure is composed of two main systems: the Central Railway (Ferrocarril Central) and the Southern Railway (Ferrocarril del Sur), covering the departments of Arequipa, Puno and Cusco. In the Peruvian portion of the area of influence there are three rail systems —the Southern Railway, the Southern Peru rail and the Tacna-Arica line. Southern Peru is completely privately-owned.

The Southern Railway is the main railway in the region in terms of extension as well as of freight and passenger transportation. The Southern Peru rail is owned by the Southern Peru mining company and is solely used for transporting the company's own mineral to and from its mines and the Ilo foundry.

There is a line joining the port of Arica and the city of Tacna, which today is used for cement and passenger transportation. This line runs from the Peruvian dock in the port of Arica to the center of the city of Tacna, and there are prospects for a connection with ZOFRATACNA through the construction of a new branch and unloading yard.

Southern Railway (Trans-Andean Rail)[21]

The Ferrocarril Trasandino S.A. concern —which manages the Southern or Trans-Andean Railway— is the property of Orient-Express Hotels Ltd. (50%) and Peruval Corp. S.A. (50%), a Peruvian privately-owned company. It is operated by PeruRail S.A., which is also owned by Orient-Express Hotels Ltd. and Peruval Corp. S.A.

The concession contract signed in 1999 between the Transportation and Communication Ministry of Peru and Ferrocarril Transandino S.A. establishes a 30-year concession, which may be extended for 5-year periods, up to a maximum of 60 years.

This rail network comprises two sections:

- The South Section, for passenger transport, covering the routes between Arequipa and Cusco. The most important markets served by this network are the ones in the Cusco-Juliaca/Puno (338 km) and Juliaca/Puno-Cusco route.
- The Southeast Section, which operates between Cusco and Machu Picchu, spanning 160 km approximately. This is the main tourist access way to Machu Picchu.

The Southern Railway is the major railway in terms of freight and passenger transport within the southern region. From its origin at the port of Mollendo, the railway runs to Arequipa, and from there to the city of Juliaca, where it forks into a branch to Puno, by Lake Titicaca, and another branch to the city of Cusco.

The largest source of its operator's revenues is passenger transportation (79.7%), mainly in the tourist Cusco-Machu Picchu route, and the remaining 20.3% is contributed by freight. The PETROPERÚ company, the main user of this railroad, accounts for the largest portion of freight transport, mostly oil products supplied to Cusco (75%) and Juliaca (25%) from the port of Matarani. IASA, the second largest customer, exports the soybean grown in Bolivia from the port of Matarani.

Southern Peru Rail[22]

This railway was built to meet the needs of the Southern Peru Copper Corporation, the world's eighth largest copper producer. It is privately owned and serves this mining company exclusively, playing specific roles in its logistics.

It connects the port of Ilo (copper foundry and refinery) with the mines of Toquepala and Cuajone. It uses a standard gauge of 1,435 mm, is 215-km long, and has about 240 km of rail tracks and five tunnels. The Ilo-Toquepala branch was built between 1956 and 1959, while the El Sargento-Cuajone branch was constructed between 1970 and 1975. Its rolling stock features 30 locomotives, manufactured in 1975, and 709 wagons.

When special items are required to be transported, an additional train is arranged to suit the specifications and operations needed. Since this railway specializes in the transportation of copper ore from and to the mines and the foundry, the freight volume is directly dependent on the volume of copper exports, which has fluctuated in the last seven years, having reached more than 5.2 million tons in 2006. The cargo per kilometer peak was recorded in 2004, with 700 thousand net tons/km.

[21] Taken from the ZAL SUR Survey, Module 1, prepared by ALG.
[22] Taken from the ZAL SUR Survey, Module 1, prepared by ALG.

Table 42 – Passengers and Cargo Carried per Rail Company

Railway	Passengers		Cargo (Tons)	
	2007	2008	2007	2008
Tacna-Arica	42,037	57,899	-	884
Matarani-Cusco	23,878	25,684	108,624	98,874
Southern Peru Cooper Corp.			5,393,779	5,935,560
Total Peru	**1,654,975**	**1,638,688**	**8,306,895**	**9,114,913**

Source: Transportation and Communications Ministry

2.3.7 Bolivian Waterways

The Bolivian Amazon Basin is rich in waterways, with very important rivers and tributaries for merchant shipping discharging into the Amazon river. It comprises about 5,000 kilometers of navigable rivers and a vast network of minor or secondary tributaries, thanks to which it is possible to link extensive areas fit for the production of grains, sugar cane, banana and root crops, and mainly the large savannas, rich in pasture for extensive beef cattle raising.

The main navigable waterways for trade purposes are the Beni and the Madre de Dios rivers, which join together in the city of Riberalta, reaching up to Villa Bella under the name of Beni river; and the Ichilo-Mamoré and the Iténez rivers, which join the Beni River in Villa Bella to form the Madera river, which flows into the Amazon river.

These water courses, especially the Ichilo-Mamoré river, used to be the only means of communication and transport to the north and northwest of Bolivia from the major production centers (La Paz, Cochabamba, Santa Cruz, Sucre, etc.).

Today, the expansion of the Asian markets has driven Brazilian producers, manufacturers and exporters to take aim at those consumption centers; hence the urgent need to find low-cost access ways to the Pacific ocean via export corridors that ensure positive economic results and a market for their products.

The Bolivian territory might be used as an export corridor, at an affordable cost, by utilizing the Ichilo-Mamoré waterway from Guajará-Mirim (state of Rondônia) to the town of Puerto Villarroel, at the very heart of the Bolivian territory, from where the Pacific coast might be reached by land.

The cities of Guajará-Mirim (Rondônia, Brazil) and Guayaramerin (Bolivia) are located at the heart of the area of influence of the Brazilian states where soybean, beef, wood and other commodities are produced.

The Ichilo-Mamoré waterway is navigable during 80% of the year by vessels with an average draft of 1.80 m, i.e. carrying approximately 500 to 600 ton shipments, and has an extension of 1,380 km from Guajará-Mirim to Puerto Villarroel.

From Puerto Villarroel, the Pacific coast can be reached through a paved road that is approximately 953-km long, taking the port of Arica as a point of reference.

Today, the Asia-bound Brazilian production —mainly soybean— has to travel some 3,140 km by land from Porto Velho (capital of the state of Rondônia) to the sea port of Santos on the Atlantic ocean, from where it is carried by sea to the Asian markets, with an approximate journey of 12,500 nautical miles, either through the Strait of Magellan or the Panama Canal.

Yet, from Africa or another sea port in Peru or Chile to the Asian markets, the travel distance by sea is only 8,500 nautical miles, avoiding, in addition, the expenses associated with the use of the Panama Canal or the passage through the Strait of Magellan.

Therefore, the proposal by the Amazon Basin Navigation Improvement Service (Servicio de Mejoramiento de la Navegación Amazónica or SEMENA, in Spanish) offers alternatives that will result in significant savings in terms of land and, very especially, sea transport costs, not to mention the fact that the overall travel time will be drastically cut.

At present, the Ichilo-Mamoré waterway features two port terminals, one in Puerto Villarroel and another one in the city of Guayaramerin, equipped with the basic elements required for the handling of divisible merchandise and grains, outdoor storage areas, a roofed warehouse for goods requiring special care, a high-capacity scale for weighing trucks, and other equipment such as cranes, conveyor belts, forklifts, etc.

There is also a shipyard equipped with steel ship building facilities and machinery, operated by professionals and technical experts trained in Belgium or in other Bolivian facilities, thanks to the cooperation of the Kingdom of Belgium and the National Treasury of Bolivia.

Ship repair work is conducted in a floating dry dock, consisting in a steel pontoon fitted with the equipment required to be lowered and raised according to the carriers' vessels needs.

2.3.8 Maritime Ports in the Area of Influence

Table 43 - Maritime Ports in the Area of Influence

	Matarani	Ilo	Arica	Iquique
General cargo (ton/year)	721,763	98,343	1,771,635	3,018,361
Solid bulk (ton/year)	1,996,829	51,702	416,686	230,472
Liquid bulk (ton/year)	447,540	691	-	-
Containers (TEU/year)	10,736	34,860	58,221	263,451
Berth length (meters)	583	580	1,224	1,144
Max. draft (meters)	9.8	11	10.3	9.3
Roofed area (sq. meters)	24,246	10,174	28,456	10,590
Unroofed area (sq. meters)	84,830	38,360	185,445	50,800
Mobile cranes	1 Gottwald HMK 280 crane, 63-ton lifting capacity	Not available	2 Gottwald HMK 300E cranes, each one with automatic spreaders, 100-ton lifting capacity each	One Demag mobile crane, 50-ton lifting capacity at 13 meters and 12-ton lifting capacity at 38 meters, and 2 state-of-the-art Gottwald cranes
Material handling equipment	2 pneumatic grain unloading towers with a capacity of 400 ton/hour, and 1 tubular conveyor belt (1,200 ton/hour), with zero emission	7 tractors, 11 forklifts, 2 container cranes, 4 tractor trailers, and 33 wagons	1,000 ton/hour mineral conveyor belts	3 bulk conveyor belts

Tons, year 2008
Arica and Iquique containers, year 2007. Source: ECLAC
Matarani, Ilo, year 2008. Source: Peruvian National Team

Table 44 – Imports, Exports and Goods in Transit in Ports in Area of Influence (Tons)

	Imports	Exports	Goods in Transit and Transshipments	Total Tons
Matarani (1)	1,291,250	1,942,386	115,728	3,349,364
Ilo (1)	100,312	334,069	256	434,637
Arica (2)	152,969	134,935	1,299,082	1,586,986
Iquique (2)	1,549,312	974,481	153,646	2,677,439
Total	**3,093,843**	**3,385,871**	**1,568,712**	**8,048,426**

(1) Source: Peruvian National Team
(2) Sources: Empresa Portuaria de Arica (EPA), 2009, at www.puertoarica.cl, and Empresa Portuaria de Iquique (EPI), 2009, at www.epi.cl

The **port of Arica** is run by the Empresa Portuaria Arica or EPA (the State-owned company serving as the port authority), and operated by a Chilean-Peruvian consortium made up of Ultramar, SAAM and Agunsa (on the Chilean part) and RANSA (on the Peruvian part), under a concession awarded by the EPA for a 30-year period as from October 2004.

This port has road and rail connections with Bolivia and Peru. There is railroad connectivity to Bolivia via the Arica-La Paz route (rehabilitation will start in 2010), and

to Peru through the rail network joining the cities of Arica and Tacna. By land, the port is connected to route 5 North, as well as to several border crossings: the Chungará-Tambo Quemado border crossing (Bolivian border) can be reached by route 11 CH, which also allows linkage to the Mato Grosso state in Brazil (via the so-called "North Bi-Oceanic Corridor"); and the Chacalluta border crossing (Peruvian border) can be accessed by route 5 North.

The port is operational 97% of the time, i.e. proper mooring/unmooring conditions are available at least 354 days a year. It has 30,456 square meters of roofed and partially roofed storage areas, and 139,695 square meters of outdoor storage areas.

The **port of Iquique**, run by the Empresa Portuaria Iquique or EPI (the State-owned company serving as the port authority) is located opposite the city of Iquique, 1,857 kilometers north of the city of Santiago. Given its strategic location, the port allows privileged access to the countries in the so-called “South America central cone" region and its facilities concentrate a significant portion of the trade between this South American region and the Pacific Rim countries. Iquique can be reached by air and land. The airport is a point of access to the port, which also has direct access to route 5 North. It is linked to the II Region through the coastal highway, which connects it with the port of Tocopilla. It also has connectivity to the neighboring countries, particularly Bolivia by route 15 CH, through the Colchane border crossing.

The port of Iquique features two mooring terminals: Terminal 1, called *“Molo,”* which is managed by EPI and operated by multiple companies, and Terminal 2, called *“Espigon,”* exclusively operated by the company Iquique Terminal Internacional (ITI).

The port has 12,088 square meters of roofed and partially roofed storage areas, and 226,960 square meters of outdoor storage areas.

It is worth noting that since mining is the single most important economic activity in this region, the mining concerns of Escondida, Candelaria, Collahuasi and Los Pelambres have built four private ports in the area, having a joint total nominal loading capacity of 6,000 metric tons/hour.

The **port of Ilo** is located in the district and province of Ilo, department of Moquegua, on the south Pacific coast. The area of influence of the port includes the departments of Puno, Tacna, Moquegua, Arequipa and Cusco as well as the Republic of Bolivia. It is 47 km away from the Pan-American Highway.

This port features the public dock of the Empresa Nacional de Puertos S.A. or ENAPU (a company that serves as the national port administration of Peru) and the private dock of Southern Peru Copper Corporation, among other berths. The terminal facilities consist of one main 302 meter-long dock containing four berths to accommodate vessels with a maximum draft of 16 to 36 foot. A Ro-Ro berth is also available.

It has a 1,560 square-meter warehouse that can accommodate 9,000 tons. There are six outdoor storage sectors for general cargo and full and empty containers, covering a total area of approximately 28,000 square meters, with a total storage capacity of some 100,000 tons; sector 5 is designated for the handling and storage of hazardous cargo, and sector 6 has an area of 10,000 square meters for future expansion.

The main types of goods handled at the port of Ilo are exports of minerals (copper cathodes), fish meal, general cargo and equipment. It also handles Bolivia-bound steel,

vehicles, spare parts and accessories, as well imports of general cargo, mining equipment, vehicles, sugar and minerals.

The **port of Matarani** is located in the district and province of Islay, in the department of Arequipa. Its area of influence encompasses the departments of Moquegua, Puno and Cusco, in addition to being linked with the neighboring Republic of Bolivia. The port is connected with the Pan-American Highway via a 54-kilometer turn-off. In addition, there is a rail connection linking it directly with Arequipa and, then, with Juliaca, Puno and Cusco.

This is the only port run by a private group and the country's second port in terms of cargo movement. It consists of a 163-hectare terminal on the Matarani Bay, protected by two breakwaters. Port facilities include a 583-meter marginal dock with three mooring berths and one Ro-Ro berth. The Matarani port terminal was privatized in 1999, when its operation was awarded under concession to TISUR (Terminal Internacional del Sur S.A.).

For moving break bulk cargo, forklifts and mobile cranes are used. Liquid bulk cargo is carried through pipes, and dry bulk cargo is moved on a conveyor belt. The port has a total of six warehouses for break bulk cargo, with warehouse number 6 being designated for hazardous cargo. Warehouses 1, 2 and 3 are located right behind the three berths.

There are five unroofed storage areas for break bulk cargo and containers. The concrete and metal silos were built for dry bulk cargo storage (mainly grains). These silos have a combined storage capacity of approximately 75,000 tons.

The main products handled at the port of Matarani as a transshipment hub are:

- Imports: grains, fertilizers, bulk coal, sulfuric acid, and vehicles;
- Exports: bulk mineral concentrates, copper cathodes, fish meal, and soybean meal.

The Peruvian dock at the Arica port is located at Terminal 7, just south of the Peruvian border and on the northern limit of the Atacama desert. The port serves several countries and its area of influence in Peru is the Peruvian southern area, including the cities of Tacna, Moquegua, Arequipa, Cusco and Puno.

The Peruvian dock within the Arica port saw its operations boosted with the amendment of the ZOFRATACNA (Tacna Free Trade Zone) Law and the commencement of feeder operations by the Transmares shipping company.

This dock, built on concrete pilings, is 215 m long and 58 m wide. It has a berth depth of 28 feet and a working length of 185 meters, and the terminal can service ships of up to 20,000 DWT.

The equipment needed for port maneuvers may be rented from the Chilean terminal operator (TPA). Service to this dock is provided by the vessel *Colca*, owned by Transmares, a company of the Chilean group Ultramar, which renders feeder service between Iquique and Callao to this dock. Cargo movement dropped by 5,000 tons in 2005 to pick up in 2006, reaching more than 25,000 tons in 2007.

Imports through this dock remained stable between 2004 and 2006, standing at approximately 15,000 tons, while in 2007 they totaled more than 25,000 tons.

2.3.9 Airports in the Area of Influence

The Arica and Parinacota Region is served by the Chacalluta international airport, located near the city of Arica and equipped for passenger transport. Refurbishing works representing an investment of US$2.5 million were recently completed, including escalators and passenger boarding bridges (jetways or jet bridges), among other state-of-the-art services. The airport is located 51 meters above sea level and features a 2,170-meter long and 45-meter wide asphalt paved runway.

Airport Diego Aracena, built near the city of Iquique, serves the Tarapacá Region. It is equipped for both cargo and passenger movement. It is located 49 meters above sea level and has a 3,350-meter long and 45-meter wide asphalt paved runway.

In Peru, Arequipa is the largest populated area in the Southern Region and, hence, constitutes an attractive market for domestic non-tourist flights, although the growth in tourism in recent years has also contributed to the increase in the number of passengers.

Given the greater demand for passenger transportation services, driven by the domestic market and the inflow of tourists, the cities located in the south of the country are served by Boeing or Airbus planes with large cargo capacity. Even when there is cargo hold space available in passenger flights, such space is not used as rates are hardly competitive. These holds might be used for cargo transportation if attractive prices were offered, but this strategy is barely considered because land transport, with greater frequencies and very often unregistered carriers, provides much cheaper transport to Lima, making air cargo hardly competitive.

On the other hand, the constraints posed by air freight, such as the fact that merchandise has to be dispatched one and a half hours before flight departure time, affect operational flexibility, another aspect taken into account by shippers, although price remains the determining factor.

2.3.10 Free Trade Zones and Export, Transformation, Industry, Trade and Services Centers (CETICOS, in Spanish)

CETICOS Ilo

CETICOS Ilo is a free trade zone (with the status of a "special treatment primary customs zone" under Peruvian law) intended to foster domestic and foreign investment, encourage exports of value-added products and employment generation, and promote the development of logistics activities.

It is located in the Moquegua region, off the South Coastal Highway, 7.6 kilometers from the city of Ilo, and occupies an area of 163.5 hectares, 16 of which are fully operational.

Its purpose is to contribute to the economic and social development of the region through private domestic and foreign investment promotion and attraction initiatives and the implementation of a logistics services platform, with a view to securing foreign market access for regional production.

The following are some of the activities that can be conducted at CETICOS Ilo under a special scheme of tax and tariff exemptions and customs benefits, among other privileges: manufacture or production, maquila, assembly, storage, repair and/or reconditioning of used vehicles, machinery and equipment, agribusiness, agricultural exports and related services (assembly, packaging, labeling, classification of goods for manufacture or production activities).

CETICOS Matarani

CETICOS Matarani is an autonomously-managed free trade zone (with the status of a "special treatment primary customs zone" under Peruvian law). It is empowered to guarantee the stability of current and future investments in the special development zone allocated to it, which encompasses a total area of 354 hectares, 15 of which are fully operational.

It is located in the district and province of Islay, department of Arequipa, off the Matarani-Mollendo road. It adjoins Peru's second largest port, and will be one of the exits to the Pacific ocean of the inter-oceanic highway.

In 1989, the Peruvian government laid the foundations for an initiative aimed at encouraging the socioeconomic development of areas outside its scope by stimulating industrial development, creating the Matarani Industrial Free Zone (ZOFRAMA) and transferring control over the 354.48-hectare awarded area first to the regional government and, later, to the ZOFRAMA Board of Directors.

Today, having consolidated the advantages and scopes that ZOFRAMA represented, the Matarani Free Industrial Zone has grown into a CETICOS (with administrative, technical, economic, financial and operating autonomy), thereby ensuring exporters, importers, logistics services providers, mining concerns, contractors and other private-sector stakeholders the opportunity to invest under advantageous tax, tariff, port proximity and capacity conditions, with access to and from Arequipa, the southern region of Peru, the center and southwest region of Brazil, and the entire Bolivian territory.

ZOFRATACNA

ZOFRATACNA is located off the South Pan-American Highway, 9.5 kilometers from the city of Tacna and 3 kilometers from the Coronel FAP Carlos Ciriani Santa Rosa International Airport. The Tacna Free Trade Zone is an enclosed site occupying an area of 390 hectares, 120 of which are fully operational, featuring services such as optic fiber, electricity, water, sewage, roads, sidewalks, parking spaces, green areas, etc. It is a "special treatment primary customs zone," strongly trade-related, with well-recognized experience and development in the country.

ZOFRATACNA allows industrial, agribusiness and maquila activities, as well as maintenance and repair of mining equipment and machinery. Services include goods storage and distribution, assembly, disassembly, packing, unpacking, packaging, labeling, fractioning, display and classification.

It has been in operation for 18 years and offers comparative and competitive advantages for industrial, trade and services activities with specific tax and tariff benefits. Its mission is to develop a platform of competitive services capable of adding value to its users' businesses, and its vision is focused on being the leading Latin American business opportunity provider by offering competitive advantages to its users.

Chacalluta Industrial Park, Province of Arica

Founded in 1994 by ZOFRI S.A., the Chacalluta Industrial Park, located in the province of Arica, offers domestic and foreign investors 123 hectares of industrial space, with special benefits and exemptions being granted to industrial activities such as product assembly, mounting, finishing, manufacture integration and industrial transformation.

Its location near the Chacalluta International Airport and the Pan-American Highway (or Route 5) ensures quick connection with Peru, Bolivia and the rest of Chile.

The Park features fully developed 1,500 to 10,000 square meter sites, with the added value of a modern service infrastructure suitable for industrial activities, in addition to different ROI boosters and activity facilitators such as the exemptions provided for in the Free Trade Zones Law, Executive Order 341-1977, the so-called Arica Law, subsidies granted by the Corporation for the Promotion of Production (CORFO, in Spanish), and incentives for the Province of Arica, such as those established in Executive Order 889 (labor subsidy) and Executive Order 15 (investment subsidy).

However, the Free Trade Zone Law, together with the Arica I and II Laws, empowers **the entire province of Arica to take advantage of the free trade zone status;** therefore, ZOFRI S.A. manages not only this industrial park but also the duty and tax exemptions in the entire province.

ZOFRI Iquique

The ZOFRI Free Trade Zone, a corporation in which the Chilean state owns a 71.2% interest, is located at the very heart of the capital city of Iquique, province of Iquique, in the Tarapacá Region.

The territorial scope of the activities of ZOFRI includes the sites it owns in Iquique, Alto Hospicio, and the Province of Arica, where, as mentioned before, it manages the industrial complex of Chacalluta and the customs duty exemptions for the entire province.

In Iquique it owns 175 hectares where more than 1,000 facilities are rented to customers who store their products, which they later sell to South American customers.

Also within those 175 hectares is the ZOFRI Mall, featuring more than 400 stores in an area of 33,000 square meters, as well as a logistics center with 5 warehouses providing more than 16,000 square meters of storage space for customers who do not have warehouses of their own, in addition to a vehicle yard and the corporate building.

In Alto Hospicio, ZOFRI has an area of 128.7 hectares, where the construction of an outer harbor is in full progress.

2.3.11 Logistics Platform Projects

Within the area of influence there are three major logistics platform implementation projects: one in Oruro (Bolivia), another one in Arica (Chile), and the third one in Arequipa (Peru).

These projects are at the study phase, with different degrees of progress.

Oruro Dry Port, Bolivia

The Oruro Dry Port (maritime terminal) project consists in an inland infrastructure specialized in rendering domestic and international trade-related services for bulk breaking of containerized goods carried by sea and land, where it is necessary to concentrate conventional activities in terms of consolidation, handling, storage, etc., while creating value added via stock management, packing and quality control operations, among other things. From this infrastructure it will be possible to subsequently distribute the goods by land, rail, air and sea in containers and other transport packing forms, pursuant to domestic and international standards currently in force. The project provides for other activities inherent to the nature and essence of this infrastructure.

The main advantages of the Oruro Dry Port are:

1. State-of-the-art logistics infrastructure in the department of Oruro;
2. Easily expandable logistics platform, communications hub and intermodal transport switch point;
3. Broad access ways and state-of-the-art technology, telecommunications and services;
4. Optimized organization, management and coordination with transport and distribution companies;
5. Great opportunities for the supply of services related to the storage, consolidation, deconsolidation and handling of goods and their subsequent distribution, as well as any other possible activity.

Logistics Platform for the Arica and Parinacota Region, Chile

The regional production development strategy for the Region of Arica and Parinacota has defined the setup of a logistics services platform as one of its strategic development axes.

This initiative pursues the integration of the regional economy into the international markets and the facilitation of trade as the two pillars of a business development policy. It is for this reason that the development of logistics services should be encouraged as a competitive strategy capable of adding value to the domestic and foreign freight traveling within the territory to or from the port of Arica, in order to take advantage of the typical free industrial zone tax and tariff benefits as well as of access to markets under existing trade agreements.

General Goal

To position the region as a platform for logistics services and value-adding industries for cargo, with a privileged treatment in relation to its territorial environment, leveraging the trade in goods and raw materials as well as the creation of industrial processes and international trade.

Specific Territorial Goal

To develop the different cargo movement infrastructures (port, airport, railways, roads) existing in Arica and to support its role as a logistics center in the performance of international trade arrangements, by reinforcing all the activities related to both incoming and outgoing cargo trade, storage, movement and conversion.

In this regard, it is important to note that the Arica and Parinacota Region, through its Regional Agency for Production Development, in association with the Ministry of Public

Works and CORFO, has been awarded an International Technical Assistance Project for the design, setup and operation of the Arica and Parinacota logistics platform. Via a cooperation grant by the Chilean International Cooperation Agency (AgCI, in Spanish), made up of funds open to public competition, this program —which is co-financed by the region— has a thirty-month implementation timeframe.

Urban Distribution Platform, Arequipa (Peru)

With a view to fostering the development of logistics infrastructure in Peru, the Peruvian Transport and Communications Ministry and the Inter-American Development Bank are leading the "Study on the Location, Feasibility, and Management System Design of Logistics Platforms in Southern Peru."

The project is aimed at conducting all feasibility studies necessary for the development of the first logistics platform in Peru's southern region, where value added services will be provided and the diversification of the supply of services will be fostered. The project includes location surveys to identify the node that is best suited for the short-term development of logistics infrastructure, pre-investment studies for the location of choice, and a platform design proposal, as well as the legal and institutional studies required to define the most appropriate investment incentive scheme for the provision of the infrastructure and related services.

The main conclusion of the location study is that the Department of Arequipa is the one with the greatest potential for the short-term development of a logistics platform oriented to the urban distribution of goods, as it concentrates high production and consumption levels, in addition to having an ever more consolidated logistics base, infrastructure networks and land availability. Likewise, the development of a logistics platform to support the consolidation of export cargo —mostly produced in the Arequipa plains— is identified as a mid-term investment opportunity. Thirdly, the volumes handled in the Tacna node are attractive enough to consider the development of a border support center.

On the basis of the market research conducted, urban distribution of goods is the main target functional orientation of the platform. Potential users associated with this type of activity are mass consumer product distributors, supermarket chains, logistics operators and freight carriers.

The second target functional orientation of the platform is regional distribution. Potential users are, once again, distributors, supermarkets, logistics operators and carriers, plus large local producers, mainly of mass consumption goods.

The third functional orientation identified for the platform, although not deemed a priority, is the consolidation of exports of goods produced in the city of Arequipa, particularly textiles, handicrafts, construction materials, and dairy products, among others.

The demand identified for the platform has been estimated on the basis of interviews and consists, in a first stage, in some 10.7 hectares of land supplemented with a truck center and a service center aimed at facilitating the establishment of companies providing support to the logistics sector, such as freight forwarders, carriers, temporary job agencies, banks, insurance companies, etc.

3. Economic Sectors Considered in the Analysis

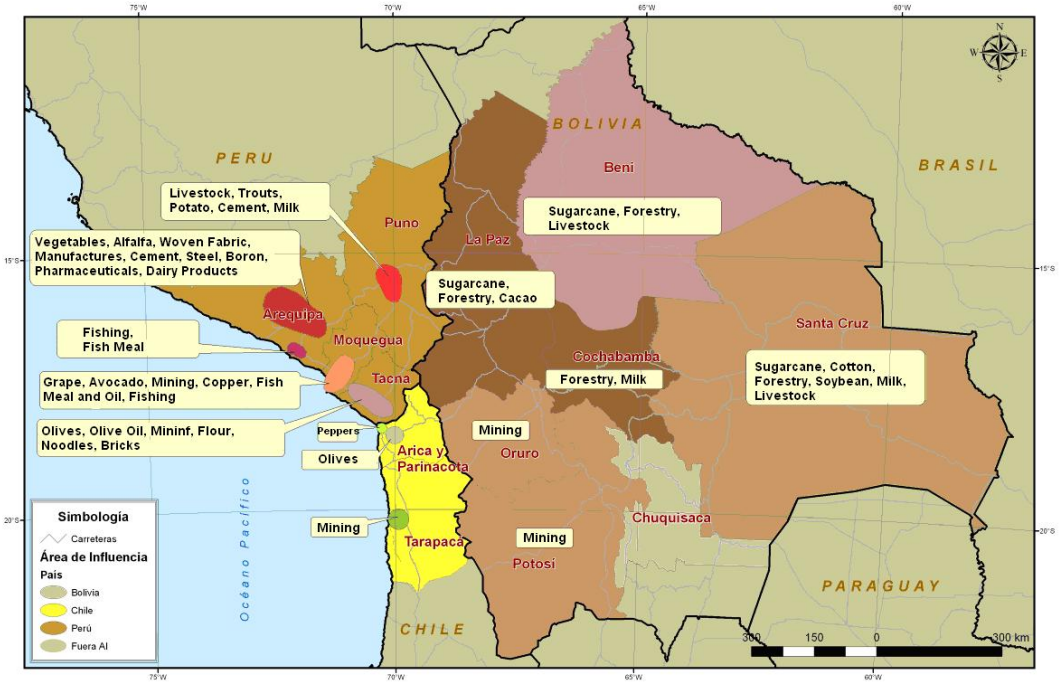
The selection of the economic sectors to be considered in the analysis was based on three basic criteria, regardless of whether it is a production integration or value-added logistics services analysis. Such criteria are as follows:

i) The selected sector is a beneficiary of IIRSA Project Group 5 of the Central Interoceanic Hub;
ii) The sector is important for the development of the area of influence;
iii) The sector is actually or potentially important for the economic integration of the countries involved in the group of projects.

Based on the aforementioned background data, the following sectors were previously identified for fieldwork purposes:

- Providers of mining services and supplies;
- Logistics and services platform for international trade;
- Sugar-biscuits;
- Cotton-yarn;
- Scrap-wires;
- Soybean-balanced animal feed;
- Leather and manufactures thereof;
- Milk and dairy products;
- Wood-furniture;
- Spices and olives;
- Jewelry.

Figure 35 – Production Map of Area of Influence



The following is a summary of the outcome of the analysis and the work carried out by the national teams at the workshop held in Santa Cruz de la Sierra in June 2009 on the basis of the information gathered during interviews with key stakeholders from each selected sector.

3.1 Providers of Mining Services and Supplies

This sector —led by a group of small- and medium-sized businesses based mainly in the city of Iquique— was identified as having production integration potential taking into account prior studies commissioned by ProChile, where the so-called "regional export clusters" were described.[23] Since 2005, efforts have been made to encourage association processes with the support of the Iquique Industrial Association.

The firms in such group are providers of supplies and services to large mining concerns, and the purpose of the clustering effort is getting to export such mining supplies and services. It is worth noting there are other 63 mining supply and service provider companies identified in the city of Iquique, and in Arica, another five.

Given the vigorous development of the mining industry in Chile, one of the world leaders in this activity, it is not difficult to assume the existence of vendors who provide the industry giants with all sorts of mining-related equipment, inputs and services.

This is, indeed, a positive fact. Yet, based on the interviewees' input, it can be inferred that, rather than consolidated clusters of companies that supply mining-related services and inputs, there is a series of economic agents who market their products on an individual basis. There is not a permanent or consolidated presence in Peru, and much less in Bolivia, and the attempts at consolidating this flow of inputs and services have been isolated and unsuccessful.

It should be noted, then, that there is production development potential in this sector and, hence, it should be considered an emerging sector.

3.2 Logistics and Services Platform for International Trade

This sector encompasses the services offered on the basis of the logistics infrastructure projects described in 2.3.11.

3.3 Sugar (Bolivia) – Biscuits (Peru)

Peru imports from Bolivia between 40 and 50 tons of sugar, which accounts for about 20% of the Peruvian imports of this commodity (Colombia is the main supplier of Peru, with 50%) and 30% of Bolivian exports. Chile has a marginal share in Bolivia's exports. Almost all Bolivian sugar exports to Peru used the Desaguadero border crossing.

In spite of this significant trade flow between both countries, the largest portion of the Bolivian sugar entering Peru is not meant to be a part of a production process, but it is used for consumption. The main importers are two Arequipa city-based wholesale

[23] "Identificación de clusters exportadores en la Región de Tarapacá," Paris Salgado, 2006.

distributors of food, beverages and tobacco: Distribuidora Alimentaria S.A. and Corporación de Alimentos del Perú. The exception is Corporación José R. Lindley, which has soft drink manufacturing plants in Arequipa and Cusco.

For the above reasons, no production integration potential is identified in this sector.

3.4 Cotton (Bolivia) – Yarn (Peru)

Bolivian cotton is produced and stocked in the area of Pailón, department of Santa Cruz. From there, it is carried by route 4 to the city of La Paz going past Cochabamba. It enters Peru via the Desaguadero border crossing, its final destination being the yarn production facilities located in the city of Lima, with part of this production being later exported to Bolivia. Peru explains 43% of the Bolivian cotton exports.

In 2008, Peru imported some 52,029 tons of cotton for a CIF value of US$94,030,974. The United States was its largest exporter (48,919 tons), with a total share of 94.0%, followed by far by Burkina Faso, with 1,614 tons (3.1%), and Bolivia, with 1,234 tons (2.4%). The average value density of cotton imports was US$1,766/ton.

Table 45 – Origin of Peruvian Cotton Imports in 2008

Country of Origin	CIF Value	Volume		%	Value Density
	US$	kg	tons		US$/ton
United States	89,040,057	48,919,229	48,919	94.0%	1,820
Burkina Faso	2,589,596	1,613,740	1,614	3.1%	1,605
Bolivia	1,901,257	1,234,148	1,234	2.4%	1,541
Colombia	342,629	193,911	194	0.4%	1,767
Spain	157,071	67,970	68	0.1%	2,311
Chile	363	234	0	0.0%	1,553
Total	94,030,974	52,029,232	52,029	100.0%	1,766

Source: Prepared by the Peruvian team based on customs data

On the other hand, of the 1,234 tons of cotton exported by Bolivia to Peru, 100% entered through the Desaguadero border crossing, from where they were carried to the Lima production centers.

Of the total 1,234 tons imported through Desaguadero, 58.4% (720 tons) was imported by the firm Fábrica Tejidos Pisco S.A.C., followed in order of importance by La Colonial Fábrica de Hilos S.A, which imported nearly 289 tons in 2008, accounting for 23.4% of the total imports of Bolivian cotton. Finally, Tejidos Jorgito S.R.L. imported 225 tons, with an 18.2% share of the Bolivian cotton import market. The three companies have their production plants located in Lima.

Table 46 – Peruvian Importers of Bolivian Cotton in 2008

Importer	CIF Value	Net Weight		%
	US$	kg	tons	
Fábrica de Tejidos Pisco S.A.C.	1,122,569	720,237	720	58.4%
La Colonial Fábrica de Hilos S.A.	488,728	288,818	289	23.4%
Tejidos Jorgito S.R.L.	289,960	225,093	225	18.2%
Total	1,901,257	1,234,148	1,234	100.0%

Source: Prepared by the Peruvian team based on customs data

The imported cotton is used as a raw material for cotton yarn manufacturing.

In 2008, Peru exported 6,474 tons of cotton yarn for a FOB amount of US$38,889,532. The destination of the cotton yarn exports is highly diversified, with Brazil being the largest buyer of Peruvian cotton yarn (749 tons, accounting for 11.6% of the total), followed by Venezuela (10.9%), Chile (10.8%), and Belgium (10.1%). The share of the remaining countries is below 10%. The exports of cotton yarn to Bolivia amounted to 163 tons for a FOB value of US$878,369. The average value density of cotton yarn exports was US$6,238/ton.

Table 47 – Destination of Peruvian Cotton Yarn Exports in 2008

Country of Destination	FOB Value	Volume		%	Value density
	US$	kg	tons		US$/ton
Brazil	5,777,955	749,104	749	11.6%	7,713
Venezuela	1,752,416	707,967	708	10.9%	2,475
Chile	1,966,365	699,484	699	10.8%	2,811
Belgium	5,113,466	654,779	655	10.1%	7,809
Hong Kong	2,985,895	412,665	413	6.4%	7,236
Netherlands	2,945,485	402,308	402	6.2%	7,321
Ecuador	1,546,925	352,724	353	5.4%	4,386
Taiwan	2,222,174	335,671	336	5.2%	6,620
Argentina	2,242,797	335,170	335	5.2%	6,692
Colombia	2,070,130	333,308	333	5.1%	6,211
Spain	1,595,993	315,165	315	4.9%	5,064
Italy	3,078,966	314,269	314	4.9%	9,797
Germany	1,923,112	274,284	274	4.2%	7,011
Bolivia	878,369	162,800	163	2.5%	5,395
Japan	537,458	78,836	79	1.2%	6,817
United Kingdom	442,773	62,678	63	1.0%	7,064
Sweden	316,100	62,245	62	1.0%	5,078
Other countries	1,493,154	220,247	220	3.4%	6,779
TOTAL	38,889,532	6,473,704	6,474	100.0%	6,238

Source: Prepared by the Peruvian team based on customs data

Of the 163 tons of cotton yarn exported to Bolivia, 35.4% was exported by Empresa Algodonera S.A., a company having its main plant in Lima. Ranking second is Textiles del Sur S.A.C., with its factory also located in the city of Lima, accounting for 25.3% of cotton yarn exports to Bolivia. The exports by La Colonial Fábrica de Hilos S.A. (12.9%) and Unifi S.A.C. (12.3%) are also significant. The share of the remaining firms is below 5%.

Table 48 – Peruvian Cotton Exporters to Bolivia in 2008

Exporter	FOB Value	Net Weight		%
	US$	kg	tons	
Empresa Algodonera S.A.	238,538	57,606	58	35.4%
Textiles del Sur S.A.C.	208,010	41,267	41	25.3%
La Colonial Fábrica de Hilos S.A.	133,894	21,008	21	12.9%
Unifi S.A.C.	58,000	20,000	20	12.3%
Cia. Ind. Textil - Trutex S.A.A.	49,638	8,097	8	5.0%
Hilandería de Algodón Peruano S.A.	24,845	4,375	4	2.7%
Textil El Amazonas S.A.	52,237	3,891	4	2.4%
Cortextil E.I.R.L.	76,548	3,191	3	2.0%
Inca Tops S.A.A.	25,661	1,960	2	1.2%
Industria Textil Piura S.A.	8,973	1,150	1	0.7%
Perú Naturtex Partners E.I.R. Ltda	2,026	255	0	0.2%
Total	878,369	162,800	163	100.0%

Source: Prepared by the Peruvian team based on customs data

It must also be noted that of the 163 tons of cotton yarn exported to Bolivia, 85 tons (52.5%) were exported via the port of Callao, 41 tons (25.3%) were exported via the port of Pisco, while 31 tons (19.3%) left through the Desaguadero border crossing.

Table 49 – Customs Office of Exit of Bolivia-Bound Peruvian Cotton Yarn Exports in 2008

Point of Departure	FOB Value	Net Weight		%
	US$	kg	tons	
Port of Callao	435,784	85,472	85	52.5%
Port of Pisco	207,507	41,167	41	25.3%
Desaguadero	154,985	31,368	31	19.3%
Callao Airport	74,934	4,456	4	2.7%
Arequipa	5,158	336	0	0.2%
Total	878,369	162,800	163	100.0%

Source: Prepared by the Peruvian team based on customs data

Finally, we may add that the destination of 91.4% of the total cotton yarn exported by Peru to Bolivia was the region of La Paz, followed by far by Arica, which received 7.0% of the total.

Table 50 – Customs Office of Exit and Destination of Bolivia-Bound Peruvian Cotton Yarn Exports in 2008

Origin	Destination				Total	%
	Arica	Cocha-bamba	La Paz	Other		
	tons	tons	tons	tons	kg	
Callao Airport	0	2	3	0	4	2.7%
Arequipa	0	0	0	0	0	0.2%
Desaguadero	0	0	30	1	31	19.3%
Port of Callao	11	0	74	0	85	52.5%
Port of Pisco	0	0	41	0	41	25.3%
Total	11	2	149	1	163	100.0%
	7.0%	1.0%	91.4%	0.5%	100.0%	

Source: Prepared by the Peruvian team based on customs data

Based on the information above, we can chart the current logistic structure of the cotton (Bolivia) and cotton yarn (Peru) economic sector as follows.

Figure 36 – Cotton-Cotton Yarn Production Chain

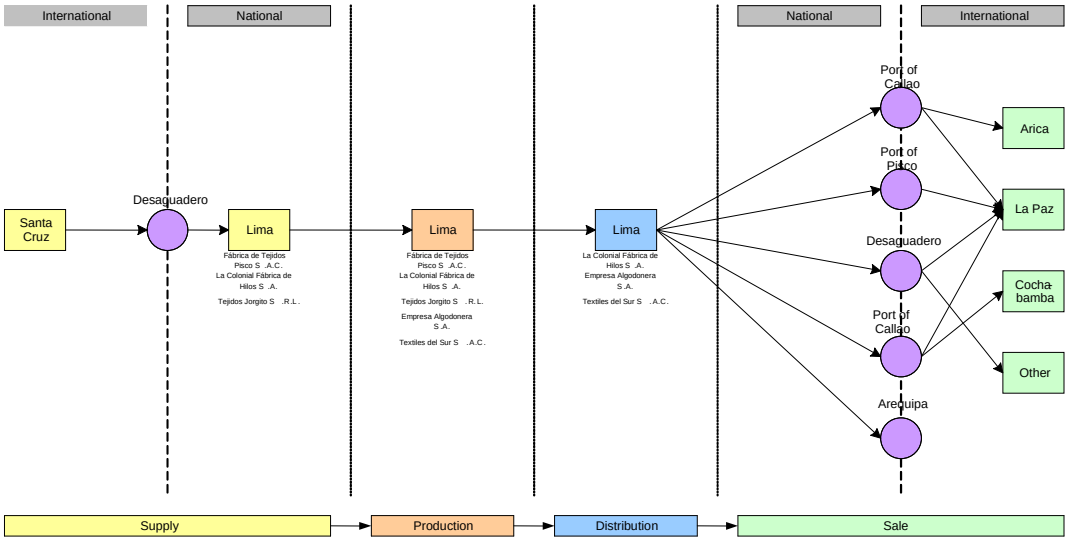


Figure 37 – Map of the Cotton-Cotton Yarn Production Chain

For Peru, Bolivia is a marginal supplier and destination of cotton imports and yarn exports, respectively. In addition, Bolivian cotton is not being used within the area of influence at present.

There is, however, production integration potential due to the installed capacity of the yarn production plants located in the area of influence, especially in Arequipa.

The realization of such potential is dependent upon the possibility of enhancing the quality of the product, which would require the genetic improvement of seeds and the upgrade of agricultural production systems. In addition to this, another opportunity seems to be the improvement of municipal roads to facilitate market access of cotton production.

Cotton freight to Peru and yarn freight to Bolivia utilize infrastructure that is part of IIRSA's project portfolio, although the use of this infrastructure by this chain is not relevant (5,200 annual tons, or approximately 170 trucks a year carrying 30 tons each). It is worth noting that the Lima-bound freight should be transported by the Ilo-Desaguadero road. Yet, since this road has no service facilities for carriers, alternative routes are used.

3.5 Scrap (Bolivia) – Wire (Peru)

Steel or iron scrap originating in Bolivia is employed in Peru as a raw material in the manufacture of steel or iron wire, part of which is subsequently exported to Bolivia. Almost 90% of the Bolivian exports of scrap have Peru as their destination, while less than 5% is sold to Chile.

In 2008, Peru imported some 166,735 tons of scrap for a CIF value of US$82,405,329, the United States being its largest exporter, with 110,214 tons and a share of 66.1% of the total. Then come Chile, with 28,950 tons (17.4%), and Bolivia, with 25,479 tons (15.3%). The average value density of scrap imports was US$435/ton.

Table 51 – Origin of Peruvian Scrap Imports in 2008

Country of Origin	CIF Value	Volume		%	Value Density
	US$	kg	tons		US$/ton
United States	60,251,361	110,214,052	110,214	66.1%	547
Chile	13,426,978	28,949,855	28,950	17.4%	464
Bolivia	7,460,875	25,479,370	25,479	15.3%	293
Brazil	1,231,082	1,945,490	1,945	1.2%	633
Ecuador	35,034	146,610	147	0.1%	239
Total	82,405,329	166,735,377	166,735	100.0%	435

Source: Prepared by the Peruvian team based on customs data

Of the 25,479 tons of scrap exported by Bolivia to Peru, around 20,474 tons (80.4%) originated in the region of La Paz, while the region of Santa Cruz was the second exporter of this product to Peru, with 4,955 tons (19.4%). Exports from Cochabamba to Peru are negligible. The average value density of the cargo exported from Bolivia to Peru was US$230/ton in 2008.

Table 52 – Origin of Peruvian Scrap Imports from Bolivia in 2008

Production Place	CIF Value	Volume		%	Value Density
	US$	kg	tons		US$/ton
La Paz	5,809,836	20,474,330	20,474	80.4%	284
Santa Cruz	1,647,326	4,955,280	4,955	19.4%	332
Cochabamba	3,713	49,760	50	0.2%	75
Total	7,460,875	25,479,370	25,479	100.0%	230

Source: Prepared by the Peruvian team based on customs data

Of the 25,479 tons of scrap exported by Bolivia to Peru, 100% used the Desaguadero border crossing as their point of entry, from where they were carried to the Arequipa production centers. Almost in its entirety (99%), such scrap was imported by the Corporación Aceros Arequipa S.A., which has two production facilities, one in Pisco and the other one in Arequipa. The firm Maxant Import S.A.C. imported 50 tons in 2008, accounting for 0.2% of the total scrap imports of Bolivian origin.

Table 53 – Peruvian Importers of Bolivian Scrap in 2008

Importer	CIF Value	Net Weight		%
	US$	kg	tons	
Corporación Aceros Arequipa S.A.	7,457,162	25,429,610	25,430	99.8%
Maxant Import S.A.C.	3,713	49,760	50	0.2%
Total	7,460,875	25,479,370	25,479	100.0%

Source: Prepared by the Peruvian team based on customs data

Scrap is recycled and processed to manufacture steel or iron wire. Aceros Arequipa S.A., whose industrial plant is located in the city of Arequipa, is the main producer of steel and iron wire.

In 2008, Peru exported 4,338 tons of iron or steel wire for a FOB amount of US$5,998,414. The main destination of these exports was Bolivia, with 3,821 tons (88.1% share), followed by the United States (3.5%) and New Zealand (3.3%). The share of the remaining countries is below 2%. The wire average value density was US$1,455/ton.

Table 54 – Destination of Peruvian Exports of Wire in 2008

Country of destination	FOB Value	Volume		%	Value density
	US$	kg	tons		US$/ton
Bolivia	5,274,701	3,821,250	3,821	88.1%	1,380
United States	244,127	149,709	150	3.5%	1,631
New Zealand	164,593	145,236	145	3.3%	1,133
Ecuador	79,489	66,824	67	1.5%	1,190
Jamaica	87,556	51,915	52	1.2%	1,687
Dominican Republic	49,527	39,785	40	0.9%	1,245
Guatemala	29,785	16,775	17	0.4%	1,776
Venezuela	12,683	10,100	10	0.2%	1,256
Honduras	12,991	8,621	9	0.2%	1,507
Spain	9,474	7,797	8	0.2%	1,215
Panama	13,317	7,332	7	0.2%	1,816
Puerto Rico	9,781	6,640	7	0.2%	1,473
Mexico	10,390	6,490	6	0.1%	1,601
Australia	9,710	5,654	6	0.1%	1,717
Portugal	10,875	5,550	6	0.1%	1,960
United Kingdom	7,867	5,394	5	0.1%	1,458
Costa Rica	4,591	2,586	3	0.1%	1,775
Nicaragua	2,973	1,825	2	0.0%	1,629
Italy	3,237	1,675	2	0.0%	1,933
Colombia	1,847	1,375	1	0.0%	1,343
Netherlands Antilles	1,705	925	1	0.0%	1,843
Chile	1,375	670	1	0.0%	2,053
Germany	38	3	0	0.0%	13,446
Total	5,998,414	4,338,474	4,338	100.0%	1,455

Source: Prepared by the Peruvian team based on customs data

Of the 3,821 tons of steel or iron wire exported to Bolivia, 97.1% was exported by Prodac S.A., whose main plant is located off the Néstor Gambetta road in Callao. Ranking second in importance is Corporación Aceros Arequipa S.A., whose factory is located in the city of Arequipa, accounting for 2.9% of steel or iron wire exports to Bolivia.

Table 55 – Peruvian Wire Exporters to Bolivia in 2008

Exporter	FOB Value	Net Weight		%
	US$	kg	tons	
Prodac S.A.	5,131,098	3,710,734	3,711	97.1%
Corporación Aceros Arequipa S.A.	140,612	109,600	110	2.9%
Trading Colchonera S.A.C.	2,991	916	1	0.0%
Total	5,274,701	3,821,250	3,821	100.0%

Source: Prepared by the Peruvian team based on customs data

It is further worth noting that of the 3,821 tons of iron or steel wire exported to Bolivia, 3,556 tons (93.1%) were exported through the city of Arequipa, and 274 tons (6.9%) entered Bolivia through the Desaguadero border crossing.

Table 56 – Customs of Exit of Bolivia-Bound Peruvian Wire Exports in 2008

Point of Departure	FOB Value	Net Weight		%
	US$	kg	tons	
Arequipa	4,965,100	3,555,917	3,556	93.1%
Desaguadero	306,610	264,417	264	6.9%
Puerto del Callao	2,991	916	1	0.0%
Total	5,274,701	3,821,250	3,821	100.0%

Source: Prepared by the Peruvian team based on customs data

We should finally add that the destination of 46.3% of the total iron or steel wire exported to Bolivia was the region of Santa Cruz, followed by the region of La Paz, which received 38.5%.

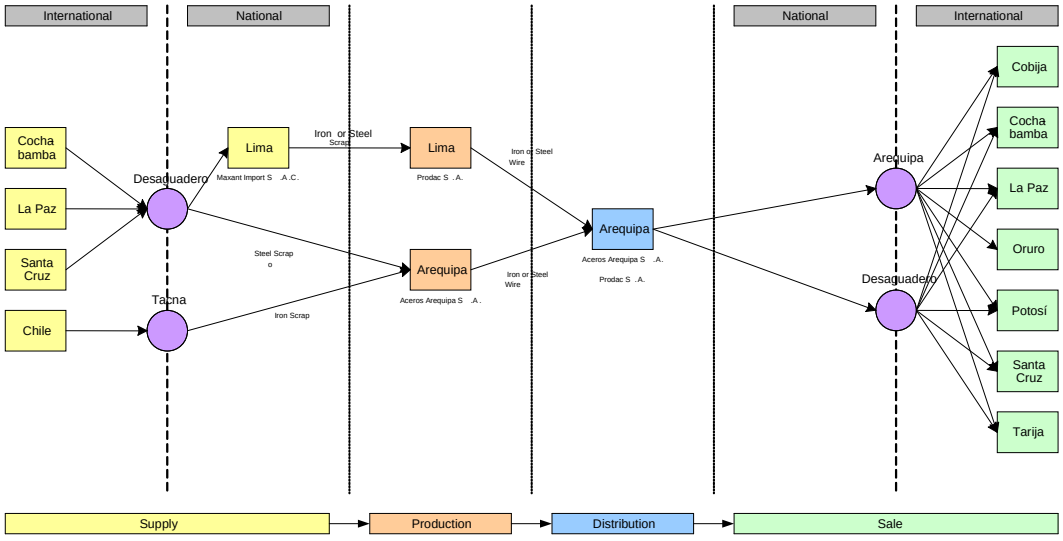
Table 57 – Origin and Destination of Peruvian Wire Exports to Bolivia in 2008

Origin	Destination								Total	%
	Arica	Cobija	Cocha-bamba	La Paz	Oruro	Potosí	Santa Cruz	Tarija		
	tons	tons	tons	tons	tons	tons	tons	tons	kg	
Arequipa	0	20	325	1,394	28	9	1,627	153	3,556	93.1%
Desaguadero	0	6	20	75	0	2	142	20	264	6.9%
Port of Callao	1	0	0	0	0	0	0	0	1	0.0%
Total	1	26	345	1,470	28	11	1,768	173	3,821	100.0%
	0.0%	0.7%	9.0%	38.5%	0.7%	0.3%	46.3%	4.5%	100.0%	

Source: Prepared by the Peruvian team based on customs data

Based on the information above, we can chart the current structure of the iron or steel scrap (Bolivia) and iron or steel wire (Peru) economic sector as follows.

Figure 38 – Scrap-Wire Production Chain



The production of iron and steel bars and rods in Arequipa uses the Bolivia and Chile-sourced scrap as input. The Bolivian scrap is mainly stocked in La Paz and enters Peru via the Desaguadero border crossing. The Chilean scrap is gathered in Arica, from where it is carried to Tacna and, from there, to Arequipa.

A large share (85%) of the iron and steel bar and rod production is exported to Bolivia. There are exports to Chile, but certain obstacles in relation to import inspection by Chile might be complicating the operations.

Road transport via the Ilo-Desaguadero road lacks carrier service facilities.

Peru-bound scrap freight and the transport of iron and wire to Bolivia use infrastructure included in IIRSA's project portfolio.

Although this production chain in particular may appear to be marginal in relation to total regional trade, the flow of products associated with the scrap-iron-wire chain shares the transport and border crossing infrastructures with a much larger number of products. Hence, the completion of the projects within the group under analysis will have a bearing on the overall trade dynamics and on this sector in particular.

If Chile could adjust its pre-import iron controls by applying internationally accepted standards instead of the existing lot-by-lot inspection, iron trade from Peru to Chile might intensify, boosting not only the demand for production supplies and raw materials but also the flow of scrap from Bolivia and Chile to Arequipa.

The dynamism of this sector depends on the demand generated by the construction sector in Bolivia and, perhaps, in Chile's northern region.

3.6 Soybean Cake (Bolivia) – Balanced Animal Feed (Peru)

Soybean cake is a byproduct from the process of soybean oil extraction with solvent. High in protein value (it is the largest source of vegetable protein), soybean cake has an extraordinary amino acid balance, and is particularly rich in lysine. It has an outstanding nutritional and energetic value and is the most economical, highest quality protein source. Soybean cake is used in the manufacture of balanced feed for all types of monogastric and ruminant animals.

In 2008, Bolivia exported to Peru around 124,097 tons of soybean cake, with the region of Santa Cruz generating the largest portion (63,797 tons, accounting for 51.4% of all soybean cake exports). It must be noted that the Arica production originated in Bolivia but was shipped from the port of Arica. The average value density of the cargo imported from Bolivia was US$385/ton.

Table 58 – Origin of Bolivian Exports of Soybean Cake to Peru in 2008

Production Place	FOB Value	Volume		%	Value Density
	US$	kg	tons		US$/ton
Santa Cruz	24,142,579	63,797,120	63,797	51.4%	378
Other	11,538,706	30,722,891	30,723	24.8%	376
Arica	9,640,938	18,457,880	18,458	14.9%	522
San Lorenzo	5,474,797	11,017,240	11,017	8.9%	497
Oruro	39,379	92,200	92	0.1%	427
La Paz	1,095	9,860	10	0.0%	111
Total	50,837,495	124,097,191	124,097	100.0%	385

Source: Prepared by the Peruvian team based on customs data

Of the 124,097 tons of soybean cake exported by Bolivia to Peru, 76% (94,266 tons) used the Desaguadero border crossing as their point of entry, from where they were carried to the Lima and Arequipa production centers. Significant volumes also entered via the port of Salaverry, in the La Libertad department (17,492 tons, accounting for 14.1% of Bolivian soybean cake exports to Peru), and the port of Callao (6,509 tons, i.e. 5.2%).

Table 59 –- Border Crossings and Ports of Entry of Bolivian Soybean Cake Exports to Peru in 2008

Destination	CIF Value	Net Weight		%
	US$	kg	tons	
Arequipa	10,444	55,852	56	0.0%
Desaguadero	32,336,653	94,266,219	94,266	76.0%
Port of Callao	2,740,142	6,508,650	6,509	5.2%
Port of Matarani	116,400	300,000	300	0.2%
Port of Pisco	2,580,428	5,474,300	5,474	4.4%
Port of Salaverry	8,167,715	17,492,170	17,492	14.1%
Total	45,951,782	124,097,191	124,097	100.0%

Source: Prepared by the Peruvian team based on customs data

The origin-destination matrix of soybean cake imports shows that the major trade flow takes place between the region of Santa Cruz, as well as other Bolivian regions, and the city of Desaguadero, followed by the movements between the port of Arica and the region of San Lorenzo and the port of Salaverry.

Table 60 – Origin and Destination of Bolivian Exports of Soybean Cake to Peru in 2008

Origin	Destination						Total	%
	Arequipa	Desagua-dero	Port of Callao	Port of Matarani	Port of Pisco	Port of Salaverry		
	tons	tons	tons	tons	tons	tons	tons	
Santa Cruz	56	63,741	0	0	0	0	63,797	51.4%
Other	0	30,423	0	300	0	0	30,723	24.8%
Arica	0	0	0	0	5,474	12,984	18,458	14.9%
San Lorenzo	0	0	6,509	0	0	4,509	11,017	8.9%
Oruro	0	92	0	0	0	0	92	0.1%
La Paz	0	10	0	0	0	0	10	0.0%
Total	56	94,266	6,509	300	5,474	17,492	124,097	100.0%
	0.0%	76.0%	5.2%	0.2%	4.4%	14.1%	100.0%	

Source: Prepared by the Peruvian team based on customs data

Of the total 94,266 tons imported through Desaguadero, 32.6% (30,728 tons) were imported by the Lima-based Romero Trading company (a member of the Romero business group), which distributes and sells soybean cake to balanced animal feed producers. The multinational Adm-Sao Perú S.A. explains 11.4% (10,723 tons) of these imports of soybean cake, which are carried to its distribution unit in the city of Lima. On the other hand, Arequipa-based wholesaler Emcoper E.I.R.L. has a 15.3% share in the Bolivian soybean cake imports. Finally, the firms La Semilla de Oro S.A.C. and Agresa S.R.L. —both located in the city of Lima— are also significant importers that operate as wholesale distributors of soybean cake. Worth noting is the case of the firm Montana S.A., which controls the entire balanced animal feed production logistics chain, from the import of soybean cake to the production, distribution, export and sale of balanced animal feed.

Table 61 – Peruvian Importers of Soybean Cake Using the Desaguadero Border Crossing in 2008

Importer	CIF Value	Net Weight		%
	US$	kg	tons	
Romero Trading S.A.	11,343,945	30,728,382	30,728	32.6%
Adm-Sao Perú S.A	3,437,757	10,722,955	10,723	11.4%
Emcoper E.I.R.L.	4,534,878	14,403,930	14,404	15.3%
La Semilla de Oro S.A.C.	4,371,208	13,084,441	13,084	13.9%
Agersa S.R.L.	3,348,232	10,228,098	10,228	10.9%
Montana S A	1,697,148	5,052,420	5,052	5.4%
Other	3,603,483	10,045,993	10,046	10.7%
Total	32,336,651	94,266,219	94,266	100.0%

Source: Prepared by the Peruvian team based on customs data

As already said, soybean cake is used as an input for balanced animal feed production. In 2008, Peru exported 89,016 tons of balanced animal feed for an amount of US$61.5 million. The main destination of these exports was Colombia, which accounted for 42.1% of the total, followed by Ecuador (27.1%) and Honduras (10.6%). Bolivia imported 520 tons of balanced animal feed from Peru, explaining 0.6% of the latter's total exports. The average value density of balanced animal feed is US$6,540/ton.

Table 62 – Destinations of Peruvian Soybean Cake Exports in 2008

Country of Destination	FOB Value	Volume		%	Value Density
	US$	kg	tons		US$/Tn
Colombia	25,920,272	37,453,478	37,453	42.1%	692
Ecuador	16,368,848	24,119,027	24,119	27.1%	679
Honduras	5,716,094	9,419,900	9,420	10.6%	607
Guatemala	5,218,491	8,251,175	8,251	9.3%	632
Nicaragua	2,291,338	3,480,000	3,480	3.9%	658
Venezuela	2,616,051	2,859,900	2,860	3.2%	915
Costa Rica	2,120,725	2,780,000	2,780	3.1%	763
Bolivia	1,006,256	520,064	520	0.6%	1,935
Panama	144,005	106,162	106	0.1%	1,356
United States	20,608	23,346	23	0.0%	883
Chile	87,061	1,575	2	0.0%	55,277
Paraguay	1,760	1,000	1	0.0%	1,760
Peruvian FTZs	9,430	500	1	0.0%	18,861
Total	61,520,942	89,016,127	89,016	100.0%	6,540

Source: Prepared by the Peruvian team based on customs data

Of the 520 tons of balanced animal feed exported to Bolivia, 65.5% was exported by Rinti S.A., the main plant of which is located in Lima, at kilometer 17.5 of the Central Highway. Ilender Perú S.A., located in the city of Lima, is responsible for 33.5% of the balanced animal feed exports to Bolivia.

Table 63 – Peruvian Exporters of Soybean Cake to Bolivia in 2008

Exporter	FOB Value	Net Weight		%
	US$	kg	tons	
Rinti S A	227,763	340,664	341	65.5%
Ilender Perú S.A	771,244	174,400	174	33.5%
Montana S A	7,250	5,000	5	1.0%
Total	1,006,256	520,064	520	100.0%

Source: Prepared by the Peruvian team based on customs data

On the other hand, of the 520 tons of balanced animal feed exported to Bolivia, 280 tons (53.9%) were exported through Desaguadero and 239 tons (46.0%), from the port of Callao.

We should finally say that the destination of 66.5% of the total balanced animal feed exported to Bolivia was the region of Cochabamba, followed by the region of La Paz, which received 27.7%.

In Chile, soybean cake is used for direct consumption by the poultry sector in the area of influence (Arica) and as an input for the preparation of balanced animal feed in the central-southern area. Balanced animal feed is consumed locally, preferably by the salmon industry in the south of Chile, while a portion of it is exported to Bolivia.

Based on the information above, we can chart the current logistic structure of the soybean cake (Bolivia) and balanced animal feed (Peru) economic sector as follows.

Figure 39 – Soybean Cake-Balanced Animal Feed Production Chain

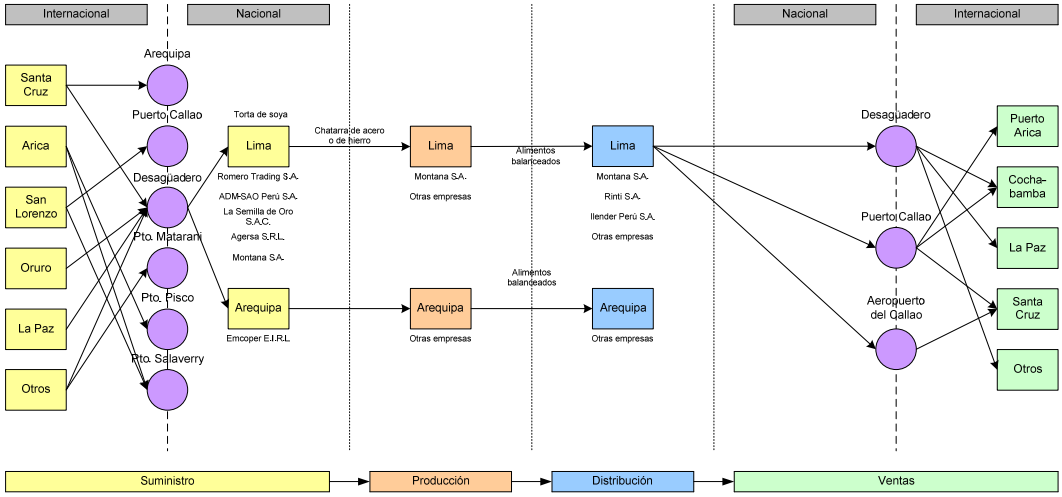


Figure 40 – Soybean Cake-Balanced Animal Feed Production Chain Map

Soybean growing in Santa Cruz is concentrated in two main areas. The first one encompasses some 380,000 hectares cultivated by medium- and large-sized producers, with small producers also found in the San Julián and Cuatro Cañadas municipalities; it is here were most storage centers (silos) and processing plants are located. The second one is a 300,000-hectare area where an approximate total of 8,000 small peasant farmers are based.

The largest share of Bolivian exports of soybean cake is shipped to the Atlantic ocean through inland waterways, and the remaining portion is sent to Chile via the inter-oceanic corridor and, to Peru, through Desaguadero.

As for land freight, in Bolivia carriers use the Santa Cruz-Cochabamba-La Paz road; when they reach La Paz, the Peru-bound cargo branches toward Desaguadero, while the cargo intended for Chile detours toward Tambo Quemado, using stretches of the Central Interoceanic Hub.

At the Desaguadero border crossing, customs formalities are complicated, and on the Ilo-Desaguadero road there are no carrier service facilities.

Insufficient agricultural machinery and persistent rains in the Santa Cruz area caused problems in the harvest of soybean, rice and other summer season crops.

The soybean sector is going through difficult times because rains damaged 180,000 of the 700,000 hectares planted with soybean in 2009.

Poor road conditions in the production areas are another source of concern for soybean growers. The San Pedro-Peta Grande (northern area) and Pailon-El Tinto (eastern area) stretches are impassable.

Executive Order 29,460 directly bans exports of vegetable oils and butters. The Congress should also consider the harm the agribusiness sector is being caused by the freeze on exports of other products. The greatest negative impact, however, is on the production of soybean, which, according to data supplied by the Association of Oilseed and Wheat Growers (ANAPO, in Spanish) will have yields amounting to 65% of the ones obtained in a normal season in Santa Cruz.

The combat of the pests and diseases that affect plantations causes production costs to rise.

Another hurdle encountered is the storage capacity during production seasons, when silos are filled up and the humidity and temperatures in the Bolivian tropic render storage outside silos impracticable.

A regulatory framework is lacking, and energy balance studies are required to be conducted in relation to the industrial production of biofuels with a view to avoiding fuel imports.

There also exists insufficient knowledge of and training in the use and management of biological control agents and highly toxic agrochemicals, as well as environmental regulations and land use planning (crop rotation).

The flow of products related to the soybean cake-balanced animal feed chain shares transport infrastructure and border crossings such as Tambo Quemado and Desaguadero, as well as roads. The area of influence studied may not seem to represent a highly significant share of the total trade between the countries mentioned; nevertheless, it has been included in the production integration potential analysis for two main reasons: its local importance and the use of infrastructure.

3.7 Leather (Bolivia) – Handicrafts and Manufactures (Peru)

Figure 41 – Map of the Leather-Leather Handicrafts Production Chain

Most leather originates in the livestock farming area of Beni and is processed in Santa Cruz and Cochabamba. Tanned hides are mainly exported to Europe, Canada, Japan and the United States from the ports of Iquique and Arica.

Chile and Peru are marginal destinations of Bolivian leather exports, with a share of 3.6% and 2.1%, respectively. The hides exported to Chile are not processed in the area of influence. In the case of Peru, even though Bolivia is, together with Ecuador, one of its main suppliers, with a 37% share, most of the processing is done in Lima, outside the area of influence.

Exports are mostly conducted via the Desaguadero border crossing, and a small portion is used for handicraft manufacture in the area of Puno and Arequipa.

Bolivia has installed capacity to process larger quantities of hides; yet, the supply is not sufficient to meet the demand. The largest companies are in a position to purchase the raw material from municipality-owned and private slaughterhouses under agreed-upon contracts and quotas.

The availability of raw hides for use as raw material for the production of semi-processed and finished leather is limited and is dependent upon the number of animals slaughtered for meat production. No business strategy is in place for the production and marketing of higher-quality hides and skins. Defective slaughter techniques and improper treatment of raw hides affect the quality of the finished product.

Another competitiveness problem that the sector faces has to do with the high costs of the chemical reagents imported for leather processing, resulting from the costly maritime import freights.

On the other hand, export-related institutions are uncoordinated, which causes delays in export formalities.

Other problems include the smuggling of raw and salted hides to Peru, the existence of unregistered, technologically and environmentally deficient tanneries, and defective coordination between tanneries and the production chain links.

In view of the fact that this national industrial sector demands bovine hides and skins mainly, and given that the Bolivian rural area is extensive enough, the recommendation is to support cattle farmers with tailor-made programs according to each region's reality, to conduct research in relation to breed improvement and farming enhancement according to each type of livestock and country region, to adapt animal slaughter infrastructure, to improve hide and skin storage and transportation processes, to stimulate investment in technology leading to enhanced productivity and reduced environmental impact of the tanning industry, and to foster decontamination programs and environmental certifications for tanneries.

In addition, and based on interviewees' responses, it is necessary to implement a regulatory framework established by consensus between the national government and the private sector with a view to combating physical smuggling, technical contraband trade, under-invoicing of exports, and informality in the sectors of leather and articles thereof, apparel and footwear.

3.8 Milk (Bolivia) – Dairy Products (Peru)

The production of fresh milk in Bolivia takes place in the departments of Santa Cruz, Cochabamba and La Paz. Once collected and stocked by PIL Andina, the industry leader, it is processed into different types of milk: powdered milk, at its Santa Cruz plant; UHT milk, at its Cochabamba factory; and flavored milk, at its La Paz plant. The productions of the latter two are almost entirely used for domestic consumption.

Figure 42 – Map of the Milk-Dairy Products Chain

Bolivian powdered milk is bought to be used as input for the production of evaporated milk in Peru. These exports, which amount to US$4.6 million (approximately 1,357 tons), are made in their entirety through the Desaguadero border crossing by PIL Andina S.A., which later uses them at the evaporated milk processing plants located in Arequipa and Lima. Peru exported 60,126 tons of evaporated milk, with Bolivia being the sixth destination of that product, accounting for 4.5% of the total exported.

Table 64 – Destination of Peruvian Exports of Evaporated Milk in 2008

Country of Destination	FOB Value	Volume		%	Value Density
	US$	kg	tons		US$/ton
Haiti	32,915,322	23,114,191	23,114	38.4%	1,424
Trinidad and Tobago	8,745,605	7,525,060	7,525	12.5%	1,162
Nigeria	7,358,020	3,533,676	3,534	5.9%	2,082
Bahamas	4,411,490	2,926,288	2,926	4.9%	1,508
Gambia	4,370,693	2,913,661	2,914	4.8%	1,500
Bolivia	3,657,466	2,716,128	2,716	4.5%	1,347
Guinea	2,536,837	1,639,918	1,640	2.7%	1,547
Ghana	2,701,611	1,530,872	1,531	2.5%	1,765
Mauritania	2,468,254	1,506,532	1,507	2.5%	1,638
Venezuela	1,755,486	1,394,500	1,395	2.3%	1,259
Côte d'Ivoire	1,760,725	1,288,674	1,289	2.1%	1,366
Chile	1,476,533	1,213,493	1,213	2.0%	1,217
Saint Lucia	1,643,753	1,069,244	1,069	1.8%	1,537
Togo	1,705,627	1,041,762	1,042	1.7%	1,637
Other countries	9,912,448	6,712,163	6,712	11.2%	1,477
Total	87,419,869	60,126,162	60,126	100.0%	1,498

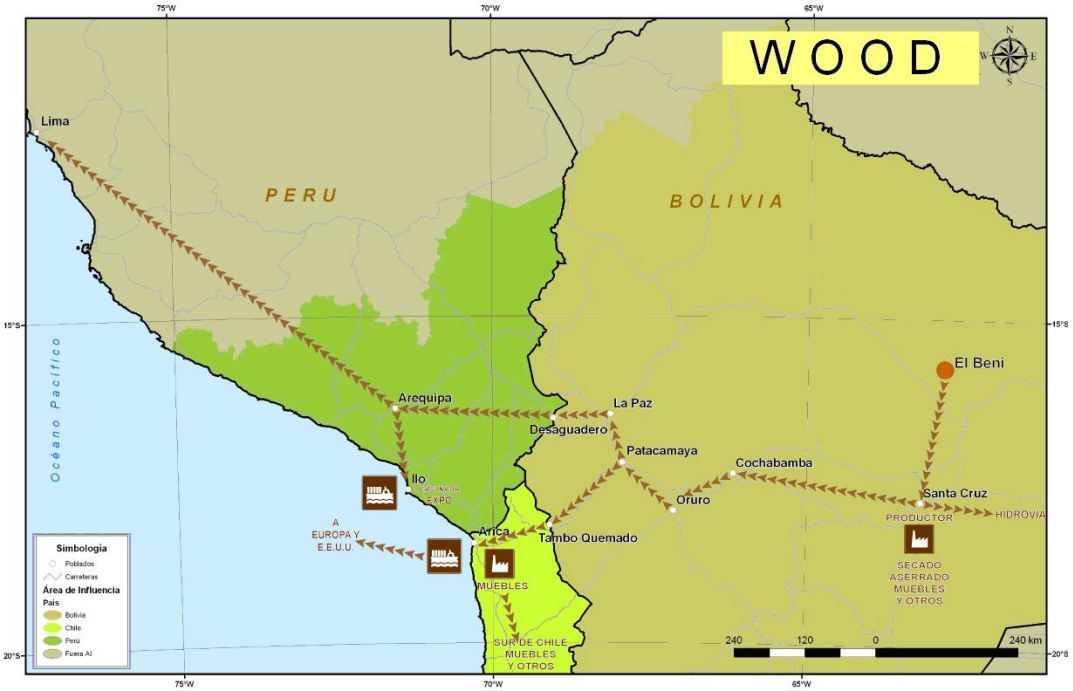
Source: Prepared by the Peruvian team based on customs data

One of the drawbacks identified is the insufficient training of producers as to how to improve yields, as well as poor maintenance of municipal roads linking the stocking and production centers. Finally, the cold chain is decisive to give impetus to this activity.

Powdered milk to Peru and evaporated milk to Bolivia are transported via infrastructure included in IIRSA's project portfolio, although the use of such infrastructure by this chain is marginal.

3.9 Wood (Bolivia) – Furniture (Chile)

Figure 43 – Map of the Wood-Furniture Production Chain



Bolivian natural forests cover an area of approximately 53 million hectares, accounting for 48% of the country's territory, and are mainly found in the eastern region of Bolivia (Santa Cruz, Beni, La Paz, Cochabamba and Pando). The main species are, in order of importance, big leaf mahogany (*Swietenia macrophylla*), oak, possumwood (*Hura crepitans*), cedar, and cumbaru (*Dipteryx odorata*).

In addition to natural forests, there are forest plantations in Bolivia.

Once wood has been harvested, it is cut into blocks. Agribusiness concerns are awarded forest concessions in the departments of Beni and Pando, from where wood is carried for processing to the department of Santa Cruz, where sawmills and wood-drying kilns are located. Wood is exported from the departments of Santa Cruz, Cochabamba and La Paz.

The largest share of wood exports from Bolivia goes to Chile, the rest of the world, and to Peru in a smaller proportion. Yet, in the area of influence, only one industrial concern (INCOMAT), based in Arica, was identified, and its mid-term prospects appear to be negative.

This firm has been operating in Arica for more than six years. Its original purpose was the development of a Chilean-market oriented fine furniture manufacture venture that would use rare woods from the Bolivian forest, such as mahogany and cedar. Indeed,

the firm set up, encountering many obstacles[24] in the way, taking advantage of the free industrial zone benefits and the investment incentives that the old Region I of Tarapacá offered.

Today, this firm is going through a retrofitting process that will allow it to manufacture functional furniture using Chile-sourced particleboard and plywood, particularly intended for the new buildings under construction in the neighboring city of Iquique. Nevertheless, the firm continues to manufacture fine furniture made from rare Bolivian wood.

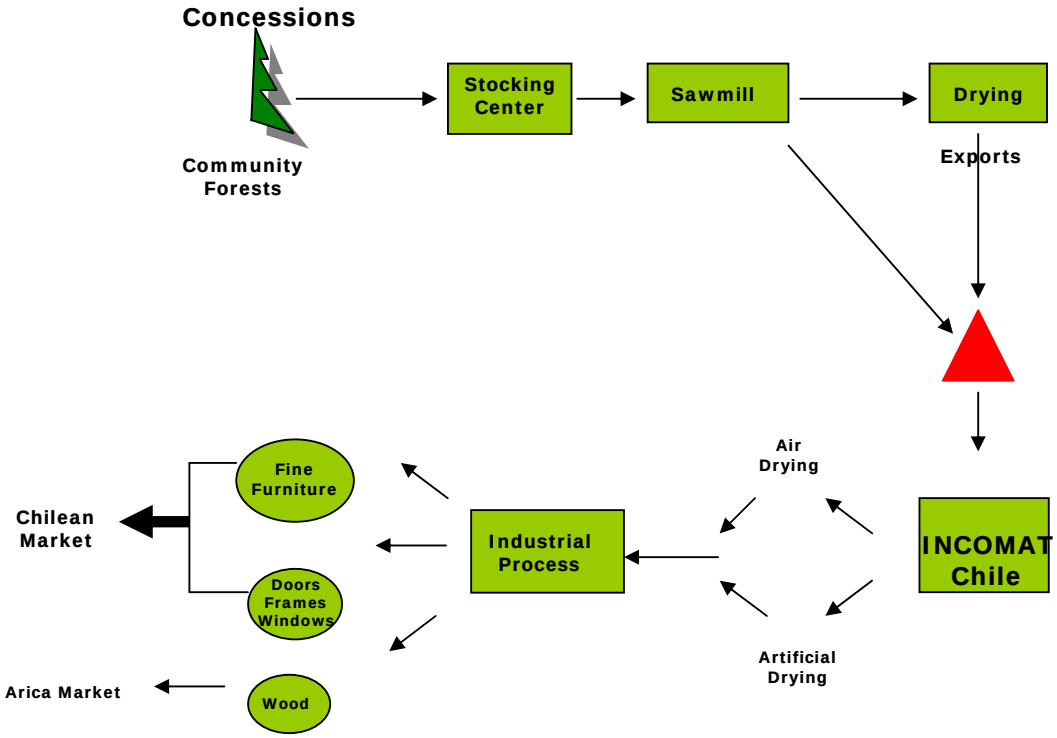
Below is a description of the linkages generated by an activity that, though receding, still persists:

- Logging operations in forests located in the departments of Beni and Santa Cruz, Bolivia;
- Export and transport of green wood to Chile;
- Air drying of wood in the city of Arica. The manufacturer believes that natural drying better maintains raw material properties, and only under time constraints wood is artificially dried in Bolivia;
- Manufacture of pre-styled or custom-made fine furniture. It includes the manufacture of frames, windows and doors;
- Sale of manufactured products in the Chilean market. The manufacturer does not export his products since, in his opinion, there is no guaranteed supply of Bolivian raw materials to ensure that demand for large orders will be met. Neither does he sell to large domestic retailers given the meager profit margin that he would obtain.

The following figure contains a diagram showing the different stages in this production integration.

[24] The interviewee is a Lebanese individual who has lived in Bolivia for several decades. During the interview, he insistently mentioned that he had difficulties setting up his business, from banking system access denial to cultural barriers that prevented him from understanding the Chilean economic and regulatory systems.

Figure 44 – Wood and Wood Manufactures Production Integration Chart, Based on the Case of the Chilean Concern INCOMAT



According to the interviewee, his business has declined, from sales for an approximate annual value of US$700,000 in the first years of operations to US$250,000 in 2008. These figures reflect the impact of the global crisis, to which Chile has not been immune, and have driven him to redirect his business toward a more functional type of furniture, which is in greater demand, poses fewer technological challenges, and ensures greater labor availability, since Arica has no skilled fine furniture labor.

By way of conclusion in relation to this sector, the existence of production integration with few possibilities of scale expansion is confirmed. Although this activity subsists, a comprehensive effort should be made to open new markets and improve its supplier network.

The flow of products associated with this chain shares transportation infrastructure and border crossings such as Tambo Quemado, Pisiga and Desaguadero. The most traveled road is the Santa Cruz-Cochabamba-La Paz road; in La Paz, trucks branch out either to Desaguadero or to Tambo Quemado and Pisiga.

At present, the main challenges for entrepreneurs in this sector are phytosanitary inspections by Chile as well as ever greater tariff barriers imposed by Latin American countries.

3.10 Spices and Olives (Chile-Peru)

In the area of influence there is traditional agricultural production that takes advantage of favorable weather conditions and includes crops such as olive, oregano and peppers of the genus *Capsicum*, among others.

The olive business is a consolidated industry in the Arica and Parinacota Region that has been operating for decades, particularly in the Valley of Azapa, after which one olive variety has been named.

Based on data obtained in an interview with the firm TRUFFA S.A., the olive business seems to be going through a scale expansion phase, with clear upstream linkages. This is, however, a complex[25] industrial sector involving a large number of small farmers and only a few larger-sized operations, one of which is TRUFFA S.A.

Production integration is established as Chilean entrepreneurs buy olives grown in the southern region of Peru. They import them pre-treated in brine and process them to market them domestically and, most importantly, internationally under the denomination of "Valle de Azapa olives."

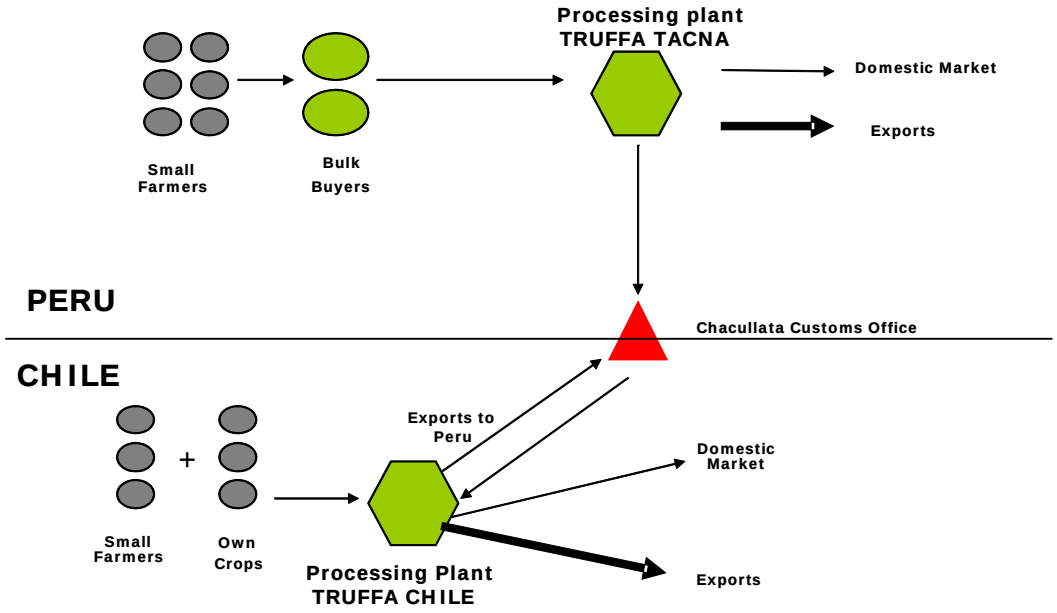
This production integration comprises the following steps:

- Chilean and Peruvian farmers grow different olive varieties;
- Market leaders, such as TRUFFA S.A., establish purchase prices thanks to their raw material (olives) purchase power both in Chile and Peru;
- In Peru, the Chilean company buys raw material through intermediaries, to whom it sets a reference price per kilogram. Intermediaries derive their profit from the lower prices they obtain in the Peruvian market;
- For the purchase of raw materials in Chile, the conditions are established in agreements made with each farmer-supplier. Olives are typically harvested and bought when they are still unripe, but this is dependent upon olive availability: in years of shortage, growers have more price negotiation power;
- The olives bought in Peru are sent to the plant that TRUFFA has in Tacna for preliminary processing;
- For strategic management reasons, the company decides whether to complete the processing in Tacna and export from there or to export the pre-processed product to the Arica plant;
- In Arica, processing is completed, and the product is packed in containers for wholesale consumption;
- Finished products are exported in 15, 25 and 55-kilo containers.

The following figure contains a diagram showing the different stages of this production integration.

[25] Prior studies ("Identificación de clusters exportadores en la Región de Tarapacá," Paris Salgado, 2006, a survey commissioned by ProChile) analyze the complexity of this sector, characterized by problems such as clustering-related issues, market access, and agronomic aspects, among others.

Figure 45 – Olive Agribusiness Chain, Based on the Case of the Chilean Concern TRUFFA



Based on the situation described, production integration is confirmed in the olive industry, which is in a scale expansion stage with upstream integration, due to the existing consolidated relationship with the production chain suppliers.

As for peppers of the genus *Capsicum* (used to make paprika), they are grown in Arequipa and stocked in Tacna to be exported to Chile. The peppers intended for pickle or paste making in Chile are also grown, stocked and pre-processed in Tacna, Peru.

This sector has production integration with clear upstream linkages and high potential for scale expansion. The relationship among suppliers, value-adding industries and distributors is verified, as Peru and Chile-based economic agents are involved.

The above was verified by way of an interview with RILA, an Arica-based food processing concern. This firm settled in the region in 1997 to take advantage of the free industrial zone benefits in the old Region I of Tarapacá. The original idea of the firm was to devote itself mainly to the processing and subsequent export of olives. Yet, the difficulties encountered, particularly with farmers, led its owners to explore other processed preserves. Today, the company produces a series of food products, among which pepper preparations stand out, their raw material being grown and pre-processed in Peru.

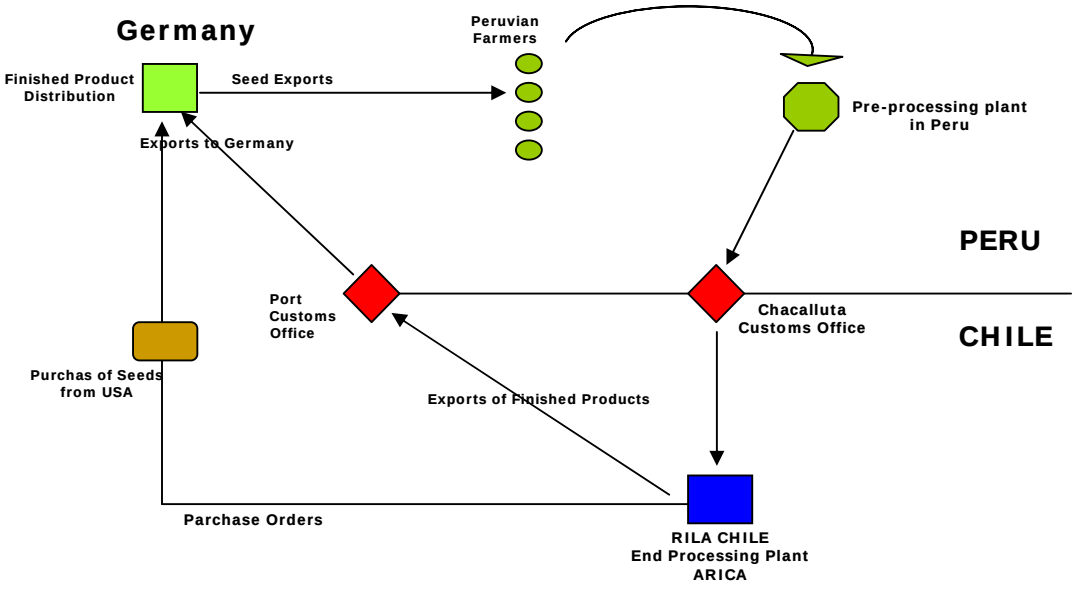
The chain generated around the manufacture of pepper-based products involves a great number of stakeholders that render it a case worth analyzing:

- *Capsicum* seeds are produced in seed farms in the United States;

- Such seeds are exported to Germany, as this country has low phytosanitary control requirements for the product to be reexported to Chile;[26]
- The seeds imported from Germany by RILA are exported to Peru and grown by Peruvian farmers, who were contacted after attempts at having Chilean farmers grow them proved unsuccessful;[27]
- *Capsicum* peppers are harvested to undergo primary processing in Peru and, subsequently, be exported to Chile;
- Peppers are end-processed, packaged and packed at RILA's plant in Arica. At present, the plant has 40 employees, mostly women and youngsters;
- The finished products are exported directly by RILA, mainly to Germany, where it has built a consolidated relationship with a supermarket chain;
- The logistic components of this production integration also involve local freight carriers that transport the raw material from Peru and the containerized finished products to the port of Arica;
- Export operations take place in and around the port of Arica, with the following economic agents playing a part: the customs office, which inspects shipments; customs agents, who take care of export formalities; port operators —in this case represented by the private operator of the Arica port (TPA)— and shipping companies, which carry this cargo to other latitudes.

The following figure illustrates the different phases of this production chain.

Figure 46 – Capsicum *Pepper and its Derivatives Production Chain, Based on the Case of the Chilean Concern RILA*



In the specific case of RILA, at least two components of production integration in the area of influence were identified according to the IIRSA methodology:

[26] The Chilean Agricultural and Animal Health and Safety authority (Servicio Agrícola Ganadero or SAG, in Spanish) requires that all Chile-bound seed exports from the United States should be fumigated with methyl bromide, which affects their quality. Seeds imported from Germany do not have to comply with this requirement.

[27] RILA, the Chilean member of a German business group, was created with the original intention of establishing strong business ties with Chilean farmers, taking advantage of the free industrial zone benefits and investment incentives offered by the old I Region of Tarapacá. The early efforts to forge these relationships first with olive growers and later with oregano and, finally, pepper farmers failed, and the firm was forced to seek reliable and loyal business partners in other latitudes.

- **Enhanced value added:** The finished product involves seeds produced in the United States, grown and pre-processed in Peru, and finished in Chile, from where it is exported, mainly to Germany.
- **Strengthening of upstream production linkages:**[28] This is, perhaps, the most valuable aspect of the case in point since, in southern Peru, a cluster of small specialized farmers qualified to grow *Capsicum* pepper according to the standards required by the industry leaders has gradually emerged and, at the same time, a primary processing industry that pre-processes peppers to be later exported to Chile has established. The upstream linkage has persisted thanks to the fact that RILA accompanies this process by providing the technical assistance required for production to meet specific standards.

In view of all the above, the production integration hypothesis is confirmed, and such integration is regarded to be at a phase of scale expansion of the raw material supplier network. The upstream integration hypothesis is also confirmed, given the consolidated relationship existing with the production chain suppliers.

Specially worth mentioning among the obstacles identified is the atomization of small olive and spice producers, who are poorly organized and adversely affected by intermediation. It is hence recommended that the supplier chain be strengthened through projects aimed at fostering and reinforcing producer associations, the technological upgrading of production processes, and training in, and knowledge of, the phytosanitary standards conducive to export processes.

The materialization of the infrastructure projects included in Group 5 of IIRSA's Central Interoceanic Hub, such as the improvement of the Arica port and the rehabilitation and improvement of the Camaná-Matarani-Ilo road (coastal road), will have a positive effect on the production and marketing processes in these sectors.

3.11 Other Sectors Analyzed

Based on the identification of the economic sectors where there might be a potential for production integration, the national public stakeholders in the area of influence having jurisdiction over matters of production development and business promotion[29] where consulted about the existence of production integration in the other sectors identified. The following is the outcome of such surveys.

Soybean Cake. Soybean in the form of grain or cake, which is a byproduct of the oil extraction industry, is only transported along the Chilean portion of the area of influence. There is no Arica or Iquique-based value-adding industry, and the product is either supplied to the salmon industry located in the southern end of Chile or exported to other consumer countries. We gained in-depth knowledge about the dynamics of this sector during an interview held with SOPRODI, a logistics operator, not a producer, which provides soybean grain storage and transport services for the Chilean salmon industry. The integration production hypothesis is rejected.

[28] The use of the term "upstream" implies a location close to the end of the chain, i.e. in value-adding and distribution-focused businesses.
[29] Consultations were made with ProChile, CORFO and the National Planning Directorate. It should be noted that, in addition, the Chilean team conducted a round of preliminary interviews in both regions for the purpose of identifying potential production integration sectors.

There is, however, clear evidence that Chilean imports of soybean cake originating in Bolivia and entering Chile through the Chungará customs office, located in the XV Region of Arica and Parinacota, are to a great extent used for poultry raising at the Ariztía plant, located in the city of Arica. It was not possible to confirm this production integration hypothesis, and neither was it possible to learn about the degree of production integration that might exist.

Leather and Manufactures Thereof. Based on the data gathered from ProChile and CORFO officers in both regions, there is no industry of this type in the area of influence. Should leather imports from Bolivia or Peru exist, they would be intended for other Chilean regions and, hence, the area of influence would only be used for transit purposes. The production integration hypothesis is rejected.

Jewelry. Based on data gathered from development agencies such as ProChile and CORFO, there are no industries linking, in terms of production integration, Chilean entrepreneurs with their Peruvian and/or Bolivian counterparts. The production integration hypothesis is rejected. This is, nevertheless, a sector considered to have a rather good potential, and it has raised several questions and primary explorations by entrepreneurs from the three countries interviewed separately.

Textiles. Based on the data gathered from the above-mentioned public development agencies, there is no production integration in this sector. There is one textile manufacturer, CONTEX, but it operates under the free trade zone regime and uses raw materials imported from Asian countries. The production integration hypothesis is rejected.

4. Impact of the Group of Projects, Recommendations and Indicative Action Plan

4.1 Production Integration

From the characterization of the selected economic sectors and, most importantly, from the interviewees' responses, it is concluded that there is no clear-cut relationship linking the group of projects with the potential for production integration and the development of value-added logistics services. On the contrary, this relationship is complex and has to do with a series of factors.

The analysis of the information compiled gives us an insight into the rationale behind the interdependence between economic activities and infrastructure. Additionally, it helps us determine how the presence or absence of complementary projects, the materialization or frustration of business opportunities, and the removal or persistence of barriers to trade or to the flow of goods may fuel or inhibit such interdependence. They may fuel it by feeding a virtuous circle whereby infrastructure favors the development of production integration, which, in turn, boosts infrastructure demand, acting as a catalyst for infrastructure expansion and improvement. Conversely, they may inhibit interdependence having a negative bearing on the productivity and competitiveness of economic activities, thereby restricting the trade in goods and services and, hence, "emptying" infrastructures.

Therefore, in order to assess the impact of the group of projects on the potential for production integration and development of value-added logistics services, the suggested approach is to define coherently articulated sets of projects, economic activities, business opportunities and obstacles, on the basis of which it will be possible to identify a succession of interconnected events triggering a demand that should give rise to investment-attracting business opportunities. When these opportunities are captured with timely and sufficient investments, the overall efficiency of the sets is enhanced.

Thus, for instance, an improvement in the Bolivian tertiary road network is likely to benefit the wood, leather, cotton, dairy, soybean and other grain industrial sectors, rendering them more competitive. This will most probably result in an increased market share, which will in turn require investments to expand production and this, once again, will demand more and better infrastructure.

Today, the greatest degree of production integration in the area of influence is between Bolivia and Peru, with the former basically playing the role of a low value-added primary product supplier, and the latter playing the "processor" or value-adding role. The following chains take part in this process:

- Soybean (Bolivia) – animal feed (Peru), with ramifications toward Lima, located outside the area of influence;
- Scrap (Bolivia) – wire (Peru), with ramifications toward Lima, located outside the area of influence;
- Cotton (Bolivia) – yarn and woven fabrics (Peru), with ramifications toward Lima, located outside the area of influence;
- Milk (Bolivia) – dairy products (Peru), almost exclusively related to the activity of one firm;

- Leather (Bolivia) – handicrafts (Peru), less intensive.

Between Peru and Chile, production integration is limited to very specific sectors (spices and olives) and related to the activities of few concerns located in border surroundings, near Tacna and Arica. This axis (Tacna-Arica) concentrates a significant portion of the flow of trade and persons, which would facilitate integration processes. In fact, in the case of olives, there are companies operating on both sides of the border.

Within the area of influence, production integration of Bolivia and Chile is weak, and there exists little integration potential in the wood and furniture sector.

However, Chile's participation in this integration process is more related to the development of value-added logistics services, as explained below. The measures recommended to be adopted in order to enhance the flow of goods and leverage the development of the Arica logistics platform would obviously also benefit any production integration process involving the three countries.

But strictly in relation to production integration, supporting the clustering process identified in the sector of mining services and equipment suppliers might help this still incipient activity. The suggested action in this respect is that Chilean export development agencies implement initiatives in Peru to promote the companies that provide mining services, supplies and equipment, in view of the strong growth of the mining industry in the neighboring country. Although we are aware of the fact that actions of this sort are already underway, the magnitude of the Peruvian mining boom and the evidence of poor or nil production integration in this sector are worth redoubling efforts.

In addition, another recommendation is to capitalize on the experience gained by Chilean development institutions in relation to supplier development, with a view to improving the quality of agribusiness raw materials in the olive, *Capsicum* pepper and Bolivian fine wood processing sectors, among others, thus intensifying the integration processes detected.

To this effect, it is imperative to recommend all parties involved to endeavor to materialize the works that have been categorized as IIRSA's portfolio projects, thus showing their neighbors their clear vocation for integration.

All the sectors mentioned are users, to a greater or lesser extent, of the infrastructures included in the project group. The most demanded projects are the rehabilitation of the El Sillar section and of route 7, Santa Cruz-Cochabamba, as well as the Desaguadero binational border service center (CEBAF, in Spanish), included in project group 8 of the Andean Hub. Ranking second are the Aiquile-Santa Cruz railway, the rehabilitation of the Puno-Juliaca road (also belonging to project group 8 of the Andean Hub) and the rehabilitation of the Juliaca-Santa Lucía section (project group 1 of the Peru-Brazil-Bolivia Hub).

To a lesser extent, there is also demand for the expansion and improvement of the Arica-Tambo Quemado road, the improvement of the Arica port, the rehabilitation and concession of the Arica-La Paz railway (Chilean section), the improvement of the Iquique port, and the rehabilitation of the Iquique-Colchane road. Nevertheless, these projects are more associated with the facilitation of Bolivian foreign trade (and, potentially, the exit of Brazilian exports) and, hence, with the development of value-added logistics services rather than with production integration.

We may then assume that the development of these infrastructures will impact positively on the integration processes. However, as already mentioned, there are other factors weighing more heavily that inhibit the integration processes, as explained below.

With the exception of soybean, Bolivia is not Peru's main supplier in the above-described chains; therefore, we may suppose that potential might exist for a larger share of Bolivian raw materials in Peruvian industrial processes. From an analysis of the reasons for the limited share of Bolivian raw materials in the Peruvian industry, it appears that quality and conformance to specifications are the main problems.

The quality of cotton has degraded as a result of reseeding, and controlled species especially developed for the area have not been added to meet market requirements. In the case of dairy cattle, no genetic improvement program has been implemented and yields are well below world averages. As for leather, quality has decreased due to inadequate livestock management and slaughter processes, owing to insufficient training and integration of leather processing into the livestock industry chain.

Peru is an important market for Bolivian sugar, but this product was excluded from the analysis as it is not utilized in the industry but intended for end use. Probably, the technical specifications required in production processes exclude Bolivian sugar from the industrial market.[30]

Crop rotation and adequate use of agrochemicals are not usual practices; therefore, future yields of soybean, cotton and other agricultural products are being jeopardized. Furthermore, industrial processes within these sectors have attained a very low technical or mechanical level, and, hence, yields are not increased.

In the case of wood, one of the problems detected is the lack of training in, and knowledge of, zoosanitary and phytosanitary standards, which causes difficulties in export processes.

As far as infrastructure is concerned, the greatest weakness is found to be the quality of the Bolivian tertiary road network and poor rural electrification. The improvement of the tertiary road infrastructure would result in a better collection of the grain, cotton and wood harvest, and in the milk production and livestock transportation. Rural electrification will make it possible, among other things, to extend the cold chain to dairy production. As for soybean, the expansion of silo storage capacity is also necessary.

Thus, we can configure a set made up of the above-mentioned IIRSA projects, the obstacles associated with poor quality and yields, and the expansion and improvement of the tertiary road network and rural electrification in Bolivia, which would act as follows:

- Tertiary road network improvements, expanded rural electrification, implementation of a regulatory framework and producer training for improved land and agrochemical use, genetic and technological improvements in cotton planting and milk production, and training in foreign trade regulatory requirements in the sectors

[30] This comment is a hypothesis formulated by the authors; it was not received or verified during interviews.

identified would result in enhanced yield and quality of Bolivian production, leveraging the production integration between these countries.

- The greater flow of Bolivian raw materials to Peru derived from these improvements might result in an increased demand for the use of the El Sillar section, route 7 (connecting Santa Cruz and Cochabamba), the Desaguadero border crossing, and the Aiquile-Santa Cruz railway, among other infrastructure projects. The timely completion of these investments will favor the above-mentioned economic sectors, thus feeding the production integration-infrastructure virtuous circle.

It is worth noting that the sequence of actions and events that would trigger a greater share of Bolivian raw materials in the Peruvian industry may occur on an incremental basis as investments are made, since the infrastructures involved (tertiary road network, rural electrification, grain silos) are dividable.

4.2 Development of Value-Added Logistics Services

The development of value-added logistics services basically depends on the effective completion of the Arica and Oruro projects. The former, intended to support port operations, will offer storage spaces, import and export consolidation and deconsolidation services, and handling of goods in transit, and the latter will serve as a break-of-bulk point for Bolivian imports and exports, facilitating goods transportation to the Pacific and optimizing product supply and distribution in Bolivia.

These projects may have a positive impact on Bolivian —and potentially Brazilian— import and export transportation efficiency via the port of Arica, facilitating merchandise flow planning, timely consolidating shipments in one or the other direction, and reducing wait times at terminals. Enhanced transport efficiency is more than likely to increase the demand for and, hence, the use of the main infrastructure to have access to the Pacific ocean, such as:

- El Sillar section;
- Route 7, Santa Cruz-Cochabamba;
- Desaguadero border crossing;
- Aiquile-Santa Cruz railway;
- Puno-Juliaca road;
- Juliaca-Santa Lucía section;
- Arica-Tambo Quemado road;
- Arica-La Paz railway;
- Iquique-Colchane road.

Regardless of the potential development of a logistics platform in Arica, today it is necessary to implement complementary infrastructure and management-improvement projects to ensure the smooth circulation of goods to and from Bolivia. Such complementary projects are likely to favor the development of the logistics platform and, eventually, leverage production integration.

Firstly, it is necessary to implement the electronic integration of import and export agents, including the Bolivian, Chilean and Peruvian customs services, with special attention being paid to the linking with Bolivia, given the high volume of Bolivian cargo movements in Chilean ports.

Another recommendation is to study and adopt the necessary measures conducive to overcoming infrastructure, equipment and staff limitations in the Chilean customs service and the agricultural and animal health and safety authority, particularly in border crossings in extreme locations (Chungará and Colchane), on the basis of surveys about cargo flows and types and the time at which these flows take place, based on increased transaction projections.

As far as infrastructure is concerned, we recommend the establishment and prompt operation of outer harbors lending operational support to the ports of Arica and Iquique. In addition to the creation of outer harbors, we recommend that new Arica and Iquique ports access ways be studied, designed and built. Likewise, roads are required to be rehabilitated and improved. For this, we recommend the rehabilitation, in a first stage, of presently poorly maintained roads and, in a second mid-term stage, the conduct of a study of the transformations required to improve their capacity so that they can meet the cargo volume demand expected to be generated by Bolivia and, especially, Brazil.