

Infrastructure in Latin America: Recent evolution and key challenges

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Notes

Lower middle-income countries: Colombia, Guatemala, Jamaica, Peru
Regional average: Argentina, Brazil, Colombia, Costa Rica, Guatemala, Jamaica, Mexico, Peru

Weights and Measures

Metric System

Government Fiscal Year

1st January – 31st December

Acronyms

AFP: Pension Fund Administration
AIJC: Areopuerto Internacional Jorge Chavez
APN: National Port Authority
BBL: Barrels per day
BOT: Building Operating and Transfer
CFA: Corporación Andina de Fomento
CIA: Central Intelligence Agency
COES: Committee of Economic Operation of the System
COMEX: Sociedad de comercio exterior
CONCAR: Concessionarios de Carreteras S.A
CORPAC: Corporación Peruana de Aeropuertos Y Aviacion Comercial
COSAPI: Consorcio SADE – Sociedad Argentina de Electrificación
CPI: consumer price index
CPP: Calling Party Pays
CPT: Compañía Peruana de Teléfonos
CTE: Commission of Energy Tariffs
DGAC: Dirección General de Aviación Civil
DGCF: Dirección General de Caminos y Ferrocarriles
DGCT: Dirección General de Circulación Terrestre
DGTA: Dirección General de Transporte Acuático
DHS: Demographic and Health Surveys
DTM: General Division of Telecommunications Management
ECLAC: Economic Commission for Latin America and the Caribbean

EIA: Energy Information Administration
ENAFER PERU: Empresa Nacional de Ferrocarriles
ENAPU: Empresa Nacional de Puertos
ENHAHO: Encuesta Nacional de Hogares
ENIGFAM: Encuesta Nacional de Ingresos y Gastos Familiares
ENIGH: Encuesta Nacional de Ingreso-Gasto de los Hogares
ENTEL: Empresa Nacional de Telecomunicaciones
EPH: Encuesta Permanente de Hogares
EPS: Entidades Prestadoras de Servicios de Saneamiento
ESMAP: Energy Sector Management Assistance Programme
FCC: Ferrocarril del Centro FCS: Southern Railroad
FCS: Ferrocarril del Sur
FCSO: Ferrocarril del Sur Oriente
FDI: Foreign Direct Investment
FITEL: Fondo de Inversión de Telecomunicaciones
FOB: Free on Board
FONAVI: Fondo Nacional de Vivienda
FOSE: Fondo de Compensación Social Eléctrica
HDI: Human Development Index
HPI: Human Poverty Index
IBGE: Instituto Brasileiro de Geografia e Estatística
IDB: Inter-American Development Bank
IGV: Impuesto General a las Ventas
ILD: International long distance
IMF: International Monetary Fund
INEI: Instituto Nacional de Estadística e Informática
IPE: Instituto Peruano de Economía
IRF: International Road Federation
ISC: Impuesto Selectivo al Consumo
ITU: International Telecommunication Union
JASS: Juntas Administradoras de Servicios de Saneamiento
JBIC: Japan Bank for International Cooperation
JSLC: Jamaica Survey of Living Conditions
KfW: Kreditanstalt für Wiederaufbau
LAP: Lima Airport Partners

LD: Local Dial
LGR: Law of Regional Governments
LIS: Lines in service
LM: Law governing municipalities
LMIC: Lower middle-income countries
LPG: Liquefied petroleum gas
MB: Million Ballers
MEF: Ministerio de Economía y Finanzas
MEM: Ministerio de Energía y Minas
MTC: Ministerio de transporte y Comunicaciones
MTC: Ministerio de Transportes y Comunicaciones
NTCSE: Norma Técnica de Calidad del Servicio Electrico
OECD: Organisation for Economic Co-operation and Development
OLADE: Organización Latinoamericana de Energía
OSINERG: Organismo Supervisor de la Inversion en Energía
OSIPTEL: Organismo Supervisor de Inversion Privada en Telecomunicaciones
OSITRAN: Organismo Supervisor de la Inversión en Infraestructura de Transporte de Uso Público
PHO: Panamerican Health Organization
PIVASA: Piazza y Valdez Ingenieros S.A
PNAD: Pesquisa Nacional por Amostra de Domicílios
PPP: Public-Private Partnership
PROINVERSION: Agencia de Promoción de la Inversión Privada Paseo de la República
PRONAP: Programa Nacional de Agua Potable y Alcantarillado
PROVIAS: Proyecto Especial de Infraestructura de Transporte
RCP: Red Científica Peruana
SECOM: Secretariat of Communications
SEDAPAL: Servicio de Agua Potable y Alcantarillado de Lima
SEIN: Sistema Electrico Interconectado Nacional
SIAF: Sistema Integrado de Administración Finanziera
SISS: Superintendencia de Servicios Sanitarios
SUNASS: Superintendencia Nacional de Servicios de Saneamiento
TCF: Trillion cubic feet
TIM: Telecom Italia Mobile
TISUR: Terminal Internacional del Sur

TP: Telefonica de Peru

TPM: Port of Matarani

UNDP: United Nations Development Programme

UNICEF: The United Nations Children's Fund

WDI: World Development Indicators

WHO: World Health Organization

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1. OVERVIEW

Peru's population of 27,544,305¹ people (July 2004 estimate) is the fifth largest in South America and the 39th largest in the world: 52% live on the coast, 37% live in the Highlands (Andes) and 11% live in the Amazon region. The *population growth rate* in 2004 was estimated at 1.39%², with a *median age* of 24.6 years. As illustrated in the map below (Figure 1.1), the country is located in the western part of South America, facing the South Pacific Ocean and sharing its borders with Ecuador and Colombia in the north, Brazil in the east, and Bolivia and Chile in the south. It has a *land area* of 1.28³ million square kilometers.

Peru, classified by the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee as a lower middle-income country (LMIC), has the seventh largest economy in South America; moreover, Peru is highly centralized: about eight million people live in Lima, the capital, and more than 60% of GDP is concentrated there.

Figure 1.1 – Map of Peru



After several years of inconsistent economic performance, Peru's economy became one of the fastest growing in Latin America, growing by 5% and 4%⁴ in 2002 and 2003 respectively. In particular, in 2002 Peru's GDP (*PPP constant 1995 international \$*) was \$119.88 billion⁵, while the *per capita GDP (PPP constant 1995 international \$)* in the same year was \$4,440⁶. But due to macroeconomic instability during the last 40 years, GDP growth has been highly volatile. The sharpest contraction of *per capita GDP (PPP constant 1995 international \$)* occurred from 1987 to 1990. In this regard, the *per capita GDP (PPP constant 1995 international \$)* recorded in 2002, at \$4,440, was lower than the value presented in 1975, of \$4,825.

Source: *The World Factbook – Peru 2004 – CIA*

¹ Source: *The World Factbook – Peru 2004 – Central Intelligence Agency (CIA)*.

² Source: *The World Factbook – Peru 2004 – CIA*.

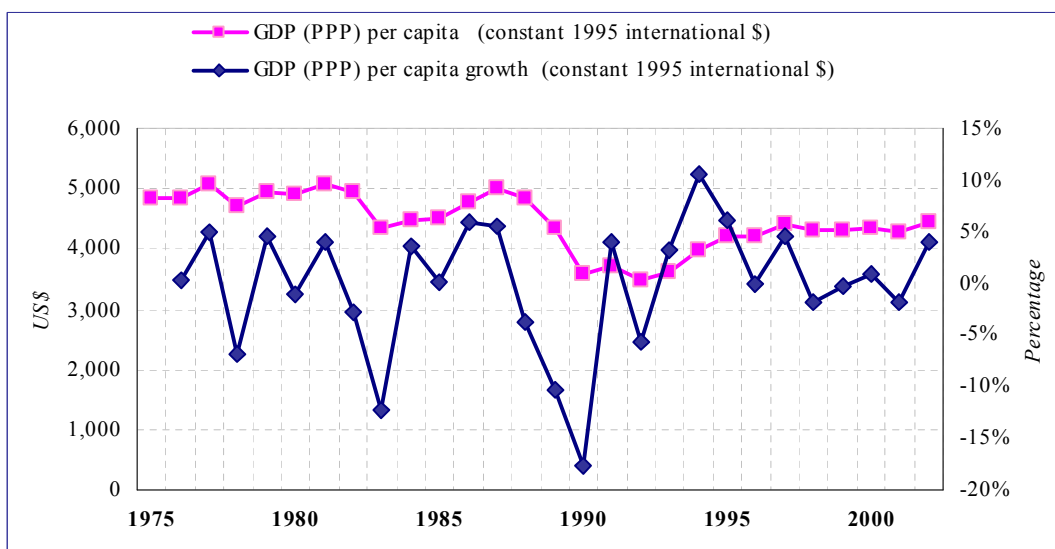
³ Source: *The World Factbook – Peru 2004 – CIA*.

⁴ Source: *The World Factbook – Peru 2004 – CIA*.

⁵ Source: *World Development Indicators 2004 – The World Bank*. Values in constant 1995 international \$.

⁶ Source: *World Development Indicators 2004 – The World Bank*. Values in constant 1995 international \$.

Figure 1.2 – Per Capita GDP – PPP and Per Capita Growth GDP–PPP (Constant 1995 US\$)



Source: World Development Indicator 2004

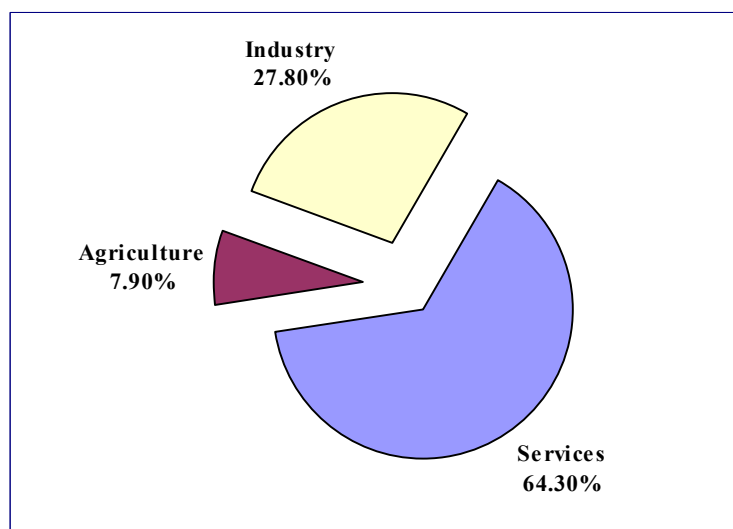
In 1990, in order to control the pace of inflation, Peru initiated an ambitious stabilization program. This program was set up, together with structural reforms carried out under the auspices of the International Monetary Fund (IMF), the World Bank and Inter-American Development Bank (IDB), in order to reduce public participation in the economy and to widen investment opportunities for domestic and foreign private operators. Foreign direct investment also was strong, owing to the ongoing Camisea natural gas pipeline project (scheduled to begin operations in 2004) and investments in gold mining. Risk premiums on Peruvian bonds in secondary markets reached historically low levels in late 2003, reflecting investor optimism and the government’s fiscal restraints. Efficiency was also promoted through economic liberalization as well as major structural reform in most infrastructure sectors. The government monopoly in the main infrastructure activities was consequently brought to an end and new legislation was enacted, aimed at boosting private participation in infrastructure activities such as transportation, telecommunications, energy and water and sanitation through ambitious and comprehensive privatizations and concessions. The reform process has been gradual and has incorporated both modernization of the regulatory framework and the creation of independent regulatory bodies.

This process of stabilization and structural reform of the Peruvian economy allowed Peru to grow at a higher rate (4.5%), on average, between 2002 and 2004, compared to the average growth rate of the Latin American region (2.1%). The fiscal deficit was reduced to below 2% and growth in the export base and favorable commodity prices led to a trade balance surplus of around 3.5% of GDP in 2004. Trade and the financial opening of the economy brought dynamism to key activities such as exports, especially in mineral and agri-business products. Export made sustainable increases to its share of GDP, rising from 13.30% in 1998 to 16.44% in 2002⁷.

With regard to the *composition of GDP*, in 2002 (see Figure 1.3) services contributed 64% to GDP, while industry and agriculture accounted for 28% and 8% respectively.

⁷ Source: World Development Indicators 2004 – The World Bank.

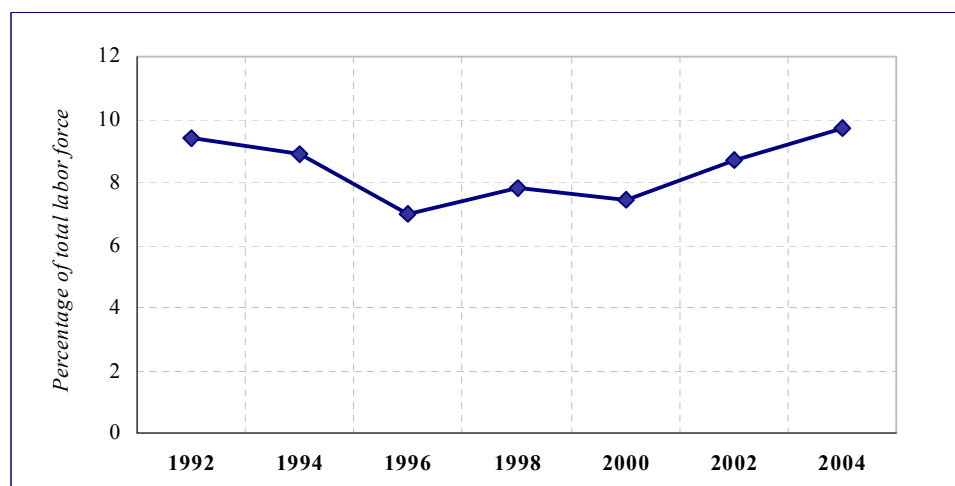
Figure 1.3 – GDP Composition by Sector – 2002



Source: World Development Indicators 2004 – The World Bank

Some structural problems still exist, especially in the labor market. In fact, since 2000 the **unemployment rate** has been increasing, reaching 9.7% in 2004⁸ (CIA estimate) (see Figure 1.4). However, this figure is still acceptable alongside corresponding data for other comparable countries in Latin America. Moreover, unemployment has yet to respond to the strong growth in economic activity, owing in part to the rigid labor market regulations, which act as an impediment to hiring.

Figure 1.4 – Unemployment Rate



Source: World Development Indicators 2004, The World Factbook – Peru 2004 - CIA

⁸ Source: The World Factbook – Peru 2004 – CIA.

With regard to *gender inequality*, in 2002 women constituted 31.88% of the total labor force⁹, while the *adult female literacy rate* was 80.33%¹⁰, significantly lower than the male rate of 91.30%¹¹.

As for *development indicators*, according to the *Human Development Index (HDI)*, Peru ranked 85th ¹² in 2002, positioning it as a country with moderate human development, better positioned than Guatemala (121st) but worse than Jamaica (79th). This weak performance is due to several components of the index: income, health and education. For instance, the life expectancy at birth in 2002 was 70 years, due mainly to the high infant mortality rate of 30 deaths per one thousand live births. In the same year, the adult illiteracy rate was at 15%, which remains unsatisfactory. Moreover, Peru ranks 23rd in the *Human Poverty Index (HPI-1)*, placing it among developing countries.

Infrastructure coverage for public services has improved, especially in the telecommunications and electricity sectors (reaching nearly 65% of the proceeds of privatization, close to US\$ 4 billion) due in part to a successful private sector participation program initiated in 1994, which enabled an increase in the diffusion of services. However, the water and sanitation and transport sectors are the least developed sectors and show a level of performance ranking among the poorest in Latin America.

There has been a decreasing trend in government capital expenditure during the last four years, reaching the lowest levels in the last 15 years (2% of GDP). The increasing trend in recurrent government expenditure has drained resources from capital creation. Political instability has also increased risk perception in the business community, and the private investment level (16% of GDP) is still far below what the country needs for long-term growth.

One of the major challenges for the future is to increase both public and private investment and efficiency, especially in the infrastructure sectors. In fact, Peru has been trying to overcome the infrastructure gap in order to improve the country's competitiveness. Ambitious estimates of investment requirements in infrastructure reach US\$18 billion¹³ for the following 10 years, according to the *Ministerio de Transporte y Comunicaciones* (see Table 1.1). Lack of infrastructure mostly affects inland Peru (71.3%). Likewise, according to World Bank estimates (2000), US\$ 2.5 billion is required to bring the national road network up to optimal condition. Financing requirements would rise to US\$ 5.2 billion for improving unpaved highways.

⁹ Source: World Development Indicators 2004 – The World Bank.

¹⁰ Source: Ibidem.

¹¹ Source: Ibidem.

¹² Source: Human Development Report 2004 – United Nations Development Programme (UNDP).

¹³ Studies made by *Instituto Peruano de Economía (IPE)* use Chilean coverage indicators as benchmarks for electricity and water and sanitation. Transport objectives are based on official estimates and teledensity objectives are Chilean and Colombian teledensity benchmarks.

Table 1.1 – Infrastructure Gap in Public Services (US\$ Million)

Sector	Area	Investment	Observations
Transport		6,090	Road network requirements are based on official estimations of the MTC
	Road network	5,005	
	Ports	159	
	Airports	926	
Sanitation		4,153	Investment needs, taking Chile as a benchmark, are considered
	Potable water	1,535	
	Sewerage	1,601	
	Served water	385	
	Rehabilitation	532	
	Micromasurement	100	
Electricity		5,569	Chile's per capita consumption growth is considered
	Generation	4,166	
	Transmission	303	
	Distribution	1,100	
Telecommunications		2,350	Fixed and mobile teledensity of 14% and 16% respectively are considered
	Fixed network	1,040	
	Mobile network	1,310	
TOTAL		18,162	
Investment by region		<i>Percentage</i>	<i>Millions of US\$</i>
Lima		28.70%	5,212
Other Regions		71.30%	12,950

Source: Ministerio de Transportes y Comunicaciones (MTC), Ministerio de Energía y Minas (MEM) and Instituto Peruano de Economía (IPE)

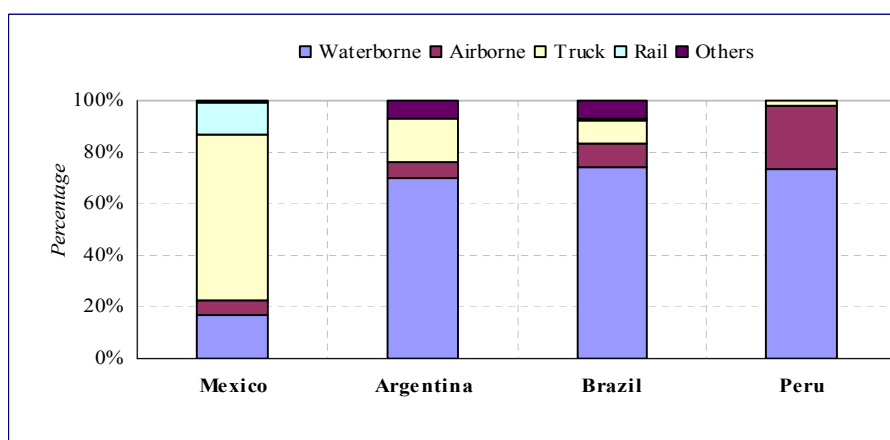
2. TRANSPORT

2.1. OVERVIEW

Peru’s geographical configuration has had a profound influence on its transport infrastructure needs and challenges; the transport sector is mostly based on roads in both the coastal and Highland areas, and on rivers in the Amazon region.

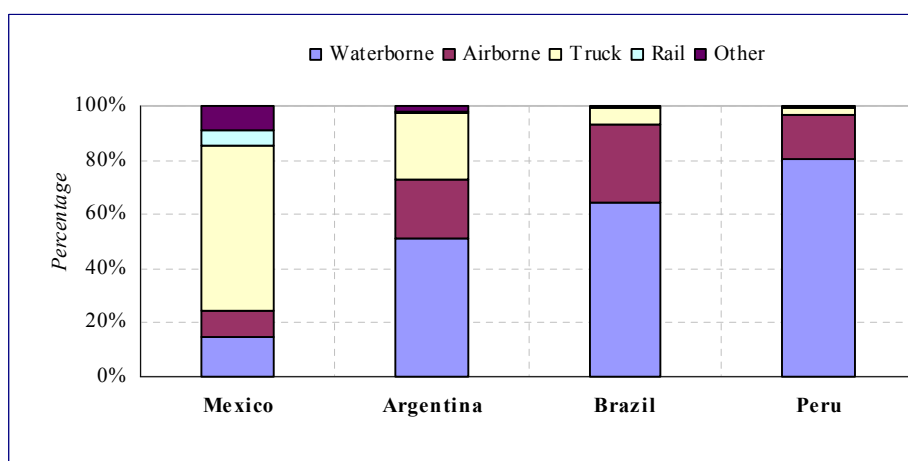
As shown in Figures 2.1 and 2.2, maritime transport is the dominant means by which goods are transported in Peru, on both the export and the import side. By comparison with other Latin American countries such as Brazil, Mexico, and Argentina, it is worth mentioning that there is limited use of trucks due to the poor condition of the road system.

Figure 2.1 – Exports by Mode of Transport – 2000 Value FOB



Source: Economic Commission for Latin America and the Caribbean (ECLAC)

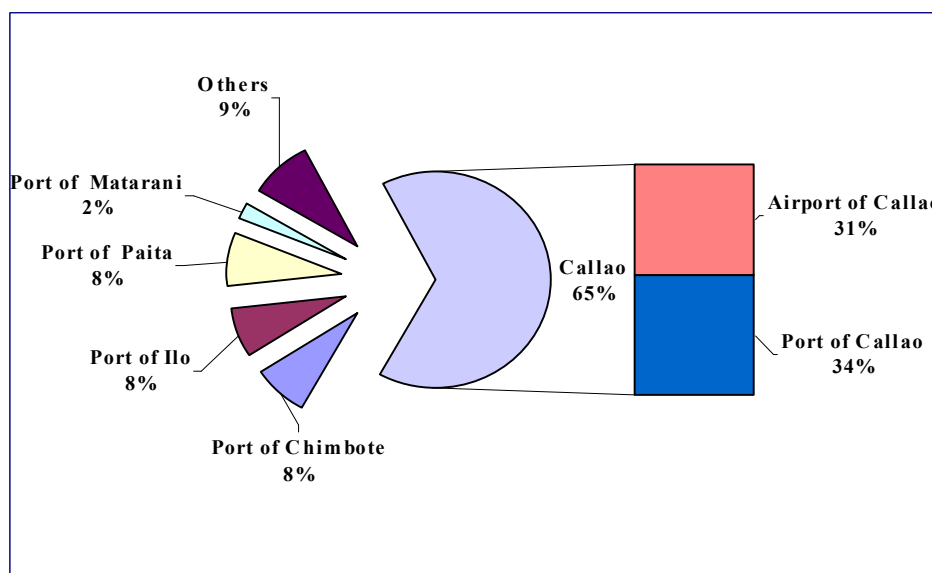
Figure 2.2 – Imports by Mode of Transport – 2000 - Value FOB



Source: ECLAC

In particular, as can be seen in Figure 2.3, the bulk of foreign trade is concentrated in the port and airport located in Callao, close to Lima: in 2003, 65% of exports were transported this way. Cargo is transported to and from Lima/Callao to the different locations where production takes place.

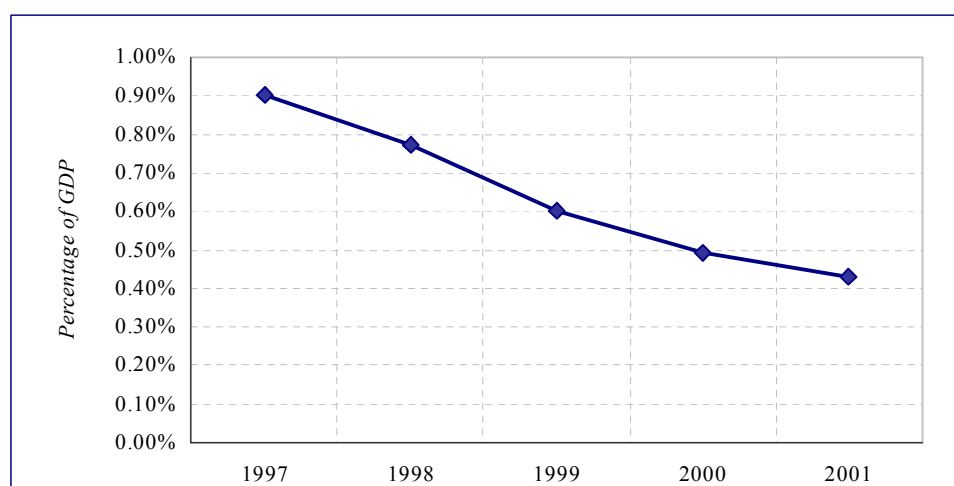
Figure 2.3 – Handling of Export by Port/Airport – Peru 2003



Source: Sociedad de comercio exterior COMEX - Peru

Expenditure on transport is less than 1% of GDP, and it dropped during the period 1997-2001 due to financial constraints. Since 1997, public investments in transport have been decreasing in order to adjust the overall fiscal balance targets established by the government with the IMF (Figure 2.4).

Figure 2.4 – Transport Investment as Percentage of GDP



Source: Ministerio de transporte y Comunicaciones (MTC) – “La brecha en infraestructura” (IPE)

2.2. ASSESSMENT OF KEY POLICY AREAS

2.2.1. ANALYSIS OF TECHNICAL DIMENSIONS

In order to assess the technical dimension of the transport sector in Peru, the following sub-sectors have been analyzed:

- roads;
- railways;
- ports;
- airports.

Roads. At the beginning of the 1990s, the road system was in a critical situation. In fact, 80% of the network was in poor condition and just 8% was adequate. Clearly, this situation posed a major obstacle to Peru's economic development. The government therefore launched the *Plan de emergencia Vial* in order to rehabilitate the main roads within the national network¹⁴. In 1992, two very important events occurred within the sector: the signing of the contract between the government and IDB (IDB granted US\$ 210 million for road rehabilitation); and the promulgation of legislative decree No. 758, the goal of which was the promotion of private participation in the construction, rehabilitation, and maintenance of infrastructure.

In spite of these government interventions the road system in Peru is still in poor condition. This is certainly the outcome of the drop in investment (as shown in Figure 2.4), primarily reflecting the effects of public budget constraints. In particular, Table 2.1 shows the road indicators for the following countries: Peru, Jamaica, and Guatemala, which are classified in the lower middle-income group in the benchmark analysis. The overall picture is that Peru's transport sector demonstrates the worst performance; in fact, its *road density* and *paved road* indicators are far below those of the other two countries classified according to the same levels of development. Moreover, these indicators have not improved remarkably during recent years, mainly due to the aforementioned fall in investments.

Table 2.1 – Roads – Indicators for Selected Countries – 2001

Country	Total road (km)	Country size (millions of km ²)	Paved road (percentage)	Road density (road km/1000 km ²)
Peru	78,230	1,280.00	13.36%	61.12
Jamaica	18,700	70.50	70.10%	1,726.69
Guatemala	14,118	108.43	34.50%	130.20

Source: World Development Indicators 2004 (WDI) – Economic Commission for Latin America and the Caribbean (ECLAC) – International Road Federation (IRF)

Indeed, considering first the total road extension of Peru, which rose from 78,112 km in 1998 to 78,319 km in 2002, the rate of growth recorded during the five-year period was practically zero, while during the previous 40 years growth had stood at an average of about 3%; indeed, the road network in 1960 was 34,357 km¹⁵. However, it should be noted that the 78,319 km¹⁶ recorded

¹⁴ Agencia de Promoción de la Inversión Privada Paseo de la República – PROINVERSION, 2002.

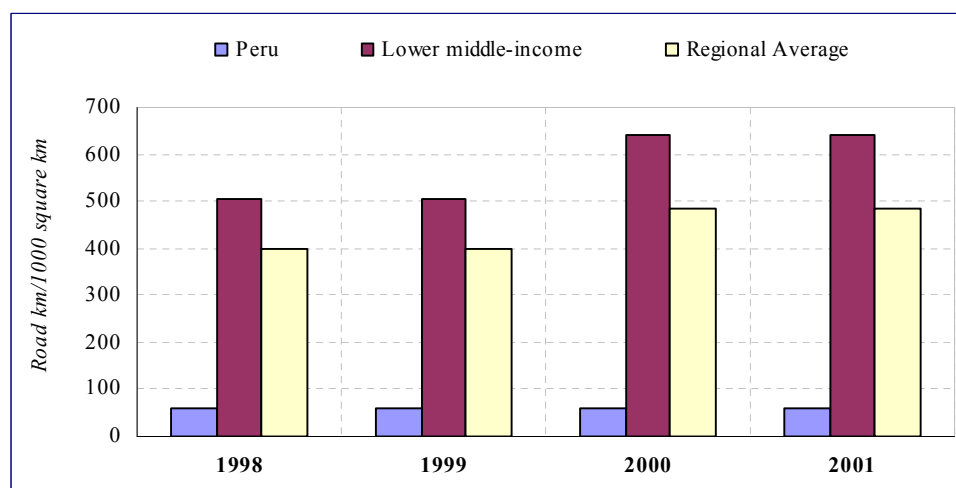
¹⁵ Source: International Road Federation (IRF) – World Road Statistics.

¹⁶ Source: Ministerio de transporte y Comunicaciones (MTC).

in 2002 consisted of 22% in the form of highways, 18% in regional roads, and 60% in other roads.

Moreover, comparing Peru with all the countries within the regional sample in terms of road density, as Figure 2.5 illustrates, its performance in the period 1998-2001 was much lower than that of the two benchmark averages; however, it should be noted that the averages are affected by the indicator for Jamaica, which is astonishing. However, even if neutralizing the latter average, the indicator for Peru would still remain lower than the benchmark averages.

Figure 2.5 – Road Density



Source: Ernst & Young Italy and Cohen&Co. elaborations on ECLAC data (*Anuario Estadístico America Latina y el Caribe 2003*)

In order to assess the *road quality*, the indicator *paved roads as a percentage of total roads* was analyzed. The results for 2001, the most recent year for which there are available data, are summarized in Table 2.2. Peru’s indicator is the lowest (13.36%), confirming the poor quality of the road system in absolute terms and, in particular, in comparison with the other countries at the same level of development (Guatemala and Jamaica) and with the regional sample. In addition, the percentage of paved roads increased only modestly from 12.97% to 13.36% in the period 1998-2001.

Table 2.2 – Paved Roads (Percentage of Total Roads) – 2001

	Peru	Guatemala	Jamaica	Lower middle-income countries	Regional average
Paved roads (% of total roads)	13.36%	34.50%	70.10%	41.73%	33.27%

Source: International Road Federation – *World Road Statistic 2004*

Finally, the poor state of the road sector is also reflected by the indicator regarding fatalities: the situation in Peru is the worst in spite of a decreasing number of road fatalities. In particular, the

indicators for the years 1999, 2000, 2001, and 2002¹⁷, were 3,214, 3,118, 3,208 and 2,929 respectively.

On the basis of this analysis, it is clear that an increase in road quality represents a major challenge to facilitate the increase of cargo traffic in the road system, a better use of the infrastructure and increased competitiveness for Peruvian firms through savings in logistics costs. For instance, it should be noted that the transport of wood from the central Amazon region to Lima is more expensive and usually takes more time than, for example, cargo traveling from Houston, Texas (USA), to Lima.

Also, it must be mentioned that, although the road system along the coast has improved, this is unfortunately not true for roads in the Highlands and the Amazon region. For instance, from the department of San Martín in the northern Amazon region, to Lima, the longest route (north-west and then south along the Pan-American Highway) turns out also to be the fastest due to the poor quality of roads connecting the region to the central highway.

Railways. With regard to the technical dimensions of the railway system, the first point to note is that coverage is inadequate, reaching 2,122.8 km in 2002, starting from 2,015.0 km in 1998. Moreover, looking at the *rail density per 100 km²*, described in Figure 2.6 below, the indicator for Peru was dramatically lower than that of the benchmark countries.

Also *railway traffic density* (traffic units/railway km) has barely increased, from 1.34 in 1999 to 1.39 in 2002. This is due to the fact that railways in Peru have been negatively affected by growing inter-modal competition. Indeed, as is the case in other Latin American countries, roads have crowded out the use of railways, especially concerning passenger transportation. In Peru, this situation is illustrated by the fact that the tourist route connecting Cusco to Machu Picchu accounted for 91% of the total passengers transported by rail in 2001. Furthermore, during the period 1995-2001, passenger traffic in the Central Railroad decreased sharply, by 95%, leading to a reduction in services. Accordingly, the cargo/passenger ratio has shifted considerably: mineral cargo dominates the Central Railroad and passenger traffic dominates the Southern Railroad.

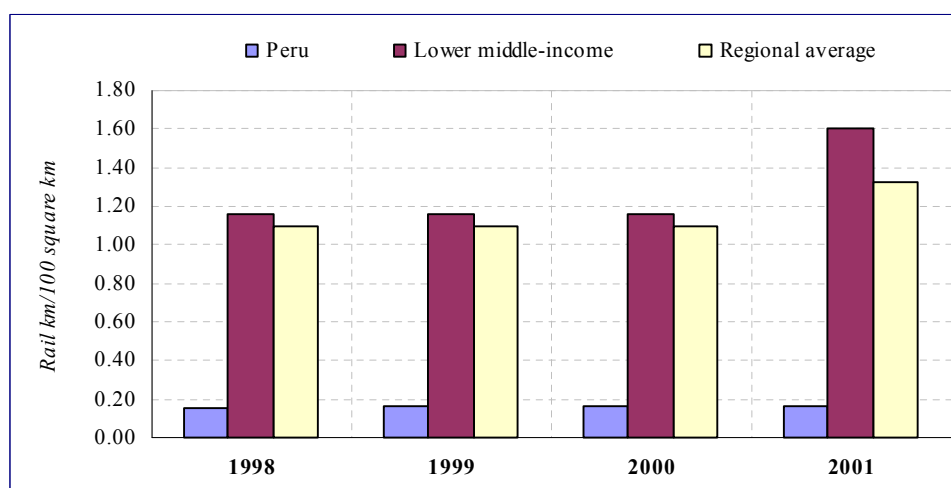
Table 2.3 – Railroads in PERU: Concessionaires and Operators

Railroads	Length (km)	Concessionaire	Operator
Central Railroad	590.9	Ferrovias Central Andino	Ferrocarril Central Andino
Southern Railroad	915.2	Ferrocarril Transandino S.A.	Peru Rail S.A.
Southeastern Railroad	134	Ferrocarril Transandino S.A.	Peru Rail S.A.

Source: Organismo Supervisor de la Inversión en Infraestructura de Transporte de Uso Público (OSITRAN) 2001

¹⁷ Source: IRF – World Road Statistics 2004.

Figure 2.6 – Rail Density



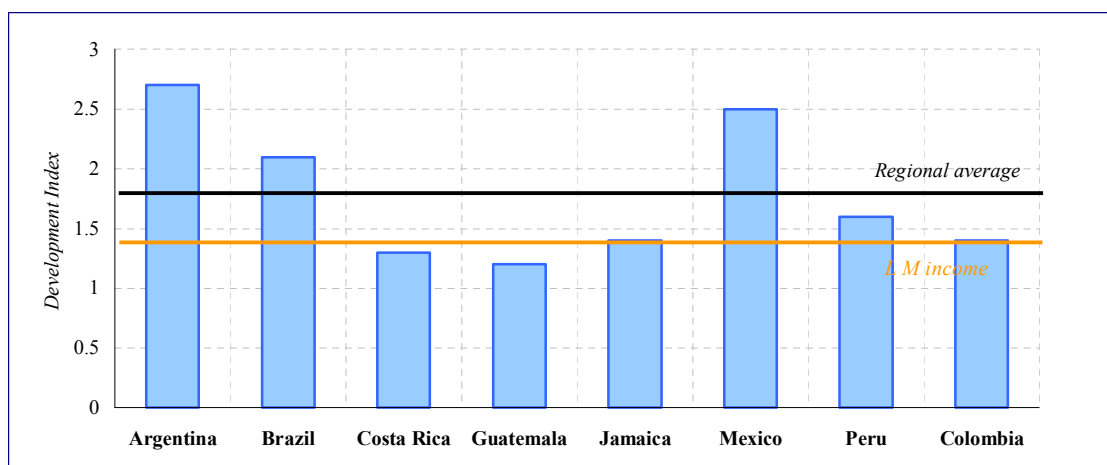
Source: Ernst & Young Italy and Cohen&Co. elaborations on ECLAC data (*Anuario Estadístico America Latina y el Caribe 2003*)

Note: Jamaica excluded

The inadequate level of rail infrastructure is highlighted also by the results of the World Economic Forum 2004 Executive Opinion Survey¹⁸. In the survey, users considered the Peruvian railroad infrastructure to be inadequate; it was given a value index of 1.6, very far from the best performances considering global competitiveness. The figure is nonetheless not far behind the regional average of 1.8, and is better than the 1.4 given to the lower middle-income countries in the region. These data clearly show Peru's complete lack of progress in the railroad sector and stress the need for increased investment to help renovate the existing infrastructure, thereby increasing its utilization.

¹⁸ World Economic Forum (WEF) 2004 Executive Opinion Survey Results, produced in collaboration with the Center for International Development at Harvard University and the Institute for Strategy and Competitiveness, Harvard Business School.

Figure 2.7 – Railroad Infrastructure Quality – 2004¹



Source: World Economic Forum 2004 Executive Opinion Survey

¹ Scoring: 1= underdeveloped and 7= as extensive and efficient, the world's best

Ports. The country has 14 ports: Callao, Chimbote, Ilo, Matarani, Paita, Puerto Maldonado, Salaverry, San Martin, Talara, Iquitos, Pucallpa, Yurimaguas, Huacho, and Chicama. Among them, Callao, which is scheduled to be privatized under concession within the next two years, dominates maritime traffic. In 2003 it accounted for more than 78% of the total seaport movement, followed by San Martin with 6.32% and Salaverry with 5.57% (see Table 2.4). Furthermore, the supremacy of port of Callao in recent years has become more evident as it experienced growth of 19% between 2001 and 2003, while the overall seaport movement increased only by 10% in the same period. It should be noted that Table 2.4 takes into account only the ports managed by *Empresa Nacional de Puertos S.A.* (ENAPU); therefore, the port of Matarani, which is the only one given in concession to *Terminal Internacional del Sur* (TISUR), is not included and, in any case, its participation is about 8%.¹⁹ The main national shipping operators are Petrolera, the Peruvian government, Petoperu, Amazonica Peruana, and the Transgas shipping line, while the merchant marine has three ships, namely, two cargo and one petroleum tanker.

¹⁹ Source: OSITRAN.

Table 2.4 – Seaport Movement – Ton by Ports – Peru 2003

Ports	Tons-2001	Tons-2001	Tons-2003	2003/2001	Participation
Callao	11,336,762	12,112,582	13,544,070	+19%	78.43%
San Martin	1,473,796	1,275,702	1,090,781	-26%	6.32%
Salaverry	871,250	853,643	961,426	+10%	5.57%
Paita	812,422	778,234	770,858	-5%	4.46%
Chimbote	520,889	310,644	331,552	-36%	1.92%
Ilo	142,385	275,103	137,807	-3%	0.80%
Iquitos	204,941	191,048	211,848	+3%	1.23%
Yurimaguas	112,069	103,494	85,824	-23%	0.50%
Huacho	121,069	99,485	51,671	-57%	0.30%
Chicama	45,897	37,939	58,264	+27%	0.34%
Puerto Maldonado	24,953	23,002	24,377	-2%	0.14%
Others	n.a.	n.a.	n.a.	n.a.	n.a.
Total¹	15,666,491	16,060,874	17,268,478	10%	100.00%

Source: ECLAC – Perfiles Marítimos

¹Matarani port excluded

Table 2.5 describes the seaport movement for the middle lower-income countries included in the survey. Although seaport movement had increased by 10% during the 2001-2003 period, Peru's indicator *tons per 1,000 people* was the lowest by comparison with the other countries at a similar level of development.

Table 2.5 – Seaport Movement – Ton – Selected Countries

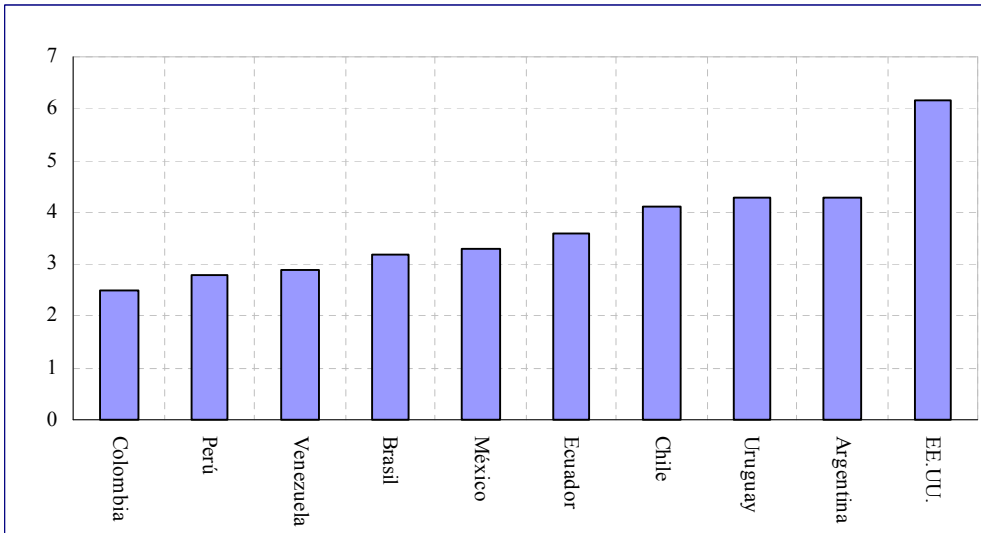
	Tons			Tons/1000 people		
	2001	2002	2003	2001	2002	2003
Peru	15,666,491	16,060,874	17,268,478	594.62	600.43	626.94
Jamaica	15,563,901	16,962,635	17,479,294	6,139.61	6,691.37	6,895.19
Guatemala	13,272,006	14,221,026	14,639,900	1,125.89	1,206.40	1,241.93
Colombia	52,352,407	52,888,358	52,316,979	1,216.62	1,209.35	1,178.31

Source: ECLAC – Perfiles Marítimos

This poor performance is due also to the fact that logistics costs, as a percentage of product value, made Peru the most expensive country. In particular, in 2000, Peru's performance was the worst – its ratio of logistics costs to product value stood at 35%, compared to countries such as Argentina (30%), Brazil (25%), Mexico (18%), and Chile (15%). Indeed, the efficiency of ports in Peru, shown in Figure 2.8 below, is very low; only Colombia presents a worse indicator. It has been estimated that even in Lima's relatively efficient port, inefficient access

and government “red-tape” add a 3%-7% cost to the value of commodities in transit. Accordingly, the Market Access Commission of Indecopi (Institute for the Defense of Competition and Intellectual Property), the autonomous agency responsible for arbitrating and the promotion of market activities, has already taken some steps to reduce exporters’ costs.

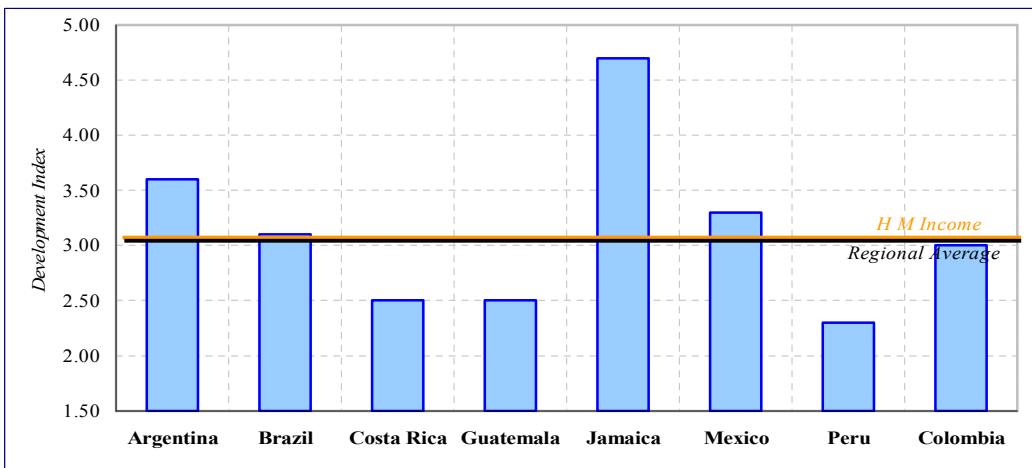
Figure 2.8 – Port Efficiency



Source: OSITRAN

Inefficiency in the sector is also reflected in the results of the World Economic Forum’s 2004 Executive Opinion Survey. In the survey, users rated the port infrastructure in Peru as the worst in the region. As shown in Figure 2.9, in fact, ports in Peru did not have an adequate level of infrastructure quality, with a score of 2.3, poor compared with both the regional average and the average for the countries representing the main benchmark group, which stood at 3.1.

Figure 2.9 – Port Infrastructure Quality – 2004¹



Source: World Economic Forum 2004 Executive Opinion Survey

¹Scoring: 1= underdeveloped and 7= as extensive and efficient, the world’s best

Airports. Peru has 52 airports with paved runways and 182 airports with unpaved runways. All the airports, except Lima, are administered by a public enterprise, *Corporación Peruana de Aeropuertos Y Aviación Comercial* (CORPAC). Airports are used principally for passenger traffic (while cargo transportation relies mainly on roads or ports). Only nine out of the 52 airports with paved runways are classified as international airports, with just four of them (Arequipa, Cusco, Iquitos and Lima) handling more than 250,000 passengers a year. Specifically, between them Cusco, in the south, is important for tourism; Iquitos, in the Amazon region, for cargo; and Arequipa, in the south, for both cargo and tourism. The Lima International Airport (*Aeropuerto Internacional Jorge Chávez*) in Callao, the largest airport in Peru, as already mentioned, was given in concession in 2000.

Table 2.6 – Airports with Paved Runways Classified by Length – 2003

	Peru	Colombia	Guatemala	Jamaica
Total	52	101	11	11
over 3,047 m	5	2	0	0
2,438 - 3,047 m	20	9	3	2
1,524 - 2,437 m	16	39	2	0
914 - 1,523 m	9	39	4	4
under 914 m	2	12	2	5
Population – million	27.1	44.4	12.3	2.6
Land - sq Km – thousand	1,280.0	1,038.7	108.43	10.831
Airports (with paved runways) /1000 sq Km	0.04	0.10	0.10	1.02
Airports (with paved runways) /million people	1.92	2.27	0.89	4.19

Source: *The World Factbook – Peru 2004 – CIA*

Table 2.7 shows passenger traffic in each airport: it should be noted that Lima International Airport is the most important airport as it handles around 60% of total traffic: more than 40% of national and almost 100% of international traffic. In general, airport transportation is not the favorite mode of transport in Peru, and figures for passenger traffic show a negative trend, decreasing from 7,543,893 in 1999 to 6,950,717 in 2003 (a drop of 7.86%).

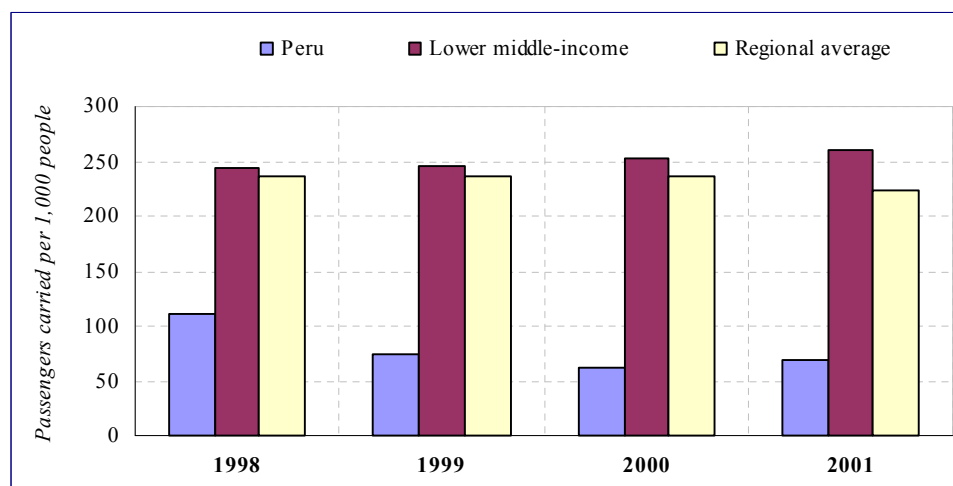
Table 2.7 – Airport Passenger Traffic (National and International) - Peru

Airport	1999	2000	2001	2002	2003
Andahuaylas	17,004	13,259	10,266	7,457	9,475
Anta – Huaraz	9,888	9,114	6,320	5,273	4,928
Arequipa	459,659	419,172	393,298	314,095	328,295
Atalaya	8,394	6,091	5,373	11,402	3,729
Ayacucho	39,107	40,868	24,451	16,318	30,732
Cajamarca	39,520	38,602	38,919	38,999	61,961
Chachapoyas	4,020	912	454	896	1,875
Chiclayo	170,427	131,429	110,625	102,637	98,948
Chimbote	8,308	2,202	1,972	370	943
Cuzco	767,107	792,125	716,235	661,127	715,655
Huanuco	7,420	9,186	5,444	4,230	6,382
Ilo	861	2,264	620	252	263
Iquitos	341,151	372,064	361,362	323,220	319,322
Juaja	6,425	2,479	1,611	645	576
Juanjui	7,927	3,434	2,463	1,893	2,747
Juliaca	177,699	167,118	114,964	118,199	123,045
Lima	4,313,568	4,505,936	4,363,873	4,196,687	4,326,066
Mazamari	-	-	2,323	6,456	7,965
Nazca	103,621	110,644	121,924	128,458	151,702
Pisco	429	3,805	1,527	418	659
Piura	170,230	159,470	132,263	124,235	110,569
Pucallpa	177,923	162,311	142,539	134,804	122,936
Puerto Maldonado	111,762	110,674	104,995	111,225	124,566
Tacna	153,562	152,246	145,423	120,050	113,712
Tarapoto	172,726	137,857	128,578	111,657	106,458
Tingo Maria	18,050	8,038	4,619	500	596
Tocache	4,549	3,042	1,311	690	1,925
Trujillo	185,823	163,118	136,139	131,485	124,778
Tumbes	32,711	37,982	47,683	33,717	41,576
Yurimaguas	9,986	10,382	8,569	4,546	7,940
Others	24,036	2,915	3,467	687	393
Total Passenger Traffic	7,543,893	7,578,739	7,139,610	6,712,628	6,950,717

Source: CORPAC (Airports managed by CORPAC)

In order to analyze the current performance of the airport system in the Latin American context, a comparison was made using the following indicator: *passengers carried per 1,000 people* (see Figure 2.10). The negative trend noted when analyzing the internal situation of Peruvian airports is confirmed: there was a huge gap between the indicator for Peru, about 70 in 2001, and those of the regional sample (225) and the countries characterized by the same level of development (261).

Figure 2.10 – Airport Sector – Benchmark Based on Passengers Carried per 1,000 People



Source: Ernst & Young Italy and Cohen&Co. elaborations on ECLAC data (Anuario Estadístico America Latina y el Caribe 2003)

By contrast, freight traffic has been increasing in recent years, as shown in Table 2.8, although the gap dividing Peru from the benchmark indicators is still evident and greater efforts are needed to reduce it. In addition, it should be noted that, also in this case, Lima International Airport has the greatest stake in the market.

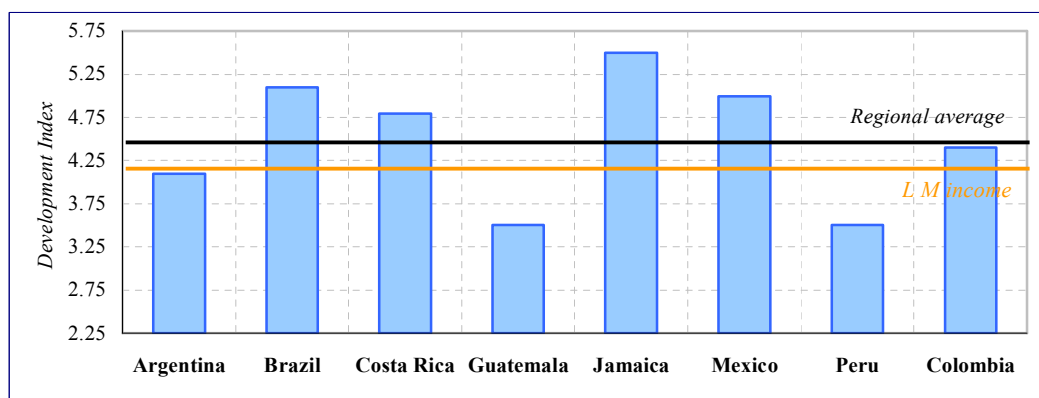
Table 2.8 – Airports – Ton – Kilometers of Freight per 1,000 People

Country/Year	1998	1999	2000	2001
Peru	286.16	234.71	2,070.24	4,395.19
Lower middle-income¹	9,698.61	9,01.79	9,195.66	9,596.19
Regional Average¹	10,568.47	9,767.95	9,825.28	7,090.11

Source: Ernst & Young Italy and Cohen&Co. elaborations on ECLAC data (Anuario Estadístico America Latina y el Caribe 2003)

¹Guatemala excluded

Considering the above, it is not surprising that Peru’s airport infrastructure quality is ranked below the regional level and that of the comparable countries. It achieved the lowest rating among the counties considered – 3.5 (see Figure 2.11).

Figure 2.11 – Air Transport Infrastructure Quality – 2004¹

Source: World Economic Forum 2004 Executive Opinion Survey

¹Scoring: 1= underdeveloped and 7= as extensive and efficient, the world's best

2.2.2. ECONOMIC EFFICIENCY AND PRIVATE SECTOR FINANCING

Recent estimates have shown that an overall investment of US\$ 18 billion is required to bring infrastructure to levels of development close to neighboring countries such as Chile and Colombia. Transport in particular needs around US\$ 6 billion. Considering recent investment levels (just over one billion dollars annually), it might be possible to attain just the *current* diffusion and quality of infrastructure found in Chile or Colombia in over twenty years. In particular, the greatest need for investment is in relation to road infrastructure, at US\$ 5 billion; investment needs in airports come second, at US\$ 926 million, and ports rank third with an estimated requirement of US\$ 159 million.

With regard to the road system, two important events occurred in the sector in 1992: the signing of the contract between the government and the IDB (the IDB granted US\$ 210 million for road rehabilitation); and the promulgation of legislative decree No. 758, the goal of which was the promotion of private participation in the construction, rehabilitation, and maintenance of infrastructure.

Within this context, the privatization process started with the first concession: the road Matarani-Arequipa which extends over 112 kilometers, was awarded by the Ministry of Transportation and Communications (MTC) to Concessionarios de Carreteras S.A. (CONCAR).

Afterward, the government launched the *Plan de Desarrollo Vial 1996-2005*, which announced that 11 highways, corresponding to approximately 7,000 km, would be given in concession. One of the main features of this plan was to bundle in the same concession roads with high traffic flow (more than 5,000 vehicles daily) and roads characterized by a lower traffic density (lower than 2,000 vehicles daily) located in the same area. Furthermore, each concession defines the stake of roads already rehabilitated and those the concessionaires have to rehabilitate during the concession period of 25 years²⁰.

After the approval of this Plan, the second road was awarded through concession - "Red Vial No. 5" - which extends over 410 km. The concession envisaged an investment of approximately US\$ 135 million, covering the routes of Lima-Huacho-Pativilica and Canta-Huayllay-Unish.

²⁰ IDB "Estrategia para el sector Transporte en Peru" 2002.

The toll charges were set at US\$ 1.6 before rehabilitation and US\$ 2.0 after completion. However, the concession framework was changed because the first one was not viable for many reasons. The new framework included a tariff of US\$ 3.5 and investments of US\$ 160 million during the concession period.²¹ Finally, the current concession project is related to “Red Vial No. 6”, which connects Pucusana-Ica. The investment estimated for its rehabilitation, construction, and maintenance is approximately US\$ 225 million²².

However, with the exception of the two highways mentioned (Arequipa-Matarani, and Red Vial No. 5), all paved roads are maintained by the national agency, *Proyecto Especial de Infraestructura de Transporte* (PROVIAS) – dependent upon the Ministry of Transport and Communication – (MTC). Current tolls do not cover costs and their amounts are lower than the target of US\$ 1.4 per 100 kilometers.

In 1973, all **railroads** were nationalized and their control was given to a state-owned enterprise, *Empresa Nacional de Ferrocarriles* (ENAFER PERU). As budgetary constraints have negatively affected its ability to invest, the quality of the railroad system and its importance as a means of transportation have decreased. The three main railroad routes on which the system is based - *Ferrocarril del Centro* (FCC), *Ferrocarril del Sur* (FCS), and *Ferrocarril del Sur Oriente* (FCSO) -, were given in concession in 1998, while the fourth - Huancayo-Huancavelica - remained under government control. In particular, the FCC connects the port of Callao with the following cities: Oroya, Juaja, Cerro de Pasco, and Huancayo. About 63% of the total cargo transported through the FCC consists of metals, such as zinc, lead, and copper. The FCS covers the routes of Matarani-Arequipa-Juliaca-Puno-Cusco and Tacna-Arica and transports mainly liquid oil, soya, carbon, and cement. Finally, the FCSO connects Cusco-Machu Picchu and Pachar-Urubamba; unlike the other railroads, this one is only used for tourism.

The performance of the railroad concessionaires, indicated in Table 2.3, followed market conditions and firm strategies. The Central Railroad still serves the mines located in the central Highlands in order to transport minerals to port of Callao. It no longer transports passengers since as this market is more efficiently served by buses and cars. The Southern Railroad has shifted towards serving the tourist sector, and the concession was awarded to the British firm Orient Express, a major worldwide tourist operator. The Orient Express integrates hotels in Lima, Cusco, and Macchu Picchu with railroad and transport concessions, all of them concentrated on the luxury vacation segment.

It is worth mentioning that the involvement of private companies in the management of railroads increased investment by a total of US\$ 25 million in the period 1999-2003, while tariffs for railroads increased by less than 15%. Instead, the routes still under public control, Huancayo-Huancavelica, have not received a major flow of resources in recent years.

²² Source: PROINVERSION 2002.

As mentioned previously, only one *airport* and one *port* were given in concession.

The port of Matarani (TPM) in the southern department of Arequipa was handed over in 1999 to *Terminal Internacional del Sur* (TISUR), owned by a private domestic group with diverse interests in the major economic sectors in Peru (banking, insurance, export agriculture, food processing and distribution, etc). Then Congress, after the political fallout of the Fujimori government in 2001, enacted a reasonable law stating that no new port could be given in concession before a new law regulating the sector was promulgated. This occurred in March 2003, with the enactment of Law 27,943. The law created a new agency, the National Port Authority (APN), whose functions collided with those already within the regulator's sphere of responsibility. Unfortunately, the APN is still weak and lacks the resources it needs to carry out its functions; its enforcement should therefore be on the government agenda.

In the meantime, the TPM has managed to increase the proportion of cargo brought from Bolivia to make up for two economic shocks faced after 1999: the major grain importer moved out of Arequipa and the main mineral exporter (Tintaya, owned by BHP Billiton) ceased production in 2002 due to low copper prices. Efficiency has increased dramatically in TPM, although it is important to mention that prior to privatization the *Empresa Nacional de Puertos S.A.* (ENAPU), the public enterprise responsible for port management in Peru, invested around US\$ 7 million. The concessionaire later invested an additional US\$ 5 million to improve the major storage facilities, the grain and mineral transport infrastructure, and the three terminals. The result was that, in the first two years of the duration of the concession, the efficiency in discharge was 11% higher in TPM than in the port of Callao.

In 2001, the major airport in Lima, *Aeropuerto Internacional Jorge Chávez* (AIJC), was handed over to a consortium – Lima Airport Partners (LAP). It was formed by Flughafen Frankfurt Main AG; Bechtel Enterprises Internacional Ltd; *Consortio SADE – Sociedad Argentina de Electrificación* (COSAPI); and *Piazza y Valdez Ingenieros S.A* (PIVASA), a local construction firm. During the first two years, LAP invested more than US\$ 30 million, and the first US\$ 110 million in new investments will be reached in 2005. This amount will fund the extension of both the national and international terminal, the construction of passenger bridges, storage facilities, a commercial center, and improvements in the fuel handling facilities. The major problem lies in the amount of royalties paid by LAP to obtain the concession: 46% of gross income. This places the concessionaire under extreme financial pressure to comply with the terms of the concession contract. Moreover, LAP is subject to regulated tariffs and to an agreement to share part of its income with *Corporación Peruana de Aeropuertos y Aviación Comercial S.A.* (CORPAC), the state-owned company that, before 1990, was responsible for the management of all airports in Peru. Certainly, the process of liberalization will boost sector performance, especially if the envisaged concessions of the other main airports, such as Yquitos, Cusco, Trujillo, and Arequipa, take place successfully. These concessions will relieve the Peruvian budget of the need to finance the investment requirements (US\$926 million) in this sector.

2.2.3. REGULATORY FRAMEWORK AND INSTITUTIONAL DEVELOPMENT

The Ministry of Transportation and Communications (MTC) is responsible for the definition of transportation policies, specifically for public works and public transportation services. It has important functions with respect to port, railway and airline operators, and providers of transportation services (both passengers and loads). It is also responsible for the planning and development of public works in transportation.

The main purpose of Law 26,917/1998 (Law of Supervision of Private Investment in Public Transportation Infrastructure and Promotion of Air Transportation Services) is to set out a legal

framework for the development of transportation services and the supervision of transport infrastructure through the elimination of barriers to the transportation services market.

This Law has created the regulatory and supervising agency, the *Organismo Supervisor de la Inversión en Infraestructura de Transport de Uso Público* (OSITRAN). Law 27,332/2000 (amended by 28,337/2004) defines several aspects related to OSITRAN and other regulatory agencies. OSITRAN is an agency under the Presidency of the Council of Ministers, in charge of supervising, regulating, and controlling the behavior of the markets where providers operate, as well as of the corresponding fulfillment of the concession contracts, taking into consideration the interests of the state, investors, and users. With regard to regulations, OSITRAN is responsible for setting rates, quality standards, and access rules for infrastructure projects. The supervision activities are based on an annual supervision program, known to all parties. The board members (four) are appointed by a Supreme Resolution for a five year term, which may be renewed once. Two members are elected by the Council of Ministers from a list of four proposed by the Ministry of Transportation and Communications, and one of these members presides over the Council. The other two members are also elected by the Council of Ministers from lists of three candidates, proposed by the Presidency of the Council of Ministers and by the Ministry of the Economy and Finance respectively. Finally, the *Agencia de promoción de la inversión privada* (ProInversión) is a public agency responsible for promoting private investment in infrastructure.

Besides the global norms mentioned above, the current regulatory framework for the road sector also includes Law 27,781/1999 (General Law of Land Transportation and Transit), which establishes general economic and organizational guidelines. The General Office of Roads and Railways (*Dirección General de Caminos y Ferrocarriles – DGCF*), under the MTC, issues norms on the use and development of roads, bridges, and railways, and monitors compliance with these rules throughout the national road network. It is responsible for the formulation, proposal and implementation of policies, strategies and plans regarding the management of the road and rail network. The office also gives opinions on rates, formulates norms, and authorizes permits and licenses for railway service operation. The General Office of Road Traffic (*Dirección General de Circulación Terrestre – DGCT*), also under the MTC, is responsible for formulating norms, granting authorizations, and supervising, controlling, and regulating services for road transportation of loads and passengers.

At the beginning of the 1990s, the government proposed an ambitious concession program (covering all infrastructure sectors) to promote private investment, in order to alleviate the financial problems affecting the infrastructure. However, in spite of the initial ambitions set out in the program, by 2004 the Peruvian state had only granted concessions for the port of Matarani, three railway lines (South, Southwest and Central), two roads (Arequipa-Matarani and Ancon-Huacho-Pativilca), the international airport Jorge Chávez, and the Machu Picchu funicular.

Alongside this, from 1993 to 1997, the government undertook an important public investment program, oriented towards the necessary reconstruction of the major roads that had been suffering serious deterioration and could not be transferred to private hands. Although public investments meant significant growth for the road network, they were gradually reduced, leading to a deterioration of the road network from 1998 onwards. At the end of 2001, the Peruvian road network had a total length of 78,230 km, of which only 13.36% was paved. Compared with other road networks in the region, the Peruvian network is in very poor condition.

The reform initiated at the beginning of the 1990s, aimed at promoting private investment in infrastructure, has gradually lost strength and popularity among policymakers. The main factors prevailing against the reform were the poor coordination in the development of a concession program, and the limited support from public authorities. After concession contracts were

awarded, concessionaires were exposed to some contingencies (investment requirements, changes in tolls, taxes, etc.) or changes in contractual rules (such as the appearance of OSITRAN), which gave rise to renegotiations or delayed starts.

Over recent years the promotion has revived again and currently five road concession projects are underway, representing about 38% of the national paved roads. An important challenge is to achieve decentralized implementation of private investment programs at sub-national level.

On the other hand, private investment in railways was declared to be of great national interest. Consequently, ENAFER (the state-owned railway company) was included in the process of promoting private investment in 1993. The design of the concessions established the separation of the infrastructure operator and of the concessionaire in charge of the delivery of services, who would pay an access fee to use the infrastructure.

The Peruvian railway network has a total length of 2,123 km and consists of three main lines, *Ferrocarril del Centro* (FCC), *Ferrocarril del Sur* (FCS), and *Ferrocarril del Sur Oriente* (FCSO). These railways were administered by ENAFER until 1999, when they were granted in concession. In general, according to IPE (2003), the evolution of the railway sector after the privatization process has been positive (in net terms). Since 2002, on the one hand, there has been a considerable increase in the volume of transported loads (especially by the FCC, the main railway for load transportation). On the other hand, the number of passengers transported by FCS and FCSO (the providers of transportation services) was lower than before privatization; although this could have been caused by the closing of low demand routes and the increase in tourist transportation rates. Nevertheless, in operational terms, the three railways showed an improvement in relation to almost all the performance indicators. There is a commitment to achieving important infrastructure and service standards, as well as adequate safety standards, by the fifth year of concession.

As discussed previously, important reforms were made in Peru during the 1990s by granting in concession the operation of roads and railways. These reforms were in line with the procedure followed by other Latin American countries, such as Argentina or Chile and, as in these countries, the road and railway sectors in Peru were not exempt from regulatory risks and the renegotiation of concession contracts. These factors, as well as the search for efficiency, market allocation and other risks, should be taken into account in facing future challenges in sector reforms.

In the port sector, the current regulatory framework is provided by Law 27,943/2003 (Law of the National Port System) and the general law mentioned in the introduction to this section. Law 27,943/2003 establishes the new institutional framework for restarting the private investment process in ports. The main objectives of this Law are to promote the development and competitiveness of ports and to modernize port infrastructure and facilitate multi-modal transportation. It regulates the activities and services (public and private) in terminals, infrastructure, and facilities within the national port system.

The MTC is the body responsible for defining sector policies and the general norms relating to the National Port System. The General Division of Water Transportation (*Dirección General de Transporte Acuático* – DGTA), under the MTC, is a technical body responsible for proposing policies for water transportation, as well as port infrastructure. OSITRAN is the regulatory agency of this sector. Law 27,943/2003 stipulates that the utilization of port facilities available for public use (either publicly or privately owned) is subject to regulated rate charges, if free competition is not present. The tariff structure is regulated by OSITRAN on the basis of proposals by the National Port Authority or the corresponding regional port authority. When services are rendered within an open competitive environment, payments are freely determined between parties.

The National Port Authority (APN) is a public decentralized body (under the MTC) responsible for the National Port System. The APN has administrative and financial autonomy and is responsible for planning the development of ports, including the implementation of the National Port Development Plan (which identifies the different needs of each port for the rational use of public resources and the promotion of private investment). It also coordinates with other public institutions, oversees the implementation of the Law, promotes public and private investment, and retains some normative and environmental functions. The APN grants licenses, authorizations, and permits for the operation of infrastructure and the rendering of services.

The implementation of Law 27,943/2003 will depend on the new rules recently introduced and on the environment created in the sector (by main public and private actors) to induce investments.

In the airport sector, the basic regulatory framework provided by Law 27,261/2000 (Law of Civil Aviation of Peru) and by the general law mentioned in the introduction of this section. This Law updates the previous normative framework for the sector and establishes the MTC as the only civil aviation authority. This authority is delegated to the General Office of Civil Aviation (*Dirección General de Aviación Civil – DGAC*), a specialized body dependent upon the MTC. The DGAC is a technical institution with administrative and financial autonomy, responsible for guaranteeing the user safety through control and supervision procedures. Among its numerous functions, DGAC proposes rulings and annexes to the law, and regulates, supervises, controls, and sanctions all civil aviation activities. This office is in charge of implementing the national aviation policy.

OSITRAN is the regulatory agency for the sector. Law 27,261/2000, (Article 84), establishes that rates and shipping charges for air transportation services are freely determined by providers according to market conditions. However, under exceptional conditions a Supreme Decree can set minimum or maximum rates for national or international air transportation. These are to be set in accordance with a technical study by the DGAC.

The international airport Jorge Chávez was given in concession in 2000. Currently, ProInversión is evaluating the introduction of the private sector into the airport system (in 19 airports representing 98% of the traffic in the provinces) through public-private partnerships.

2.3. POLICY OPTIONS AND IMPLICATIONS

Recently, Peru has undertaken a process of political decentralization, by enacting several laws to promote private investments. ProInversión, the public agency in charge of promoting private investment in Peru, has recently scheduled several processes aimed at improving the transport sector and envisaging investments, first in the road transport sector, then in airports and ports.

This new Peruvian policy depends upon the conviction that higher infrastructure investment efficiency may be reached by initiating a decisive process of private investment. Indeed, there are major constraints on tariff increases given the widespread poverty throughout Peru, which includes well over 50% of the population. Investments financed by tariffs may be viable just for Callao and some regional ports in the north of Lima (Chimbote and Paita, for instance). Difficulties in raising tariffs are likely to weaken state-owned enterprises, due to a shortage of public resources for financing less profitable investments, and so private investment is needed.

But the new schemes to promote investment do not rely only on private funds. Public-private partnerships are being designed to address the lack of profitability in certain activities, taking into account demand, GDP growth projections, and poverty levels throughout the country. So, different kinds of private and public participation should be developed and tested to address the risks and difficulties faced in the different infrastructure sectors.

2.4. PRIORITIES FOR FUTURE REFORM

The agenda for future reform may be summarized as follows:

The main goal for the incumbent government is to make progress in paving the way for the ambitious privatization plans launched in the 1990s, which so far have not been completely implemented. In fact, the main achievements of the plan to date are:

- (i) the concession of the three main railroads *Ferrocarril del Centro* (FCC), *Ferrocarril del Sur* (FCS), and *Ferrocarril del Sur Oriente* (FCSO);
- (ii) the concession of two highways: the Red Vial No. 5 and the Arequipa-Matarani;
- (iii) the concession of the International Airport Jorge Chávez (AICJ);
- (iv) the port of Matarani; and
- (v) the Machu Picchu funicular.

These efforts are clearly not sufficient to improve the infrastructure sectors under public budget constraints. In particular, the main steps needed are:

- improvements in the poor road conditions (well represented by the lowest paved road indicator shown by Peru, in comparison with the other Latin American countries analyzed in this report) through the implementation of a combination of the following methods:
- public-private partnerships (**PPPs**), and
- building, operating and transfer contracts (**BOT**).

Of course, PPPs and BOTs may provide assistance for high traffic density highways, but not for rural and municipal roads, in which private sector participation is not valid. The government should therefore focus its investments in the following areas:

- (i) reduction of the ratio of logistics costs to total revenues. Such costs help to explain why Peru is doing less well than other comparable countries in handling certain types of exports such as fruits: Peru's export of fruits are US\$ 40 million, compared to US\$ 800 million for Ecuador and US\$ 1.3 billion for Chile. The crucial importance of achieving this goal is confirmed by a 2001 World Bank study, which identified the high cost of transport and business logistics as a major reason for high prices and low competitiveness; and
- (ii) promotion of the port and airport concession process, attempting to minimize public subsidies and to guarantee the efficiency of both sectors.

Finally, it should be noted that, since all the major railroad lines have been awarded in concession, it is the responsibility of the private sector to improve the infrastructure in order to meet the quality standards of countries with the same level of development. Moreover, it is important for Peru's competitiveness that a higher level of multi-modal integration be pursued, in particular between railroads and ports.

Finally, in terms of institutional reform, three major aspects should be addressed:

- (i) first, clear identification of the roles of each actor in the sector. Overlapping roles, as between OSITRAN and the APN, should be resolved and avoided in the future;
- (ii) second, clear participation of OSITRAN in the concession process should continue, in order to reduce risks that could affect the long term viability of the project; and

- (iii) third, ProInversión must continue to work closely with stakeholders prior to undertaking any process; this usually means that processes will take longer, but projects will be better structured.

3. ENERGY

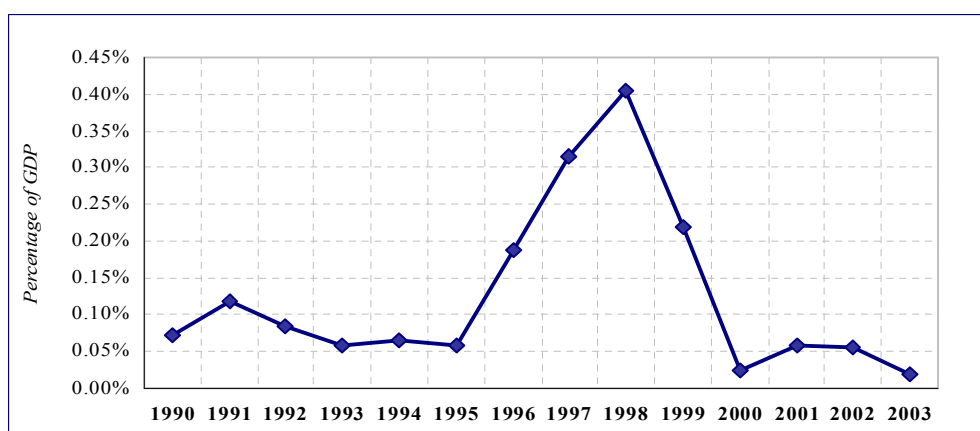
3.1. OVERVIEW

In 1968, the energy sector in Peru was placed in the hands of state-owned companies. The oil sector was nationalized in 1968 and Petroperu was incorporated with monopoly powers in the sector. By the mid-1970s, large oilfields were discovered in the Peruvian jungle and a pipeline was built to the coast; as a consequence, there were significant developments in the refinery sector. Petroperu had a monopoly to contract with private operators and by the mid-1970s around 18 contracts had already been signed. The contract included a rule stipulating fifty-fifty profit sharing with the private operators. The increase in oil supply turned Peru into a net exporter of oil. By 1980, the government unilaterally renegotiated oil contracts in light of the high profits deriving from booming international oil prices. The regulatory framework for oil was highly volatile and in 1981 the new government introduced a policy of incentives to promote private participation. Four years later, a second unilateral renegotiation of contracts and expropriations was carried out.

Oil reserves peaked in 1985 at more than 800 million barrels (mb). Production at that time was estimated at 160,000 barrels per day (bbl/d) and low domestic demand gave room for exports. Current reserves are estimated now at 350 mb and total production represents around 90.000 barrels per day (bbl/d), while domestic consumption has grown very rapidly with a relative price structure that has promoted imports of oil products. The current deficit in the trade balance of hydrocarbons is approximately US\$ 700 million.

In addition to problems relating to the deficit of energy resources, investment in exploratory drilling has decreased sharply since 1998 (See Figure 3.1). Only five exploratory drillings have been made on average since 2000 (most of them without commercial findings). This data is extremely low compared with the average level of well drilling twenty years ago (an average of about 18 a year). Shell Oil Company carried out most of the activity in the mid-1980s and it subsequently discovered the Camisea Natural Gas Field with 13 TCF (trillion cubic feet) of natural gas reserves with a high level of liquids. Private investment (US\$ 1.6 billion) focused on Camisea upstream and downstream operations and a 700 km pipeline was planned, to be built and to start operations by 2004. Additionally, an LNG export project to North America is being proposed Camisea reserves.

Figure 3.1 – Investment in Exploration



Source: Petroperu S.A.

Then, concerning the electricity sector, it must be stressed that, from 1972 onwards, the government owned all vertically integrated electricity companies: ElectroLima, Peru's largest distribution company and the second largest in power generation, provides services to the capital, while Electroperú supplies the rest of the country.

In the early 1990s, since the power sector in Peru faced a chronic lack of investment in infrastructure, appropriate maintenance was not carried out. Moreover, there was systematic destruction caused by terrorist activity. As a result of these two factors, the overall sector performance presented worsening indicators. This negative trend is represented by the following data: the electrification coefficient reached only 45% of the population, and energy supply was insufficient to meet the expected demand, resulting in distribution losses slightly higher than 10%.

The structural reform of the electricity sector began in 1992 in the face of this difficult situation, and was based on the Chilean model, which was implemented in 1982. The electricity Concession Law (Decree Law 25,884) was among the most important legal instruments. The electricity sector was divided into four activities: power generation (competitive); power transmission (regulated); power distribution (regulated); and marketing²³. The new regulatory framework established a vertical breakdown of activity in the electricity sector, free entry into the generation business, rate-setting mechanisms for regulated markets based on the economic criteria established by an independent regulatory body, *Organismo Supervisor de la Inversión en Energía* (OSINERG), high power incentives for exclusive local distribution companies, and open access to transmission networks.

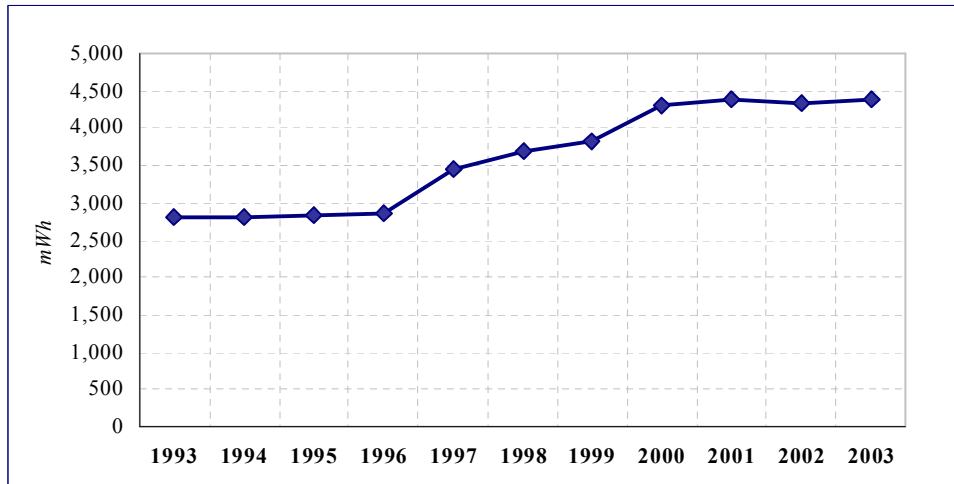
The privatization of state-owned energy assets started in 1994. The distribution company operating in Lima was split up into two entities: Edelnor and Luz del Sur, formerly Edelsur. Investment commitments in new generating stations were also imposed as part of the new investors' obligations.

Despite the wave of privatization, key generation and smaller distribution companies remained in public hands. Specifically, in the area of generation, the dominant Electroperú – currently just a large hydro producer with 1000 MWh of installed capacity – remained in public hands, as well as many smaller generators. In addition, the distribution companies outside Lima are mostly state-owned companies, although the incumbent government is about to privatize them. However, the government could face difficulties relating to the size of the companies and to the public opinion about privatization.

Since 1994, following privatization, (see Figure 3.2), electricity generation capacity in Peru has been growing at an annual average rate of 4.6%, while energy demand has been at 3.1% per year and, accordingly, the reserve margin for the system increased from 21% in 1994 to more than 40% in 2004.

²³ However, this activity was not drafted in the legislation.

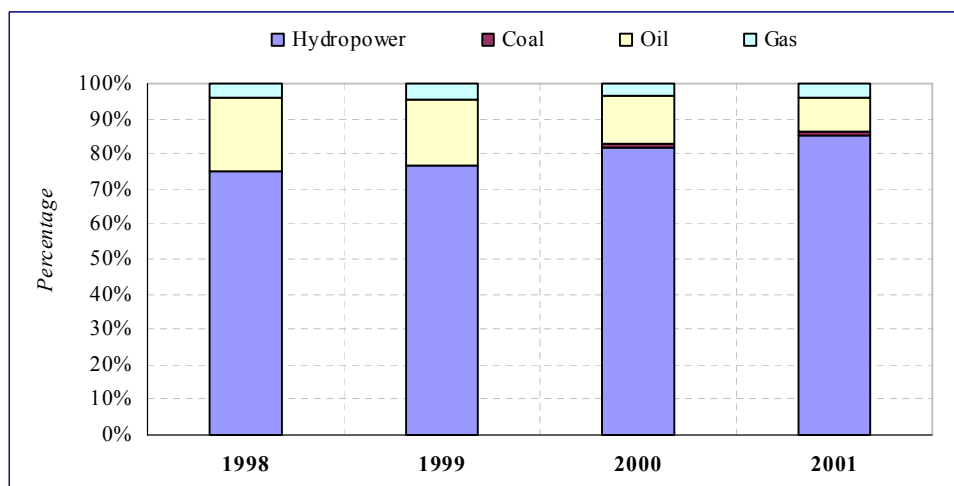
Figure 3.2 – Installed Capacity - 1993-2003



Source: Organismo Supervisor de la Inversión en Energía (OSINERG)

Electricity generation is operated primarily by companies within the *Sistema Eléctrico Interconectado Nacional* (SEIN) (92%), followed by self-generation (6%), while the remainder corresponds to isolated electric systems. This system has always relied heavily on hydraulic generation, which made up about 85% of total generation in 2001 (nearly 86% of the SEIN’s generating capacity is hydroelectric). However, reform in the electricity sector has changed the generation power structure and, accordingly, the share of hydro capacity has decreased. Indeed, two new sources of energy have recently entered the market, namely coal power plants and, more importantly, natural gas from the aforementioned *Camisea project*, which finally became operational in 2004 after several delays. The Camisea project will particularly favor efficiency in the energy sector due to relatively lower prices for fuel.

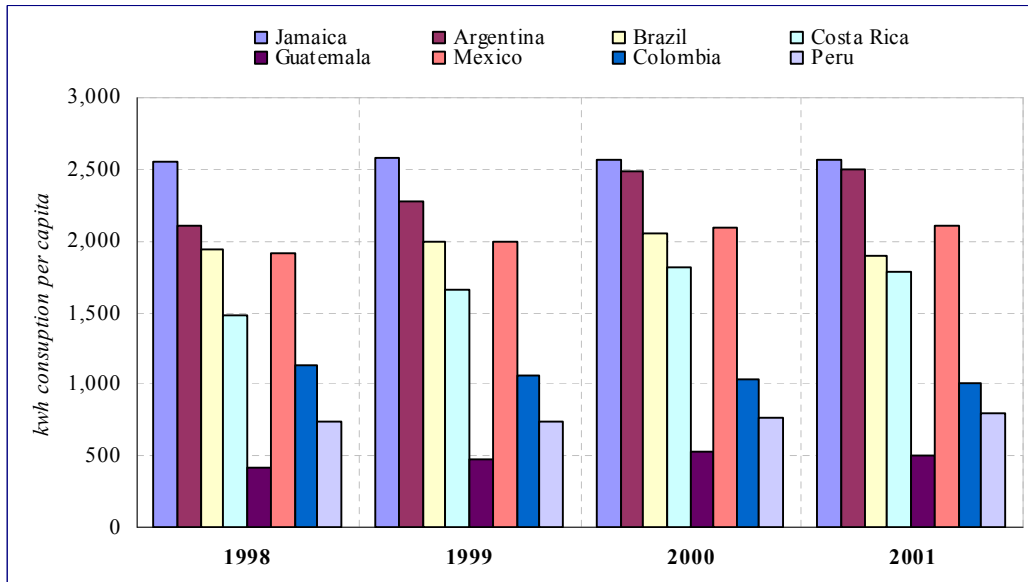
Figure 3.3 – Electricity Production by Source



Source: World Development Indicators 2004 - WDI

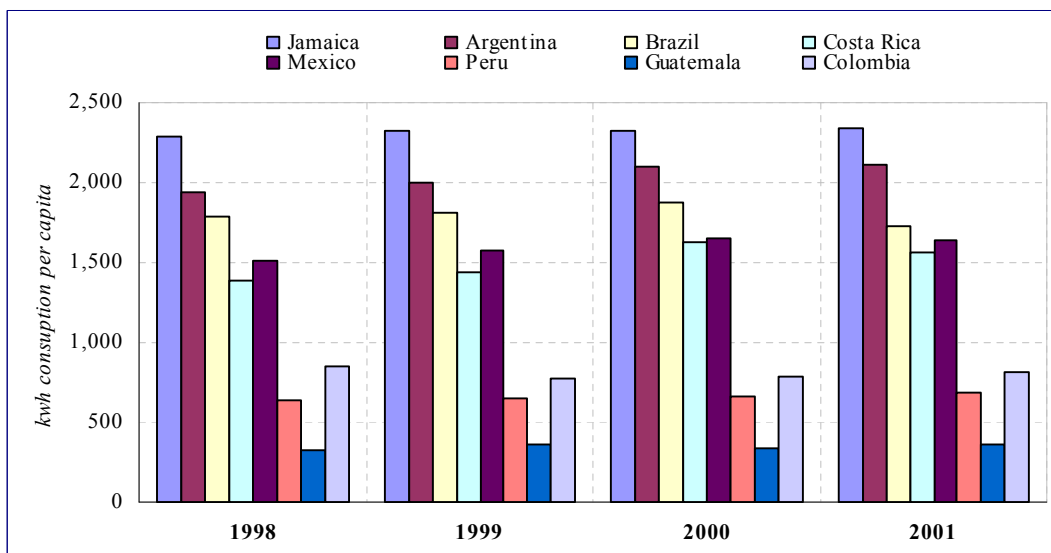
In spite of the aforementioned increase in electricity generation capacity following privatization, *energy production per capita* in Peru (788.63 in 2001) was lower than the regional average (1,645.23 in 2001) as well as the average of the lower-income countries analyzed (1,216.21 in 2001); this low comparative performance was also due to the remarkable value shown by Jamaica (2,564.93 in 2001).

Figure 3.4 – Electricity Production



Source: World Development Indicators 2004

Figure 3.5 – Electricity Consumption



Source: World Development Indicators 2004

The situation does not change substantially when considering electricity consumption. In fact, as shown in Figure 3.5, Peru's *energy consumption per capita* (692.49 in 2001) was again lower than the regional average (1,405.93) and the average shown by the comparable countries (1,052.81 in 2001). Practically, aside from the performance of Guatemala, Peru presents the lowest indicator within the sample considered, both in terms of production and consumption per capita. This is clearly due to the poverty of the population, as demonstrated by Peru's low GDP per capita.

3.2. ASSESSMENT OF THE KEY POLICY AREAS

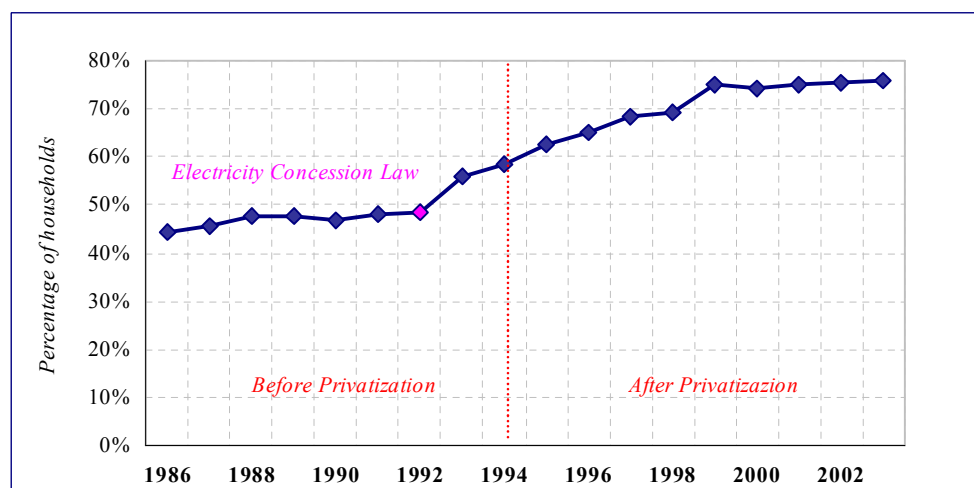
3.2.1. ANALYSIS OF THE TECHNICAL DIMENSIONS OF THE SECTOR

In order to assess the technical dimensions of the energy sector in Peru, the following sub-sectors have been analyzed:

- (i) Access;
- (ii) Affordability;
- (iii) Quality of service; and
- (iv) Technical dimension and efficiency.

Access. Electricity services coverage has been increasing during recent years in Peru. The *electrification coefficient* (percentage of households with access to electricity), as noted in Figure 3.6, rose from 48% in 1992 (before the Electricity Concession Law) to 76% in 2003, due to system reform and expansion and better energy distribution policies.

Figure 3.6 – Electricity Coefficient – 1986-2003



Source: Ministerio de Energía y Minas and Organismo Supervisor de la Inversión en Energía (OSINERG)

In spite of this increase in service coverage, it should be noted that Peru's performance in 2002 (71.90%), as indicated in Table 3.1 (showing the percentages of households reporting access to electricity in all the Latin American countries analyzed) was the lowest within the group of selected Latin American countries.

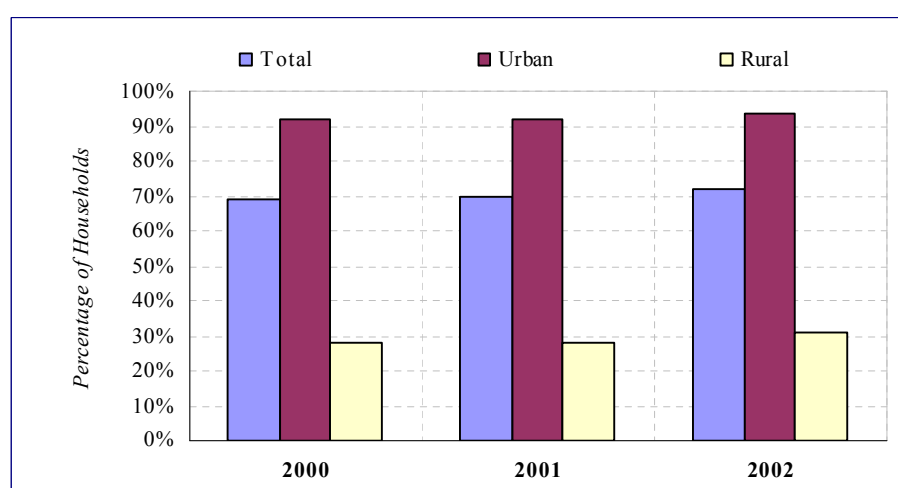
Table 3.1 – Access in Latin American Countries – Benchmarks

Country	Households reporting access to electricity		
	Total	Urban	Rural
Argentina (2002)	n.a.	99.57%	n.a.
Brazil (2002)	96.25%	99.42%	79.48%
Costa Rica (2002)	98.41%	99.81%	96.30%
Guatemala (2000)	73.11%	95.34%	56.20%
Jamaica (2000)	86.88%	92.04%	79.49%
Mexico (2000)	97.18%	n.a.	n.a.
Peru (2002)	71.90%	93.70%	30.80%

Source: Argentina - Encuesta Permanente de Hogares (EPH) 2002; Brazil - PNAD (IBGE) - National Sample Survey of Households (2001,2002) and Brazilian Census (2000); Costa Rica - Encuesta de Hogares de Propósitos Múltiples (2002); Guatemala - Encuesta Nacional de Ingresos y Gastos Familiares (ENIGFAM) 2000; Jamaica - Jamaica Survey of Living Conditions (JSLC) 2000; Mexico - Encuesta Nacional de Ingreso-Gasto de los Hogares (ENIGH) 2000; Peru - DHS (Demographic and Health Surveys), Instituto Nacional de Estadística e Informática (INEI), Encuesta Nacional de Hogares (ENHAHO) 1999, and Household Energy Use in Developing Countries-A Multicountry study 2003- ESMAP – Table A.2.5

Moreover, the electrification coefficient is unevenly distributed all over the country as a function of the regional level of development. Urban areas, as shown in Figure 3.7, had the highest electrification coefficient, having reached approximately 94% in 2002, rising from 92% in 2000. By contrast, in rural areas only 31% of households had access to electricity in 2002. Specifically, Lima had the highest electrification coefficient, reaching approximately 99% by 2004, up from 79.5% in 1992, followed by Tacna 97.2% and Arequipa 94.5%. By contrast, in other underdeveloped regions such as Cajamarca only 33% of the population had access to electricity services.

Figure 3.7 – Households Reporting Access to Electricity

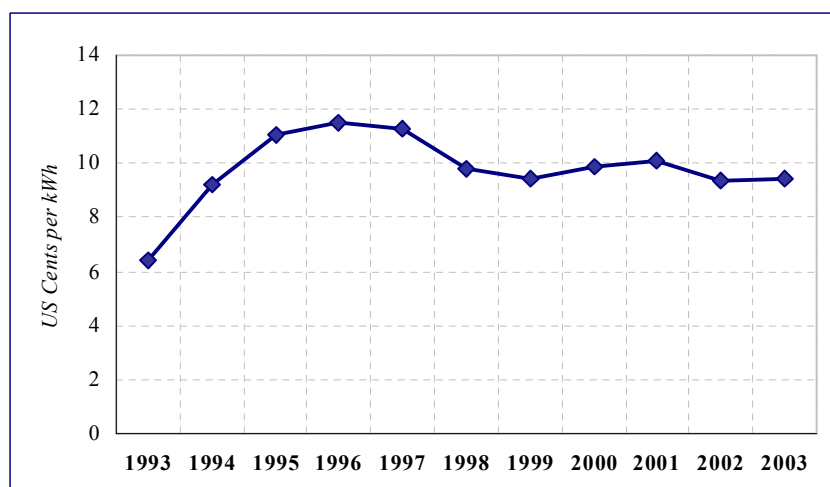


Source: Instituto Nacional de Estadísticas e Informática – INEI

Furthermore, the information regarding household cooking fuel also testifies to the different regional conditions. In 2000 4.6% of households in Lima used electricity for cooking, 74.1% used liquefied petroleum gas (LPG) and 30% kerosene; however, a different situation arose in inland rural areas. For instance, in the Apurimac region 89.3% of households relied on firewood for cooking needs.

Affordability. Residential electricity tariffs increased rapidly until 1996 (see Figure 3.8), an economic reflection of the new regulatory framework: regulatory procedures established that calculation of regulated bus bar tariffs should include expected supply and demand for the next four years. The reduction of prices after 1997 can indeed be explained by the increase in expected supply and efficiency gains related to the slow increase of small gas-fired turbines within the system. A major factor was the expected development of new gas-fired turbines supplied by the Camisea green field natural gas project. Regulatory procedures envisaged that the new supply would begin in 1998, but it actually took far more time for this project to become operational. Generators therefore complained that the regulated bus bar tariffs since 1997 had been distorted by regulatory decisions regarding the high level of uncertainty concerning the completion of the Camisea project.

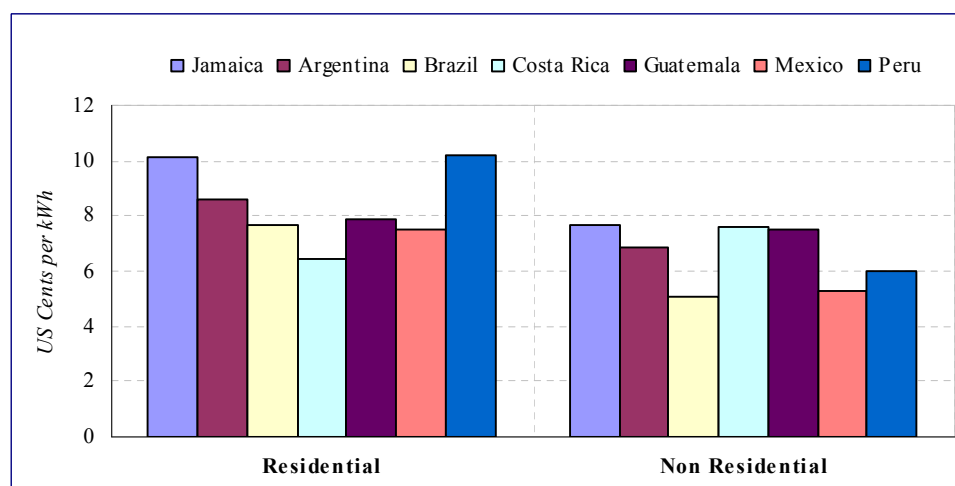
Figure 3.8 – Residential User Annual Average Tariffs



Source: Organismo Supervisor de la Inversión en Energía (OSINERG)

In spite of this decreasing trend in tariff levels, in 2001 the *electricity residential end-users tariff* in Peru was the highest in the Latin American sample (10.2 cents per KWh). As illustrated in Figure 3.9 below, it is surprising to observe that Peru’s indicator showed the largest difference between the tariffs for residential and non-residential users, at 10.2 cents per KWh and 5.98 cents per KWh respectively, among the countries within the regional sample. This large gap is a result of the income inequalities existing in the country.

Figure 3.9 – Electricity End-User Tariffs – 2001



Source: Jamaica – Energy Information Administration (EIA), Argentina – WDI 2004, Brazil – Electric Energy National Agency (ANEEL), Costa Rica – Panamerican Health Organization (PHO), Guatemala – EIA, Organización Latinoamericana de Energía (OLADE), Mexico – EIA, Peru – OSINERG

Finally, it should be noted that, according to official data, spending on electricity at national level reached about 6% of household expenditure in 2003, although expenditure was unevenly distributed also in this case (See Table 3.2). Indeed, the data for Lima showed a high level of expenditure on electricity, at close to 9%, while in the northern Highlands it represented only about 1.70% of income, which is mostly explained by the alternative resources used to substitute electricity in areas outside the capital. The data may also reflect the influence of the cross-subsidies that the government introduced in the regulatory framework in 2001 (*Fondo de Compensación Social Eléctrica* – FOSE). The subsidies benefit residential clients consuming 100 kWh or less per month. Over 2.3 million users benefit from cross-subsidies, representing 61% of the total users of the public electricity service.

Table 3.2 – Percentage of Total Household Expenditure on Electricity Services - 2003

	Percentage of total household expenditure in electricity service
Costa norte	5.44%
Costa centro	6.72%
Costa sur	7.35%
Sierra norte	1.70%
Sierra centro	4.19%
Sierra sur	4.34%
Selva	3.38%
Lima metropolitana	8.78%

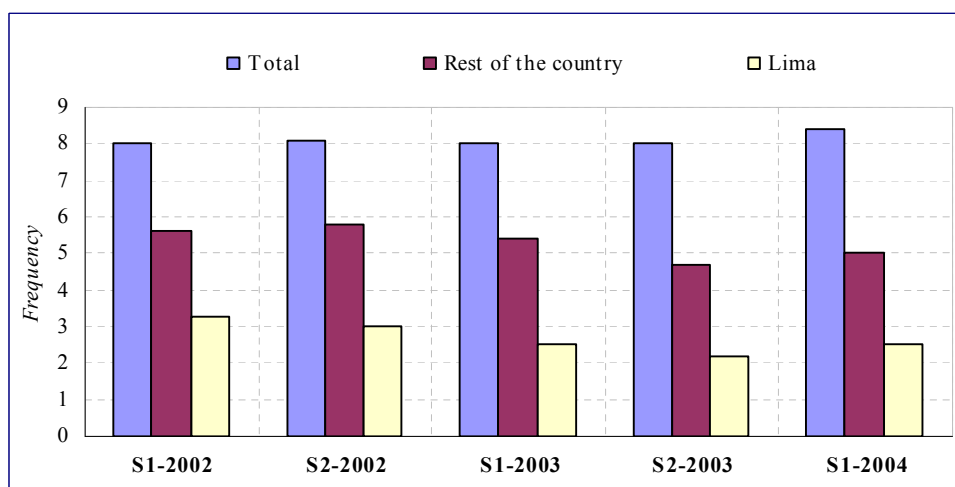
Source: Instituto Nacional de Estadísticas e Informática – INEI

Quality of service. Although reform of the Peruvian electricity sector began in 1994, the Technical Quality Norm of Electrical Service (*Norma Técnica de Calidad del Servicio Eléctrico* – NTCSE) was issued in 1997, causing serious controversy in the electricity industry due to

companies' claims that this norm was enacted according to the standards for developed countries. Despite this controversy, NTCSE appears to have taken effect, since distribution companies have had to comply with quality targets set by the regulator, the *Organismo Supervisor de la Inversión en Energía* (OSINERG). This norm includes four aspects: quality of service provision (number of interruptions to the client); quality of product (tension and frequency of service); commercial quality (accuracy of energy measurement and user claims); and quality of public lighting. The quality of service provision limits the duration and the frequency of interruptions in electricity services.

According to current rules (average duration, in hours, of interruptions to the user), the quality of service, as can be seen also by the data on *Frequency of interruptions* described by Figure 3.10, is considered to be at an acceptable level in Lima, while the rest of the country is at an intermediate level.

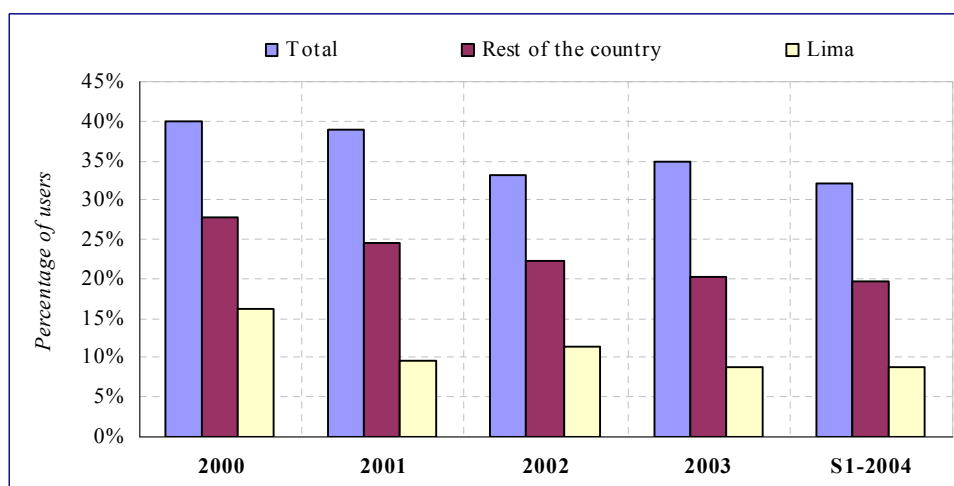
Figure 3.10 – Frequency of Interruptions



Source: Organismo Supervisor de la Inversión en Energía (OSINERG)

This improvement in service quality, especially in Lima, is mainly due to privatization. Indeed OSINERG, which gathers information on the percentage of users reporting matters related to service quality, has observed that Lima, which is served by private distribution companies, performs better than the other cities in the rest of the country where service is mainly provided by publicly-managed distribution companies. For example, 58% of the population said that electricity services were good in 1997, rising from 28% in 1994. In addition, power outages in southern Lima also fell to an average of 2.5 in 2002, from 10 in 1992. Also, outages declined to four hours in 2002, from 62 hours in 1992.

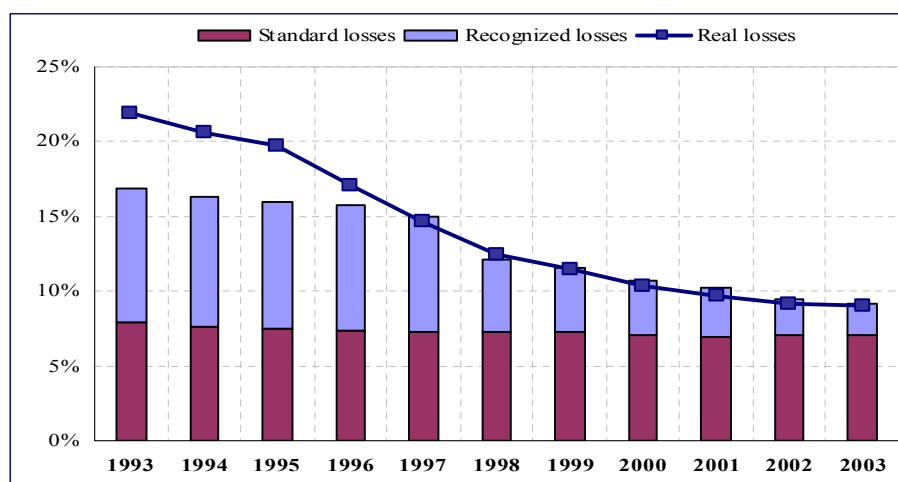
Figure 3.11 – Percentage of Users with Poor Quality Service Provision



Source: Organismo Supervisor de la Inversión en Energía (OSINERG)

Technical efficiency. In analyzing the technical efficiency of the energy sector, the first aspect to mention is the tendency of *losses in energy distribution*. It is worth mentioning that this indicator in Peru has shown a decreasing trend after privatization, having steadily decreased from 21.9% in 1993 to 9% in 2003. Improvements have been made through better commercial policies (distribution energy theft was considered high before structural electricity reforms) as well as the incentives built into the regulatory framework determined by OSINERG.

Figure 3.12 – Electricity Distribution Losses

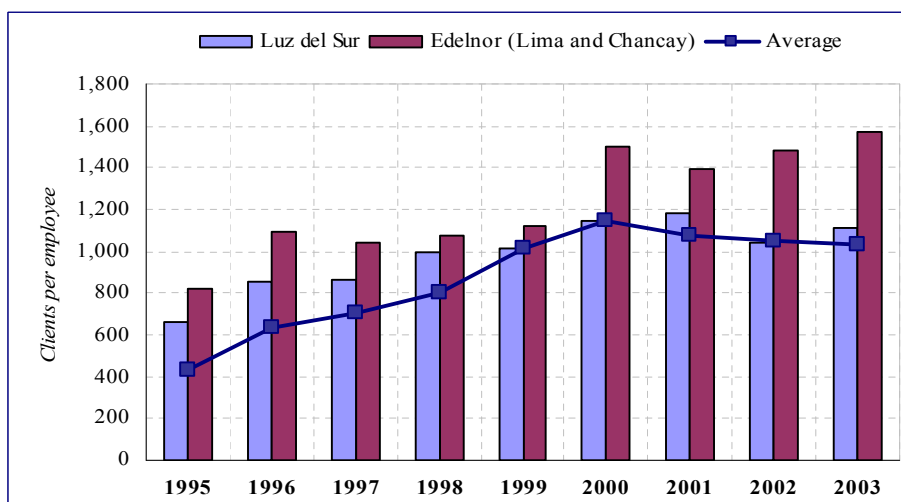


Source: Organismo Supervisor de la Inversión en Energía (OSINERG)

Looking at productivity indicators such as *clients per employee* it can be noticed that the private distribution companies in Lima, namely Edelnor and Luz del Sur, performed better than the national average in the period 1995-2003. Indeed, in Figure 3.13, which shows the situation after privatization, it can be seen that the indicator *clients per employee* has steadily increased in

the case of Edelnor from 822 in 1995 to 1,575 in 2003, having always been above average. The same can not be said for Luz del Sur, since its performance has been below average in some of the years considered.

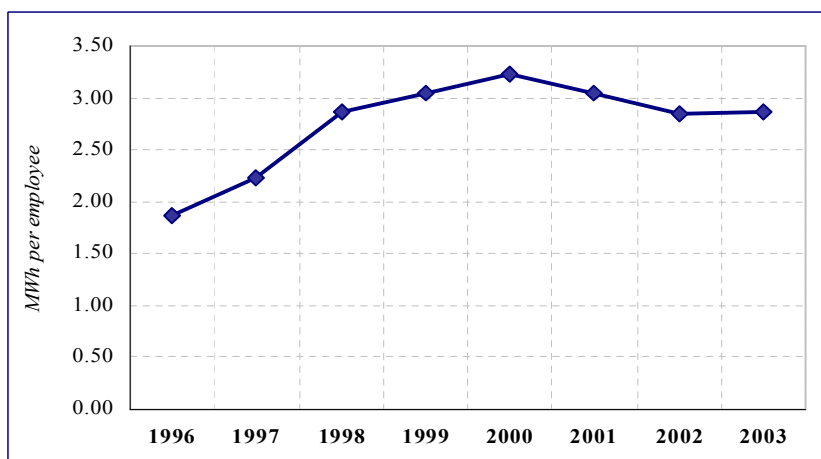
Figure 3.13 – Clients per Employee



Source: Organismo Supervisor de la Inversión en Energía (OSINERG)

Likewise, another productivity indicator for generation companies, *MWh per employee*, also showed a productivity increase up to 2000, but decreased slightly afterwards (since 2002). However, Figure 3.14 shows that after the privatization process, MWh per employee increased from 1.86 in 1996 to 2.86 in 2003.

Figure 3.14 – MWh per Employee



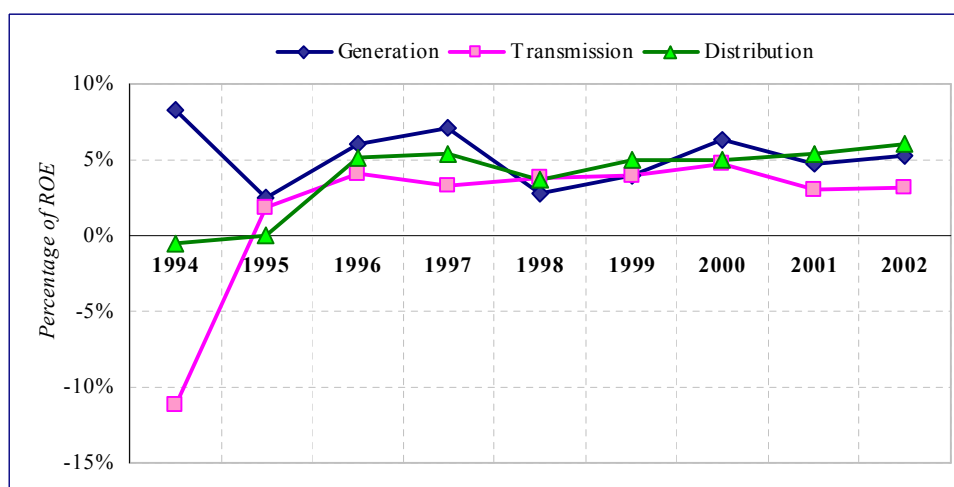
Source: Organismo Supervisor de la Inversión en Energía (OSINERG)

3.2.2. ECONOMIC EFFICIENCY AND PRIVATE SECTOR FINANCING

Firstly, in analyzing the *financial health of main providers* the aggregated data on return on equity relating to the companies involved in this sector must be observed (see Figure 3.15), which indicates that:

- (i) return on equity in distribution activities reached a minimum of - 0.54% in 1994 (when the largest state company, ElectroLima, was privatized) and a maximum of 6.03% in 2002;
- (ii) return on equity in transmission activity varied from - 11.18% in 1994 and a maximum of 4.73% in 1998.
- (iii) return on equity in generation activity has been quite volatile in the last ten years and ROE has never exceeded 7%.

Figure 3.15 – Return on Equity

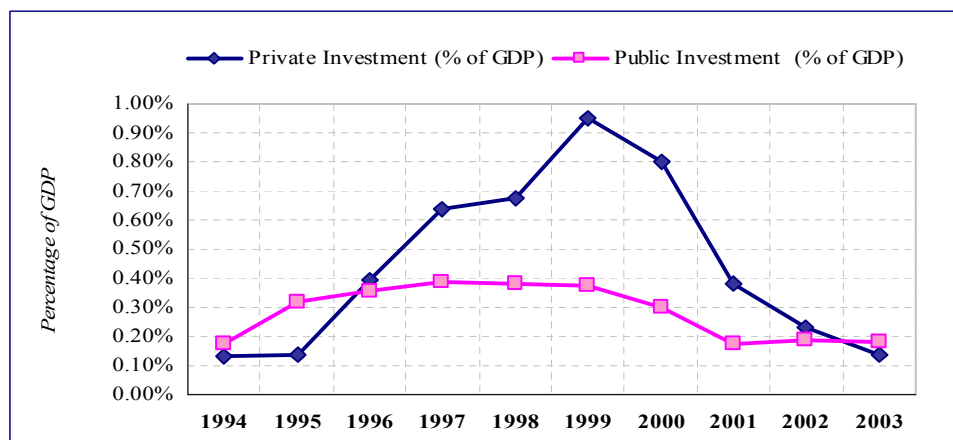


Source: Organismo Supervisor de la Inversión en Energía (OSINERG)

However, it must be stressed that private generators and distributors have complained that financial performance has recently been negatively influenced by the decrease in tariffs set by the regulator. Moreover, incumbents are facing increased competition from new gas-fired turbines, which will increase pressure for greater efficiency, price decreases, and will entail a redistribution of market share.

Then, concerning private investment in the sector, as demonstrated in Figure 3.16 below, it must be noted that private investment in the energy sector increased sharply, following the privatization process, and peaking in 1999 (0.95% of GDP). Afterwards, uncertainty regarding investment in Latin America, along with the financial problems of the major international players in energy, caused investments to drop until 2003. However, a high level of reserves and good hydrological seasons to 2004 ensured greater reliability for the energy supply. Nevertheless, an increase in investments is needed in order to provide energy for service expansion and the expected economic growth.

Figure 3.16 – Private – Public Investment in Energy as Percentage of GDP

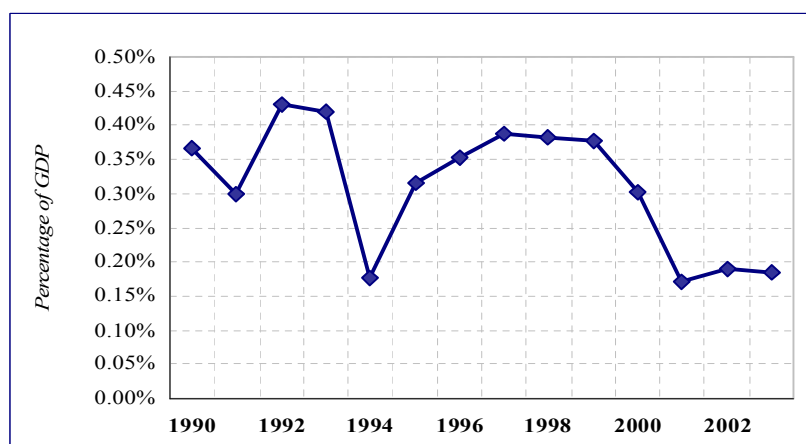


Source: Ministerio de Energía y Minas (MEM) and El Instituto Nacional de Estadística e Informática (INEI)

In terms of the *fiscal dependence of the sector* it is worth mentioning that most public funds used to finance investments and to cover recurrent expenditure in the electricity sector come from the budgets of state-owned companies owning assets in the sector. This means that the majority of such expenditure is self-financed, i.e. the company raises revenues through tariffs to cover the cash outflows for investments. Nevertheless, some spending on electricity projects still comes from the fiscal budget. Indeed, the financial performance of state-run distribution companies serving the smaller inland cities with lower income populations is lower than the Peruvian average; some of them therefore require financial support from the government.

However, the government’s strategy for reducing capital expenditure in order to fulfill overall fiscal targets has also led public companies to decrease investments in the electricity sector. Indeed, by 2003, investment as a percentage of GDP stood at about 0.2%, the same level recorded in 1994 (see Figure 3.17).

Figure 3.17 – Investment by Public Companies



Source: Ministerio de Energía y Minas (MEM) and El Instituto Nacional de Estadística e Informática (INEI)

3.2.2. REGULATORY FRAMEWORK AND INSTITUTIONAL DEVELOPMENT

Law 26,734/1996 set up OSINERG as the public institution in charge of the supervision and control of the Law and of the technical norms relating to activities developed in the electricity and hydrocarbons sectors. It is also responsible for monitoring compliance with technical and legal norms regarding to the preservation and protection of the environment. Law 27,332/2000 (amended by 28,337/2004) defines several aspects related to OSINERG and other regulatory agencies. OSINERG absorbed the CTE (Commission of Energy Tariffs), which formerly carried out the regulatory functions with reference to rates and prices.

Electric power. The current legislative framework for the electricity sector is composed of Law Decree 25,844/1992 (Electricity Concessions Law, which allows for private generation, transmission, and distribution of electricity) and regulations and amendments, together with Laws 26,734/1996 (which create the regulatory and supervising agency, OSINERG) and 27,332/2000 (the general law of regulatory institutions of private investment in public services).

According to the Electricity Concessions Law, the Ministry of Energy and Mines (MEM) and OSINERG are the public institutions in charge of enforcing the Law. The Law establishes the conditions (concession or authorization or none) under which all activities (generation, transmission, and distribution) can be performed.

The MEM keeps a Registry of Electricity Concessions. It also grants concessions, upon application by candidates, for generation to plants with a capacity of over 10MWh, transmission (when using public goods) and distribution (public utility). Whenever there are two or more applicants, the concessionaire will be selected by a tender procedure. Concessions are granted without a fixed term and enable the utilization of goods of public use and the right to construct and operate generation plants, sub-stations, transmission lines, or distribution lines. Concessions for the distribution of electricity are granted with geographical exclusivity. MEM grants authorizations to generation plants with a capacity of between 500kW and 10MWh. Activities not requiring concession or authorization may be performed freely, subject to the corresponding technical norms.

The Electricity Concessions Law established the Committee of Economic Operation of the System (COES) as a technical institution with the objective of coordinating operation at minimum cost and guaranteeing the provision of electricity in each interconnected system. The COES is composed of representatives of generation companies and agents of the transmission system (transmission and distribution companies).

The Law establishes a system of regulated prices and margins for (i) the transfer of power and energy between generators, (ii) the transmission of electricity, (iii) sales of energy to distribution companies for public service, and (iv) sales of the public service to end-users. Otherwise, prices are determined by negotiation between the parties. Regulated prices will reflect marginal costs and will be structured so as to promote efficiency within the sector and to reflect competitive conditions, and are calculated by the COES.

The electricity sector has been vertically and horizontally unbundled since 1992. In addition, the government divested assets of the state-owned utilities ElectroLima and most of ElectroPeru into separate companies. Currently, the installed electricity generation capacity is evenly split between hydro and thermal (natural gas, diesel and fuel oil-fired generation). More than 80% of the installed capacity is currently connected to the national grid (SEIN), while the remaining capacity belongs to self-producers. Hydroelectric power supplies about one third of the country's energy requirement. However, since output fluctuates due to rainfall seasons, there have been some attempts to become less dependent on this kind of energy and to replace it, in part, with natural gas-fired plants. The transmission system is composed of the national grid and several independent grids. These grids are managed by *Red de Energía de Perú* (given in concession in 2002), with 29% of the system, and several small transmission companies. The

distribution system is composed of 21 companies. The Peruvian public agency Fonafe holds stakes in several companies.

The intended reformulation of the electricity sector initiated in 1992 parallels the restructuring carried out in other Latin American countries, such as Argentina, Brazil, Guatemala, Ecuador and Chile. The latter country was a pioneer of reforms in the sector in Latin America. Starting between the 1970s and 1980s, reforms involved the restructuring and privatization of enterprises, the creation of the Electricity Bureau (*Comisión Nacional de Energía*), and the enactment of the Electricity Law. The assets concerned with operating generation, transmission, and distribution were unbundled and made subject to open-access requirements. An independent operator is in charge of the dispatch and coordination of both contract and spot transactions in each electricity system (SIN and SING). The margins of natural monopoly activities are regulated by price caps.

Despite these similarities with other countries in the region and the progress evidenced in the sector, the discontent and opposition to privatization in Peru in the late 1990s meant that several concession projects were not completed or took a long time to start (such as the generation plants Egasa, Yuncan, and Egesur). There is no clear indication as to whether the government will keep these companies as public enterprises or not.

Peru, Colombia, and Ecuador have been analyzing the possibility of creating an integrated market. This market will allow the purchase of electrical power at more favorable conditions throughout the area. Collaboration with Ecuador is currently underway in the form of a project to export electricity from hydro plants during excess capacity seasons, and to import electricity in the dry seasons.

Hydrocarbons (crude oil and natural gas). The current legislative framework for the hydrocarbons sector is composed of Law 26,221/1993 (Hydrocarbons Law), Law 26,734/1996 (OSINERG), and Law 27,332/2000 (regulatory institutions for private investment in public services).

Law 26,221/1993 establishes that the state promotes the development of hydrocarbons activity on the basis of free access and competition. It states that the Ministry of Energy and Mines (MEM) is responsible for the formulation, approval, proposal, and implementation of policies relating to the sector, as well as for establishing the pertinent norms. Both MEM and OSINERG are in charge of the supervision and enforcement of the Law. OSINERG is also responsible for supervising the legal and technical aspects of hydrocarbon activities throughout the national territory.

This Law also creates the state-owned company Perupetro S.A. This company is responsible for promoting investment in exploration and production, and for negotiating and supervising contracts in its role as contractor. Perupetro markets hydrocarbons (from service contracts) through third parties, according to free market principles, and makes proposals to MEM regarding other policy options related to exploration and production.

The Law stipulates that Perupetro has the property right over extracted hydrocarbons with the objective of awarding exploration and/or production contracts. According to the model of license contracts, property rights are transferred to the licensees, who pay a royalty to the state. Under service contracts model, the private company renders the contracted services and charges a service fee (which may be related to production), and Perupetro retains ownership of the product. Contracts can be awarded by negotiation or tender.

Crude oil and derivatives. The Law enables any entity (single person or company) to construct, operate and maintain an oil pipeline for the transportation of hydrocarbons (through a concession contract) and to construct, operate and maintain refineries or processing plants (subject to the corresponding norms stated by MEM).

The transportation, distribution (wholesale or final), and marketing activities relating to products derived from hydrocarbons are ruled by norms dictated by MEM. Activities and prices of crude oil and by-products are deregulated.

In 2003, Peru consumed 163,000 barrels per day (bbl/d) of oil (including crude oil and LNGs), but produced only 95,000 bbl/d. Import needs are met by Ecuador and, to a lesser extent, by other Latin American countries.

Currently, several international producers participate in production, such as Pluspetrol (from Argentina, which accounts for 63% of output), Petro-Tech (from the United States), Petrobras (from Brazil), and Sapet (a subsidiary of China National Petroleum Corporation).

Crude oil production declined significantly throughout the last decade, from about 130,000 bbl/d in 1995. According to the Energy Information Administration (EIA), the main factors determining this slowdown have been poor drilling results and unattractive royalty terms. In recent years, the government has launched a new attempt to increase exploration and production, through a new royalty scheme and incentives (such as the refund of VAT incurred during exploration stages and acceleration of the bidding process).

Supreme Decree 017-2003 EM redefined the royalty mechanism, by offering a self-selection menu of contracts. The first type of contract is an increasing-fee production-based royalty scheme (5% on production of 5,000 bbl/d or less, between 5% and 20% on production between 5,000 and 100,000 bbl/d, and 20% on production over 100,000 bbl/d). The second type is a scheme based on economic results, with a fixed fee of 5% and a variable fee between 0% and 20%, depending on revenues and costs incurred by the company during the previous year.

The result of the recent incentive schemes is a surge in upstream activities, with new exploration and production inland and offshore recorded in 2003 and 2004.

In the downstream, there are six refineries. One of the two private refineries, La Pampilla, represents about 50% of total refined products in Peru. The state-owned company Petroperu operates four refineries. Some attempts to privatize state-owned refineries were made in the late 1990s; however, as in the electricity sector, public opposition delayed the privatization process and there is uncertainty as to whether the government will maintain these companies as public enterprises or not. Finally, gas stations are widespread; 70% of stations are unbranded and the remaining 30% come under seven brands.

Natural gas. Law 27,133/1999, regulating the Hydrocarbons Law, establishes specific conditions and procedures for the promotion and development of the natural gas market, fostering competition and diversification of the country's energy sources. These includes gas production, the development of the transportation and distribution infrastructure, and industrial uses.

With respect to production, the Law defines the specifications for granting production rights (according to Legislative Decree 674/1991, of Promotion of Investment, and Supreme Decree 059/1996, of concessions related to infrastructure). Additionally, it establishes that all concession contracts must specify a minimum period of time during which the concessionaire has an obligation to meet the domestic demand and a price cap for natural gas.

The Law also stipulates that the concession contracts for the transportation and high-pressure distribution of natural gas may include a mechanism guaranteeing that annual income covers service, operation, investment and maintenance costs.

Supreme Decree 042-99-EM regulates the distribution of natural gas through pipelines, including procedures for granting concessions, the setting and revision of rates, safety and environmental norms, and norms related to the regulatory agency. With regard to rate-setting, the Decree stipulates that the distribution rate should provide the concessionaire with sufficient

resources to cover the costs of distribution and marketing services under efficient operation conditions.

The sector has become relevant with the development of the *Camisea project*. This project became operational in 2004 after several delays, which were due to contract rescissions (owing to the company's low perception of returns, failure to reach consensus regarding about the electricity rate, the prohibition of vertical integration in natural gas provision in Lima, and the refusal to export natural gas to Brazil) and new tender procedures. The project was divided between the exploration and production of natural gas, on the one hand, and transportation and distribution of natural gas, on the other. An international consortium (with Pluspetrol as the main shareholder) was awarded a 40-year contract for exploration and production. Another international consortium (with Techint and Pluspetrol as main shareholders) was awarded a 33-year contract for transportation and distribution (renewable for 10-year periods, up to a limit of 60 years). In 2002, the Suez Group was awarded a 33-year contract for the distribution of natural gas in Lima and Callao (renewable for 10-year periods, up to a limit of 60 years). Before Camisea, only two natural gas wells existed: Aguaytía and Costa Norte.

Camisea is expected produce at a level 16 times that of Aguaytía and 32 times that of Costa Norte, which boosts the importance of natural gas as an alternative source of energy in Peru. Before this project, natural gas was mainly used for thermal generation, and input for hydrocarbon production and refining. The new project is expected to meet demand from the industrial and electricity generation sectors, as well as the potential demand from commercial and residential users. Finally, a private consortium is planning an expansion of the Camisea project to export natural gas in the form of LNG to North America.

Upstream prices are differentiated according to different users, generators (US\$1/1,000 cf), and others (US\$1.80/1,000 cf) and are subject to a cap defined in the license contracts. Transportation margins are also defined in the contracts, to guarantee a present value of revenue (to cover long run average costs), and are differentiated according to user. Distribution margins are based on operation, maintenance, and investment costs under efficient operation conditions.

The forthcoming years will see an significant increase in natural gas consumption in many industry sectors (in generation to reduce the price of energy, and in the residential and commercial segments as a substitute for the more expensive fuels) and a growth in the natural gas network (national and regional natural monopolies). The normative framework, either in terms of the regulation of the whole value chain (as is currently the case) or rules for a natural gas market (possible development in the future), as well as the role of the regulatory agencies, will be key points in the efficient development of the sector.

3.3. POLICY OPTIONS AND IMPLICATIONS

Peru has achieved a very high level of access to electricity services in urban areas, but the rural areas lag behind on account of more expensive distribution networks. Appropriate sources of financing and incentives have to be analyzed and put in place to promote a greater service coverage in rural areas.

Natural gas will be a driving force in the market, and gas distribution companies must receive proper incentives for the expansion of service coverage.

However in Peru there is, above all, a need for greater competition: this should be achieved by means of measures such as regulation of access to facilities. Some progress has been made: for instance, since 2000, there has been greater price transparency on account of the requirement to allocate charges by activity (that is, generation, transmission, and distribution). The regulatory framework for the electricity sector needs to be revised in order to increase market and

customer-oriented mechanisms. Competition also needs to be strengthened in fuel substitution and quality in fuel distribution needs to be monitored in order to deter fraudulent commercial practices affecting formal operators and consumers.

Moreover, the incomplete privatization of the electricity sector will put further pressure on the state's role in energy markets and could affect private investments. In fact, Law 26,734/1996 enabled the government to retain a "golden share" in all privatization, thus giving to the government the control of corporate decisions regarding shutting down the company, bringing in new shareholders, reducing capital, registering on the stock exchange, or merging with other companies.

Finally, environmental considerations will slowly become a driving force in fuel consumption along with a tax policy regarding hydrocarbons.

3.4. PRIORITIES FOR FUTURE REFORMS

Considering the factors discussed above, the electricity sector has achieved all its main objectives, a fairly good result given the initial conditions of the sector in 1993. Nevertheless, more than one decade after reform in the sector, some challenges remain to be addressed:

- (i) efficiency in generation activities has to be promoted: current capacity payments impair the viability of new entrants in the market. Asymmetries in dispatch rules and tax burdens must be revised in order to establish a level playing field;
- (ii) better risk management and the introduction of more flexibility in contracts in order to improve incentive mechanisms (generally observed in more developed competitive open markets) must be pursued;
- (iii) investment in the sector should be increased. Investments have shown a downward trend, which, if confirmed in the future, may cause serious problems also due to the fact that sector profitability is currently the subject of discussion between the regulator and the industry operators;
- (iv) the independence of OSINERG should be strengthened as it lacks real autonomy and is subject to political interference;
- (v) greater coordination between the privatization agency (ProInversión), OSINERG and Indecopi must be favored;
- (vi) the proper fiscal use of royalties in the natural gas sector needs to be discussed. The government is planning to use this source of income to fund the armed forces;
- (vii) the privatization process, especially regarding the generation and distribution of government-owned companies, should be pushed forward; and
- (viii) the asymmetry that exists in the market in favor of generation companies, thus hampering distribution companies, must be reduced.

4. WATER AND SANITATION

4.1. OVERVIEW

The water and sanitation sector is plagued by political deadlocks; it currently demonstrates major deficiencies and the situation may therefore be considered critical. Overall, there is a 50% gap in coverage between rural and urban areas and the penetration rate is too slow to keep up with the population growth. Piped water is the major source of water in urban areas (84% in 2002), while surface water (45% in 2002) is mostly used in rural areas. Accessing surface water is time-consuming for households as it takes time to reach the water source; in fact, 50% of the population lives more than 10 minutes away from the source.

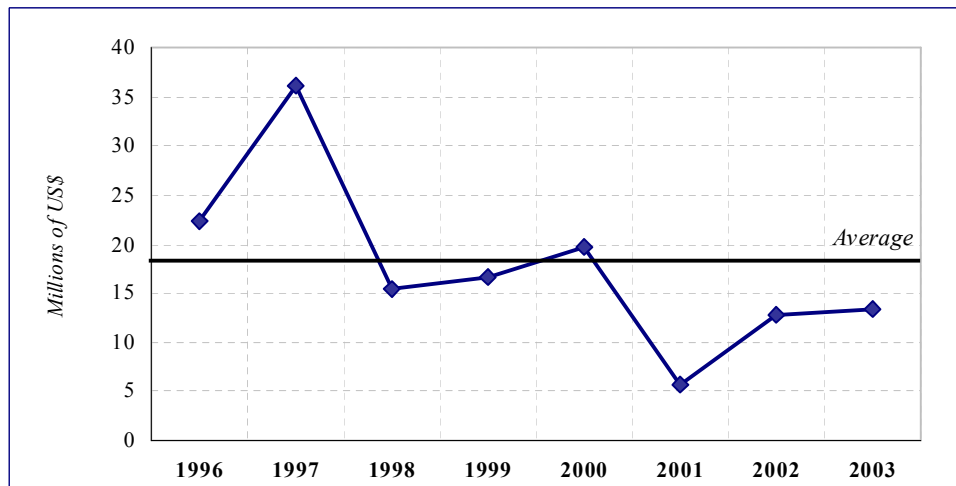
The municipalities are responsible for service provision, except for the capital, Lima, where the central government is directly involved. There are four types of organizations for service provision:

- (i) the public enterprise, *Servicio de Agua Potable y Alcantarillado de Lima* (SEDAPAL), is the service provider for the capital;
- (ii) 53 municipal firms, *Entidades Prestadoras de Servicios de Saneamiento* (EPS), provide service in selected urban areas;
- (iii) municipalities provide direct service; and
- (iv) communal organizations – the *Juntas Administradoras de Servicios de Saneamiento* (JASS) – provide services in rural areas.

SEDAPAL and the 53 EPSs cover 60% of the population. During the 1990s, investments in water and sanitation services were mainly financed through a general contribution levied on workers' salaries (*Fondo Nacional de Vivienda – FONAVI*) and through resources from the Treasury, a great part of which came from external debt and international donations.

The level of investment per EPS has been very low in the period 1997-2003, reaching US\$ 17.8 million per EPS (excluding SEDAPAL), while the average estimated need is US\$ 112 million annually per EPS. This investment gap is certainly the main reason behind the low coverage presented in Peru. The peak was reached in 1997, consistent with the aggregate data.

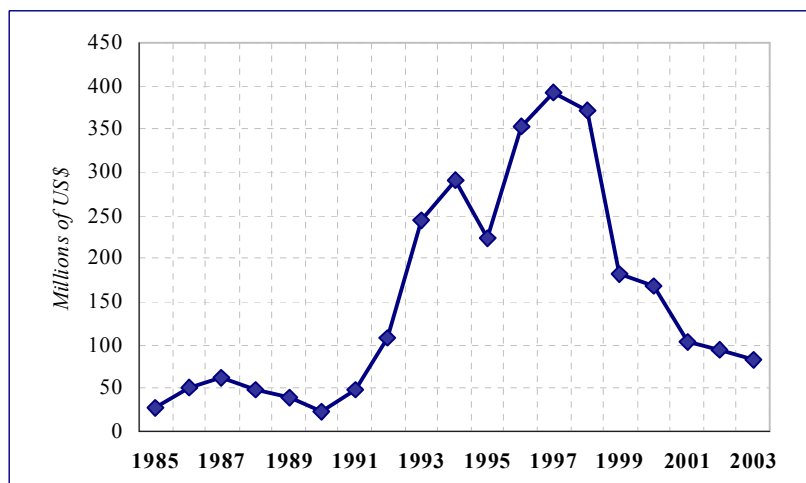
Figure 4.1 – Average Investment per EPS (Excluding SEDAPAL) – 1997-2003



Source: Superintendencia Nacional de Servicios de Saneamiento (SUNASS)-Indicadores de Gestión 2002

With regard to investment in the water and sanitation sector overall, after the peak in 1997, when investments reached US\$ 400 million as illustrated in Figure 4.2, there was a continuous decline, to an investment level of less than US\$ 100 million in 2003, a very poor level considering the major deficiencies in the sector. Indeed, as indicated in Table 4.1, the investment needs in the sector have been estimated at around US\$ 3.776 billion considering only EPS (excluding SEDAPAL and coverage in rural areas), while another estimate, which takes into consideration the goal of reaching service levels similar to those currently enjoyed in Chile, sets the investment needs at US\$ 4.153 billion.

Figure 4.2 – Investment in Water and Sanitation - 1985-2003 (Million US\$)



Source: Programa Nacional de Agua Potable y Alcantarillado (PRONAP) (1985-1998), Sistema Integrado de Administración Financiera (SIAF) Ministerio de Economía y Finanzas (MEF)-SEDAPAL (1999-2003)

Table 4.1 – Estimated Investment Needs in Urban Areas

	Percentage	Millions of US\$
Potable Water	38.50%	1,455
Sewage System	61.50%	2,321
TOTAL	100%	3,776

Source: Master Plans EPS

The main problem with increasing investments level is that municipal firms are currently facing a major financial crisis. Tariff levels do not allow costs to be recovered, leading to a negative financial result. The management of two municipal firms, officially declared bankrupt, will be taken over by private firms in 2005.

From a general point of view, performance in the sector is worsened by the fact that environmental and public health consequences are not considered in the general sector policy. In addition, coordination is lacking between the different agencies responsible for the various aspects of service provision.

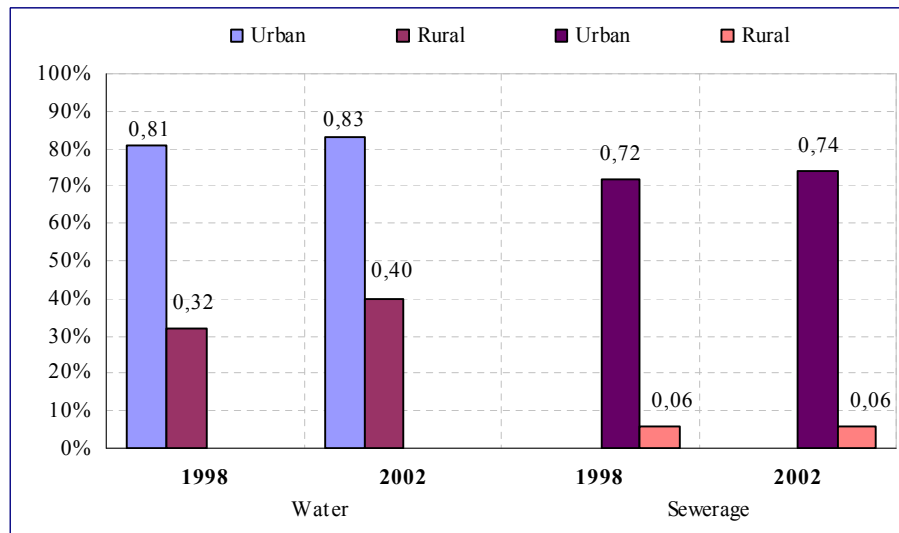
4.2. ASSESSMENT OF KEY POLICY AREAS

4.2.1. ANALYSIS OF TECHNICAL DIMENSIONS

As already mentioned in the overview, **access** to water and sanitation is far from being widespread; moreover, there are major differences in coverage between rural and urban areas. Looking at access to water sources (see Figure 4.3), coverage in urban areas in 2002 (82.9%) was twice that of rural areas (39.7%). The situation regarding sanitation services is even worse than the situation of the water division. In fact, only 74.3% of the urban population had access to sewerage services, while barely one in more than 20 people in rural areas had access to the same type of service (5.5% in 2002). Quite surprisingly, on-site sanitation is more widely used in rural areas (44.5% in 2002) than in urban areas (19.2% in 2002).

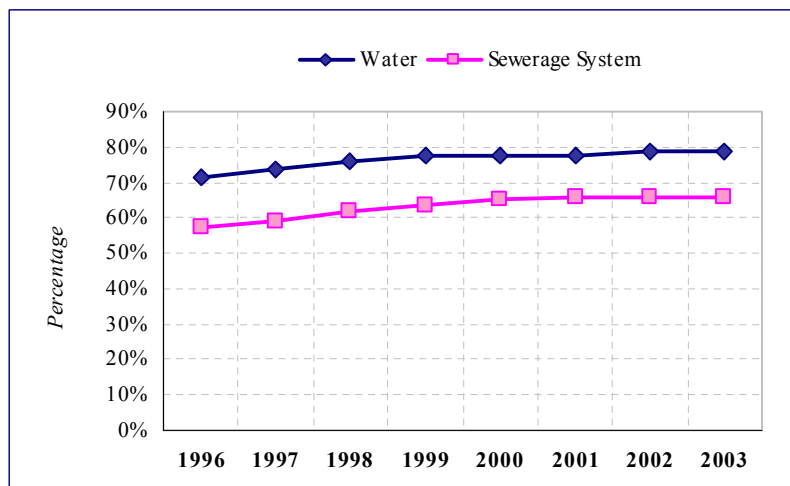
Although increasing throughout the period 1996-2003, sector performances lagged behind in the period 1998-2003 and are well below those stated in the Millennium Development Goals.

Figure 4.3 – Access to Water and Sanitation Services in Urban-Rural Areas



Source: SUNASS

Figure 4.4 – Coverage of Water and Sanitation Services (excluding SEDAPAL) – Peru 1996-2003



Source. SUNASS - Indicadores de Gestión 2002

Taking household connections into consideration²⁴, the analysis provided by the Pan American Health Organization (PHO: 2001)²⁵ confirms the large gap in service coverage between urban and rural areas (see Table 4.2).

²⁴ The following definition comes from the WHO/UNICEF Joint Monitoring Programme: Domestic connection: Taps installed either within the individual house or within a private plot of land positioned outside the house structure, irrespective of the source or extraction method.

²⁵ PHO (2001); “Disparities in Access, Use and Expenditure in Drinking Water in Latin America and Caribbean –”; Technical Report Series n° 7.

Table 4.2 – Peru – Access to Improved Water Sources: Percentage of Population – 2000

	Total	Urban	Rural
With Connection	61.35	76.18	29.20
Without Connection	38.65	23.82	70.80
- Reasonable Access ²⁶	14.07	10.65	21.47
- Without Service	24.58	13.17	49.33

Source: Pan American Health Organization (PHO)

It should be noted that the percentage of the households without service stood at 24.58% in 2002, but in the rural areas it peaked at 49.33%, which means that almost half of rural households did not have access to this basic service. Expanding the analysis to Peru's peer group, as shown in Table 4.3, it is fair to say that Peru's overall performance in this key sector was very poor, even when it is compared to countries with similar levels of development; in fact, Peru shows the highest percentage of people without access to services.

Of course, given the importance of this kind of service for the prevention of disease and poverty, the Peruvian government needs to show greater commitment to improving its performance in relation to this indicator.

Table 4.3 – Water Coverage: Percentage of Population – 2000 – Selected Countries

	Peru	Colombia	Guatemala	Jamaica	Lower middle-income countries
With Connection	61.35	75.16	61.71	38.32	59.14
Without Connection	38.65	24.84	38.29	61.68	40.87
- Reasonable Access ¹	14.07	15.45	18.55	42.20	22.57
- Without Service	24.58	9.39	19.74	19.48	18.30

Source: Ernst & Young Italy and Cohen&Co. elaborations on data from Pan American Health Organization

¹This percentage is the sum of people having direct access to the network with the percentage of population having at least 20 litres of safe water per person per day from a public water point (public standpipes, rain water collection, etc.) located within 200 meters from users.

With regard to *sanitation coverage*, Table 4.4 illustrates Peru's situation. According to the PHO, in 2000 52.73% of the population was served by the sewerage system through connections and 47.27% by other means; in particular, 20.99% had on-site sanitation systems and 26.28% had no service. As in the case of water services, there is a lack of uniformity between urban and rural areas with regard to the distribution of sewerage services; in fact, in urban areas 67% of the population had access to this service through connections, while in rural areas only 21.81% of the population had access to this service by means of connection. It must be emphasized that 60.47% of the population in rural areas has no access to this service whatsoever. Therefore, the

²⁶ Availability of at least 20 litres of safe water per person per day from a public water point (public standpipes, rain water collection, etc.) located within 200 meters from users.

extension of this service to rural areas should be one of the main issues the government needs to address so as to improve the social conditions of Peru's rural poor.

Table 4.4 – Peru – Access to Improved Sanitation: Percentage of Population – 2000

	Total	Urban	Rural
With Connection	52.73	67.00	21.81
Without Connection	47.27	33.00	78.19
- On Site ²⁷	20.99	22.50	17.72
- Without Service	26.28	10.50	60.47

Source: Pan American Health Organization (PHO)

Table 4.5 broadens the analysis of this indicator to include the other Latin American countries classified by OECD as having low income. It shows that 52.73% of the population in Peru is connected, a comparatively adequate result, while the average of the lower middle-income countries is 46.05%. However, a critical percentage of the population is without service in Peru; in fact, its indicator of 26.28% is the lowest value in the peer group.

Table 4.5 – Access to Improved Sanitation: Percentage of Population – 2000 – Selected Countries

	Peru	Colombia	Guatemala	Jamaica	Lower middle-income countries
With Connection	52.73	60.21	42.15	29.10	46.05
Without Connection	47.27	39.79	57.85	70.90	53.95
- On Site ²⁸	20.99	23.19	37.34	61.35	35.72
- Without Service	26.28	16.60	20.51	9.55	18.24

Source: Ernst & Young Italy and Cohen&Co. elaborations on data from Pan American Health Organization

To compare the *quality* of the Peruvian water and sanitation service with the other Latin American countries classified by OECD as having lower-middle income, three main indicators have been analyzed:

- (i) Water supply time (hours a day);
- (ii) Disinfection of the urban system (drinking water); and
- (iii) percentage of volume treated collected from sewerage system.

²⁷ On-site sanitation system includes any of the following technology: connection to septic systems; latrines, wet or dry etc. Obs: Adequate disposal of human excreta refers to a private or shared satisfactory sanitary means of excreta disposal that hygienically separates human excreta from human contact, such as any of the above.

²⁸ On-site sanitation system includes any of the following technology: connection to septic systems; latrines, wet or dry etc. Obs: Adequate disposal of human excreta refers to a private or shared satisfactory sanitary means of excreta disposal that hygienically separates human excreta from human contact, such as any of the above.

Regarding *water supply time*, Peru's performance is inadequate. Table 4.6 shows that Peru's indicator (13.7) is lower than Colombia's (21.30) and Jamaica's (16.0). Only Guatemala presents a worst indicator, at 12.0.

The indicator *disinfection urban system – drinking water* indicates a similar result. According to the Pan American Health Organization, the value for Peru (80.0%) is lower than that of Colombia (83.6%) and Jamaica (90.0%), yet higher than the figure for Guatemala (25.0%).

By contrast, regarding the indicator *percentage of volume treated collected from sewerage system*, Peru shows the best performance among its peer group. Its indicator (14.0%) is the highest, but giant steps are still needed in order to improve the quality of the sewerage system.

Table 4.6 – Water and Sanitation Sector: Quality Indicator – 2000 – Selected Countries

	Peru	Colombia	Guatemala	Jamaica
Water supply time (hours a day)	13.70	21.30	12.00	16.00
Disinfection urban system – Drinking water	80.00	83.60	25.00	90.00
Percentage of volume treated collected from sewerage system	14.00	10.80	1.00	n.a.

Source: Pan American Health Organization (PHO)

Examining the evolution of the water and sanitation service quality more closely, Table 4.7 shows the other two indicators: water effectively disinfected in urban areas (% of total supplies) and wastewater treated to at least the primary level in urban areas (% of wastewater). Peru has made appreciable improvements in recent years. In fact, the first indicator analyzed rose from 84.7% in 1998 to 98.0% in 2002. This increase is very important due to its connection with the public health issues and the spread of human diseases. The second indicator, regarding sewerage service quality, has also improved, rising from 14.2 in 1998 to 20.0% in 2002.

Nevertheless, wastewater is still mainly disposed of without treatment. As mentioned above, on average, only 20% of wastewater is treated before disposal, causing the discharge of very high levels of pollutants into the sea and rivers. Rivers, in turn, are the major source of water for urban consumption. As a consequence, the costs for treating piped water are very high and deter many firms from making improvements to service quality; also, piped water tends to be unsafe for drinking.

Table 4.7 – Water and Sanitation Sector: Quality Indicator – Peru

	1998	1999	2000	2001	2002
Water effectively disinfected in urban areas (Percentage of total supplies)	84.7	91.00	96.0	96.7	98.0
Wastewater treated to at least the primary level in urban areas (Percentage of wastewater)	14.20	17.0	16.9	19.3	20.0

Source: Instituto Nacional de Estadística (INEI)

4.2.2. ECONOMIC EFFICIENCY AND PRIVATE SECTOR FINANCING

The most common way to classify EPSs is based on the number of connections. Only one EPS, SEDAPAL, the public enterprise serving Lima, has more than one million connections. The average ranges from 13,000 to 200,000 connections and includes 13 EPSs. Sixteen EPSs have between 10,000 and 30,000 connections. The remaining 24 EPSs have no more than 10,000 connections.

Table 4.8 – Classification of EPS by Size

Enterprise	Connections	
SEDAPAL	More than 1 million	Company of Lima
13 EPS: SEDAPAR, EPS GRAU, SEDALIB, EPSEL and others	From 30,000 to 200,000	Large companies
16 EPS	From 10,000 to 30,000	Medium companies
24 EPS (8 not regulated for SUNASS)	Less than 10,000	Small-scale enterprises

Source: Plan Estratégico DNS-MVCS

There is a low overall level of service efficiency. At the national level, the average percentage of unaccounted-for water by these 53 firms is 45%, but this figure disguises large differences: while one firm reaches a level of 79% of unaccounted-for water, another firm barely reaches 10%. Twenty-two EPSs give no treatment whatsoever to wastewater, while only one treats 100%. It should be no surprise that the latter firm, EPS Moquegua, is located close to an important mine (Southern Peru Copper Corporation), in a region in which a high profile is given to environmental concerns. The operative margin is low, at an average of 31% for the 55 EPSs. The highest performing firm is in the Highlands (Huancavelica), at 58%, and the lowest, at -66%; the latter also recorded 79% of unaccounted-for water (Pisco, south of Lima).

Table 4.9 – Selected Efficiency Indicators

Indicator	National Average	Minimum	Maximum
Access to Improved Water Sources	83%	29% EPS MARAÑON	98% EPS TACNA
Access to Improved Sanitation	74%	28% EPS MARAÑON	94% EPS TACNA
Continuity	14 Hours/day Sedapal 22 Hours/day	3 Hours/day EMAPA VIGSSA	24 Hours/day EMUSAP AMAZONAS
Unaccounted-for Water	45%	79% EMAPISCO	10% EPS NORPUNO
Served Water Treatment	20%	0% 22 EPS	100% EPS MOQUEGUA
Operating Revenues	31% Sedapal 42%	-66% EMAPISCO	58% EMAPA HUANCA VELICA

Source: SUNASS – Indicadores de Gestión 1996-2002

Most major cities in Peru are located along the coast where water supply depends on rivers running from the Highlands into the Pacific Ocean. Therefore, droughts, which tend to be increasing in frequency, affect the water supply cities, particularly Lima. In 2004, after several years without rationing, the number of hours of service in Lima was restricted to fewer than eleven hours a day, from 5 am to 4 pm.

Finally, Table 4.10 provides the production and distribution costs and the tariffs for water and sanitation services in Peru and its peer group. As shown, the level of tariffs in Peru is very low, especially the tariffs for the sewerage service. This confirms the difficulties regarding tariff-setting in Peru, where political interferences and the lack of decision-making power on the part of SUNASS (*Superintendencia Nacional de Servicios de Saneamiento*) prevent the sector from overcoming tariff problems.

Table 4.10 – Production and Distribution Costs and Tariffs: US\$/m³ - 2000 – Selected Countries

	Peru	Colombia	Guatemala	Jamaica
Water production and distribution costs	0.18	0.22	0.04	0.15
Mean tariff for drinkable water	0.27	0.25	0.39	1.07
Mean tariff for sewerage service	0.12	0.14	n.a	1.07

Source: Pan American Health Organization (PHO)

Due to these very low tariffs which barely cover operating costs in Peru, there are very few companies that can be considered as performing well. Firms depend heavily on Treasury transfers in order to finance expansion. Outside Lima, the improvement of service in most cities relies on household self-financed expansion, i.e. families get together and through communal work expand household connections, the bulk of which is then connected to the local infrastructure. As a consequence, there is no organized private sector financing.

Tariff setting has thus been a major obstacle to sector development. The tariff setting process ends in a recommendation by SUNASS and needs to be approved by the EPS board, which is appointed by the mayors of municipalities. Consequently, tariffs are set well below a level that would make services profitable, and there are no incentives to increase them as mayors would be blamed for the rate increases. They run the risk of political setbacks given that EPSs are owned by the municipalities.

A major effort is currently being made to introduce private investments into two firms in the northern part of the country (Tumbes and Piura). The private investment participation scheme has attempted to address several of the sensitive issues raised by other privatization schemes: inconsistency between tariffs and improvements in service quality, and investments financed with donor monies. The scheme combines public investment, donor cooperation funds, and private investment. The German financial institution, *Kreditanstalt für Wiederaufbau* (KfW), will provide €16 million, €8 as a loan and the other €8 as a donation. The Peruvian government will provide US\$ 4 million, and it is expected that EPSs will contribute US\$ 5 million. In the 30-year concession period, the anticipated level of investment is US\$ 67 million.

The government aim is that this process could be used as a “case study” for successful public-private partnerships (PPP), which could help to foster more efforts – nine other EPSs have been considered as priorities in this round of private investment promotion. The government has already secured external funds for some of them through loans and donations from KfW and the Japan Bank for International Cooperation (JBIC).

Table 4.11 – EPSs Scheduled to Enter into Public-Private Partnerships (PPP) and Sources of External Funding

COMPANIES	Urban Population 2002 (Thousands)	Co-Financing BID/KfW	Complementary financing JBIC
SEDAPAR S.A.	944		
EPS GRAU S.A.	860		Coordinated
SEDALIB S.A.	823	Eligible	
EPSEL S.A.	835	Eligible	
SEDACHIMBOTE S.A.	365		Coordinated
EPS TACNA S.A.	249		
SEDAMHUANCAYO S.A.	339	Eligible	
EPS LORETO S.A.	449		Coordinated
EPS SEDACUSCO S.A.	312		
EPS EMAPICA S.A.	196		
EMAPA SAN MARTIN'S	212		
EMFAPATUMBES S.A.	178	Eligible	
EMAPISCO S.A.	91	Eligible	
TOTAL	5,852		

Source: SUNASS

Finally, regarding SEDAPAL, it must be stressed that although it shows poor financial and low efficiency indicators, such as 45% of water unaccounted for, it does not have a concession plan. It was recently decided that private participation will be made through operation contracts, allowing for external financing.

4.2.3. REGULATORY FRAMEWORK AND INSTITUTIONAL DEVELOPMENT

Decree Law 17,752, the General Law of Water (amended by Decree Law 18,735 and Legislative Decrees 106-81 and 708), establishes that water, without exception, belongs to the state and that its domain is inalienable. There is no private ownership or rights to water. The rational use of water can be granted only in harmony with the country's development and social interests.

The basic legal framework for the water and sanitation sector is composed of Laws 26,388/1994 (General Law of Sanitation), and 27,332/2000 (general for all regulatory agencies) and Decree 017/2001-PCM (regulatory agency of water and sanitation, SUNASS).

The General Law of Sanitation (regulated by Decree 09/1995-Pres) establishes the role of the institutions, determines the rights and duties of consumers and providers, defines the tariff regime and determines the conditions and models of private participation in the sector. The Ministry of Housing, Construction and Sanitation is responsible for determining policies and promoting the development of the sanitation sector. It also regulates design standards and technical specifications for drinkable water and sewerage systems. The regulatory and supervising agency, SUNASS, is in charge of proposing norms for the provision of sanitation services, controlling the provision of these services and promoting its development, as well as acting as the last recourse for complaints from users. SUNASS sets rates for services and activities within its domain. Provincial municipalities are responsible for the provision of sanitation services and for granting concessions to service providers. The providers may be public, private, or mixed entities, and should be functionally and administratively autonomous.

The General Law of Sanitation and its regulation establishes the principles for tariff setting: economic efficiency (optimal allocation of resources), coverage of costs under efficient operation subject to standards of quality and service, and coverage requirements (social equity). SUNASS establishes the levels of service and quality (continuity, bacteriological quality, and turbidity). The achievement of these standards is part of the providers' commitments undertaken in order to obtain rate increases. The Law also states that the tariff schedule should be easily understood, implemented, applied, and monitored (transparency requirement).

The period starting with the enactment of the General Law of Sanitation is characterized by a major transformation of the sector and its institutions. Service providers under the responsibility of the municipalities represent one step forward towards decentralization. However, in several instances directors and personnel do not have suitable skills for the tasks they are assigned.

Before the Law, a significant portion of the population had been receiving a subsidized service. The new situation should lead SUNASS to define rates enabling costs to be covered. The previous situation gave rise to both discontentment and serious financial sustainability problems for the entities responsible for provision towards the end of the 1990s, leading to a gradual decline in the quality of the services provided.

Law 26,842/1997 of Health stipulates that public health is primarily the responsibility of the state. This Law determines that the national health authority shall establish essential prevention and control measures to stop and prevent acts or situations from creating risks to health and the environment. In particular, the Law stipulates that water supply, sewerage, disposal of excreta, reuse of wastewater, and the disposal of solid waste are subject to the provisions defined by the

health authority (currently the Ministry of Housing, Construction and Sanitation). The authority has powers of enforcement.

Other norms complement the basic framework. On the one hand, there are several Laws regulating specific aspects of the sector: Laws 27,332/2000 (for Organizations Regulating Private Investment in Public Services), 27,293/2000 (Governing the National Public Investment System), 27,783/2000 (Bases for Decentralization), 27,867/2002 (Regional Governments), and 27,972/2003 (Municipalities). On the other hand, there are sanitary norms, and technical norms for quality requirements for drinking water (physical, chemical, and bacteriological), supply of drinking water, and industrial drainage systems.

At present, there are some inconsistencies between the provisions set forth in the Law Governing Municipalities (LM) and the Law of Regional Governments (LGR). In particular, the LM states that provincial municipalities administer and regulate, either directly or by concession, safe water and sanitation services. According to economies of scale, it could be more efficient to centralize service provision at the provincial level and to provide rural sanitation services when the latter cannot be provided by the district municipality or by the municipalities responsible for rural populations. On the other hand, district municipalities administer and regulate, either directly or by concession, safe water and sanitation services and provide rural sanitation services. LGR states that the functions in the areas of regional governments are, as follows:

- (i) to formulate, approve and evaluate regional plans and policies in the areas of housing and sanitation, consistent with the development plans of local governments and in accordance with national policies and sector plans;
- (ii) to implement action involving the promotion, technical assistance, training, and scientific and technological research in the areas of construction and sanitation; and
- (iii) to provide technical and financial support to local governments in the provision of sanitation services.

The General Law of Sanitation states that provincial municipalities are responsible for the provision of sanitation services and, consequently, for granting operating rights to the EPSs. Given the inconsistency regarding the entity responsible for the provision of sanitation services, the LM must prevail over this Law since the former is a specific law whereas the latter is general. The second inconsistency relates to the delegation of regulatory powers to provincial and district municipalities according to the LM and to SUNASS in the norms described above.

Depending on the interpretation of the Laws, there may also be some overlapping of roles between SUNASS and the health authority, which may require clarification, limiting the scope of powers granted to the health authority to areas concerning only the health aspects of sanitation activities.

The model of water service provision in Peru has followed the same pattern as in other Latin American countries. In particular, the government level at which regulation has been defined is similar to countries such as Argentina and Brazil and the opposite of Chile. The latter followed a policy of centralization, after several years of decentralized regulation and provision. The most significant reforms in Chile were initiated in the late 1980s with the new regulatory framework for the sector, centralizing a great part of regulations and provision. This framework was based on the electricity sector, with the application of the price cap regulation with a reasonable return under efficient operation conditions (“*empresa modelo*”). In 1989, it created the regulatory body *Superintendencia de Servicios Sanitarios* (SISS), responsible for inspecting the sector and regulating charges and fees. Under this institution, the pre-existing dual role of operator and regulator was divided. In 1989 public operators were converted to corporations, and finally in 1997 they were privatized, after an important upward readjustment of prices. The privatizations pursued the double objective of obtaining private resources for financing

infrastructure and services, thus allowing the government to exit from productive activities. However, there was some debate as whether the government should have adopted a concession framework rather than the privatisation of companies.

At the end of the 1990s, Peru faced an economic situation in a state of deterioration. The state lacked the necessary funds to invest in infrastructure for sanitation and many service providers were in precarious financial conditions. This situation gave rise to a series of dispositions and legislative projects with the clear aim of reducing the financial distress of service providers and fostering private participation as a way of attracting necessary investments in the sanitation infrastructure.

A new norm is Decree 908/2000 (Law of Fostering and Development of the Sanitation Sector), which establishes a new regulatory scheme for the sector and increases the models for the participation of the private sector in sanitation. This Law has not yet been enacted; Law 26,338 and its regulation (Decree 09/1995-Pres) are therefore still in force.

4.3. POLICY OPTIONS AND IMPLICATIONS

Peru is failing to reach its target of reaching universal coverage in cities and, above all, in rural areas. However, the level of poverty throughout the country, at well over 50% of the population, does not enable tariffs to be raised to the level necessary to encourage the entry of private operators in this sector. New ways of fostering both private and public investment must be designed: investment needs remain an issue and public investment will not be sufficient to narrow the gap between those with adequate service (in urban areas) and those without (in rural areas). Therefore, the public sector will continue to play a major role in service improvement until the increase in per capita GDP enables private financing through tariffs.

Attempts at solving EPS inefficiencies by undertaking giant projects (some of them planned for SEDAPAL), such as the redirection of water flows from rivers running into the Amazon to the coastal areas, involve risks. These efforts represent major investments and will exceed all estimates made so far. The alternative is to solve inefficiencies at management level. This may require major training programs, which have not been implemented so far. Another possibility may be a change in corporate governance of the EPSs', thus somewhat reducing dependence upon the mayors of the municipalities.

Given the fiscal constraints, private participation represents a major target: SUNASS must be strengthened in order to supervise and monitor the commitments made by private operators. According to the schemes currently used, SUNASS is responsible for approving the tariff increases necessary to repay public loans.

The quality and availability of water is an issue to be addressed by the regulator and the Ministry. They need to play a more active role in coordinating all responsible agencies.

The modernization of the Water Law, in an attempt to introduce some economic incentives to promote more efficient use, is also an option. This will obviously affect the water and sanitation sector in terms of the price-quality relationship of the service.

4.4. PRIORITIES FOR FUTURE REFORM

The government should take actions to address the following issues:

- (i) the completion of the schedule of Public-Private Partnerships (PPP) currently under way. By the end of March 2005, the process should be completed in Tumbes and Piura. Moreover, the active participation of all relevant agents, including the regional governments, should be sought,;
- (ii) the strengthening of SUNASS, which must be able to cope with the regulatory needs of the new Public-Private Partnerships, and the clarification of its role and scope of powers in order to prevent overlapping with the health authority;
- (iii) the initiation of reforms to improve the “corporate governance” of EPSs. At the same time, management skills should be improved;
- (iv) environmental outcomes and service quality must be explicitly specified among the responsibilities of EPSs;
- (v) the design of a specific new strategy for SEDAPAL, given its size and possible gains from economies of scale;
- (vi) coping with the lack of:
 - a definite government policy for the sector, and
 - planning and design criteria. For instance, a national drinking water supply and sanitation plan has not yet been prepared;
- (vii) avoidance of political interference by municipalities in EPS management;
- (viii) promotion of the participation of municipalities in rural services; 43% of rural villages autonomously manage their water supply and sanitation systems;
- (ix) the lack of inter-institutional coordination; and
- (x) the resolution of inconsistencies in the regulatory framework, especially between the Law Governing Municipalities (LM) and the Law of Regional Governments (LGR).

5. TELECOMMUNICATIONS

5.1. OVERVIEW

The telecommunications sector in Peru was dominated by public companies since 1970. The *Compañía Peruana de Teléfonos* (CPT) was responsible for providing telecommunications services in the capital, Lima, while *Empresa Nacional de Telecomunicaciones* (ENTEL) had concession rights both for service provision in the rest of the country and monopoly power over international and domestic long-distance services. Peru's mobile telephone market, covering Lima, started in 1990 through the Tele2000 Company (owned by domestic investors and later sold to Bell South).

The new regulatory framework for telecom services was drafted in 1991 in the *Ley General de Telecomunicaciones*. The Minister, together with the *Organismo Supervisor de Inversión Privada en Telecomunicaciones* (OSIPTEL), is in charge of monitoring the market. The Minister grants concessions, authorizations, permits and licenses for radio frequencies in order to provide telecommunications services. OSIPTEL was established in order to regulate the behavior of telecom operators, to monitor quality and concession contracts and to set tariffs. OSIPTEL also administers a fund, *Fondo de Inversión de Telecomunicaciones* (FITEL), which provides minimum subsidies in competitive bidding for rural operators, and is financed from 1% of the sales of telecommunications operators.

Private sector participation in the telecommunication market began in 1994 through the acquisition of CPT and ENTEL Peru (fixed telephone line sector) by Telefonica de Peru (TP). Under the concession contract, in order to provide incentives for service expansion, it was granted a temporary five-year restriction on competition (i.e., a monopoly position), during which cross-subsidies between long distance and local telephony were to be eliminated. A readjustment of tariffs was included in the concession contract, with the aim of counterbalancing this new decision. As a result of privatization, the number of fixed telephone lines in service has increased threefold since 1993, and there have been improvements in service quality. However, teledensity in Peru lags behind other Latin American countries with similar levels of development. Local call charges and monthly fee rates have increased sharply but rates for long-distance calls have slowly decreased due to competitive pressures, especially in recent years. The *Lineamientos de Política de Apertura del Mercado de Telecomunicaciones* were drafted before the introduction of competition. Interconnection is mandatory; however, Telefonica delayed the procedures for interconnection with the incoming operators and OSIPTEL had to provide interconnection mandates on several occasions. TP gave up its legal monopoly in 1998, one year before it was due to expire.

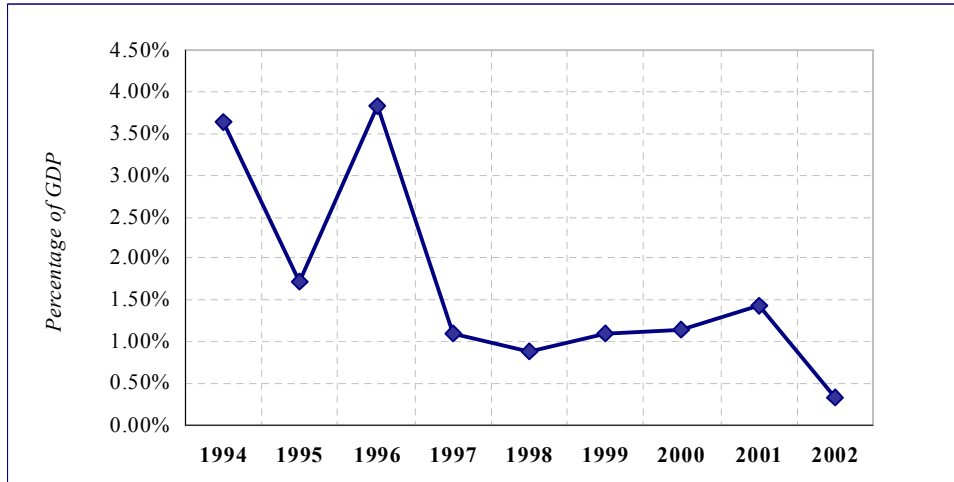
There has been stronger dynamism in relation to mobile services since 1996, when the "Calling Party Pays" system was introduced into the market. Telecom Italia Mobile (TIM), one of the most important mobile service operators, entered into the market in 2000 as the winner of the government bid, providing a second driving force for service expansion.

OSIPTEL reports that there are now eight fixed telephony providers, three mobile providers (down from four, now that Telefonica de Peru has acquired Bell South Latin American operations), 52 long-distance carriers, 24 local carriers, 126 cable television firms, and around 180 registered companies providing other services, including 72 Internet service providers.

Investment in the sector reached around 3% of GDP on average between 1994 and 1996 and remained at around 1% thereafter. Since 1999, foreign direct investment (FDI) in telecommunications accounted for 25% of total FDI. By 2003, Telefonica accounted for 54% of investment in the sector. The total revenues for the telecom sector peaked at around 3% of GDP in 2003 and Telefonica accounted for around 60% of revenues. Private investments in the

telecom sector, as shown in Figure 5.1 below, fell sharply in 2002 to 0,33% of GDP from 1,44% of GDP in 2001.

Figure 5.1 – Private Investment in Telecom Industry to GDP



Source: World Development Indicators 2004 – The World Bank

5.2. ASSESSMENT OF KEY POLICY AREAS

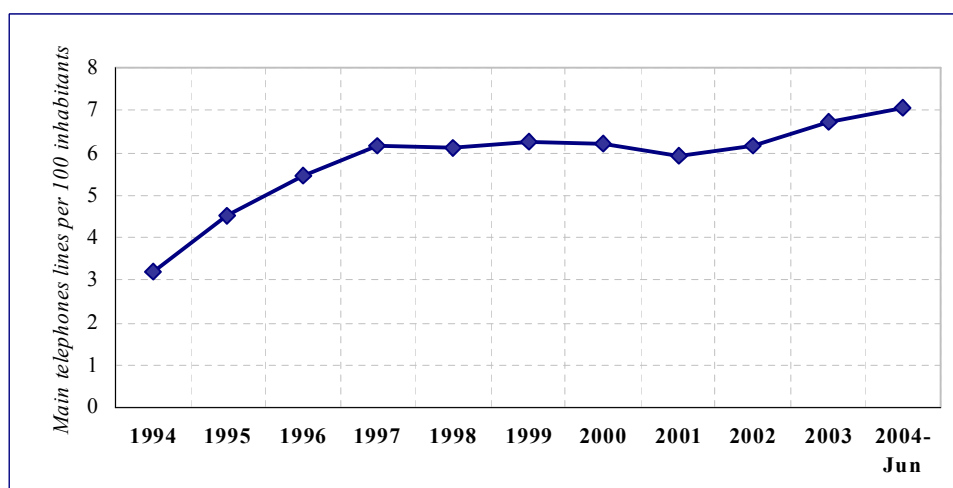
5.2.1. ANALYSIS OF TECHNICAL DIMENSIONS AND EFFICIENCY

In order to assess the technical profile of the telecommunications sector in Peru, the following items have been analyzed:

- (i) access;
- (ii) affordability;
- (iii) quality of service;
- (iv) technical dimensions and efficiency.

Peru lags behind Chile, Colombia, and Ecuador in terms of fixed-line or mainline teledensity. Telefonica Internacional is the dominant operator in most telecommunications services in Peru, in fact, its market share is around 97% of fixed-line services in 2004. From 1994 to 1997 the number of lines in service (LIS) almost doubled as Telefonica took advantage of the incentives given in the concession contract, which allowed for temporary protection from competition in all telecom services for a five-year period. However, from 1997 to 2001 the growth of fixed lines was almost at zero (even negative for certain periods), due to the high level of tariffs compared to international levels, widespread poverty throughout the country and a downward trend in the macroeconomic cycle. Market penetration, as illustrated in Figure 5.2, started to rise once again from 2002 onward owing to new consumption plans introduced by incumbent operators and a more favorable macroeconomic environment.

Figure 5.2 – Fixed Teledensity

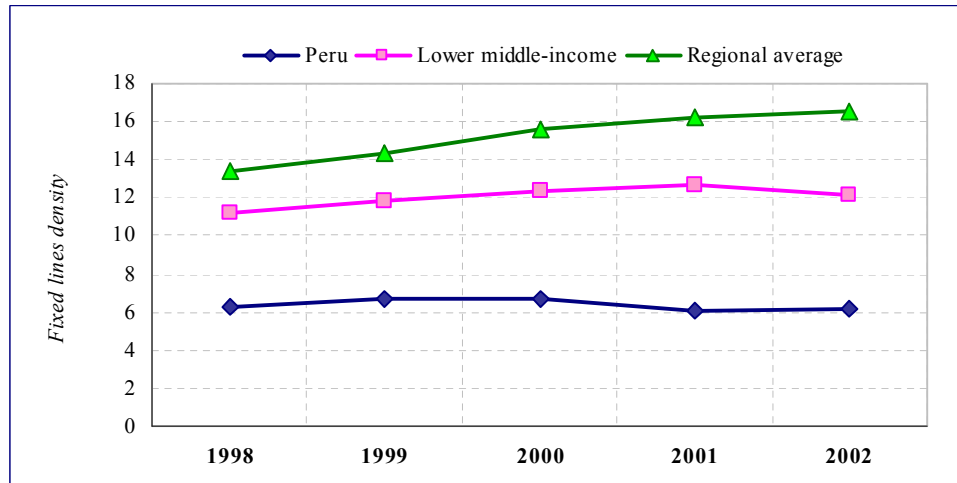


Source: OSIPTEL

Three new operators had entered into the fixed telephone line market by mid-2004: Telmex (10,000 LIS), Bell South (60,000 LIS) and, more recently, Americatel (900 LIS). Some of them have entered during the last four years and operate mostly in the corporate markets. In line with the consolidation process undertaken by the telecommunications industry in Latin America, Telmex has acquired AT&T operations in Latin America, and BellSouth operations are to merge with Telefonica. The last deal will have strategic importance as since 2003 Bell South has offered fixed and wireless communications in order to compete with Telefonica.

It is worth underlining the huge differences in service coverage between the capital, with a density of 13.9 lines per 100 inhabitants, and the poorest regions such as Apurimac (1.2), Amazonas (1), and Huancavelica (0.5). These differences may be explained by the high correlation between income and the number of lines in service.

Figure 5.3 – Fixed Teledensity - Benchmarks

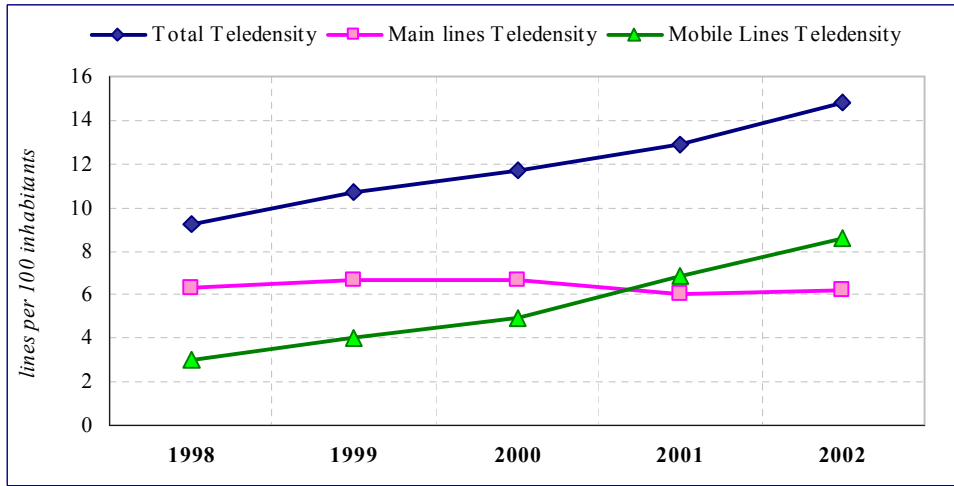


Source: *World Telecommunication Indicators 2004 – International Telecommunication Union (ITU)*

Broadening the analysis, Figure 5.3. shows that Peru’s total fixed teledensity (around 6%) lags behind the average presented of the peer group of lower middle-income countries (12%), as well as the regional average (16%).

A breakdown of the overall teledensity in Peru is shown in Figure 5.4. Looking at the recent trend, it is apparent that, as in other Latin American countries, mobile phone teledensity has overtaken fixed line teledensity. The replacement of fixed lines by mobile lines is increasing yearly, a trend driven by prepaid mobile services.

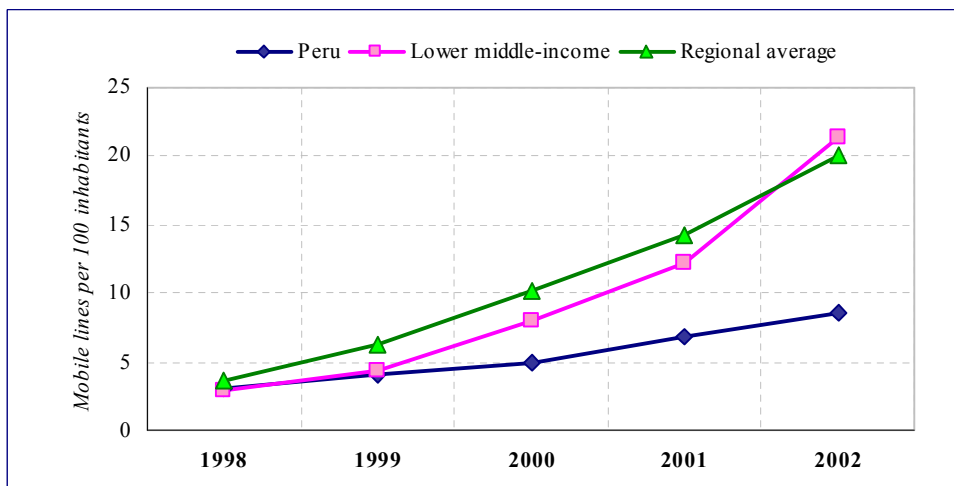
Figure 5.4 – Teledensity in Peru



Source: World Telecommunication Indicators 2004 – ITU

In fact, the mobile market in Peru has shown greater dynamism since 1996 with prepaid mobile services and the “Calling Party Pays” system. In 2001, the number of mobile lines exceeded the number of fixed lines. By the end of 2003, there were 10.71 lines per 100 inhabitants, a greater number than in Colombia or Ecuador.

Figure 5.5 – Mobile Teledensity Benchmarking



Source: World Telecommunication Indicators 2004 – ITU

In spite of the increase of mobile lines in services, as illustrated in Figure 5.5 above, the indicator for Peru (8.62) is still far below the average of the lower middle-income countries (21.62%). Therefore, there is room for improvement in market penetration through increased competition and cost-cutting in order to make this service more affordable for the lower income brackets (which are dominant in Peru).

Figure 5.6 – Market Share of Mobile Lines by Companies

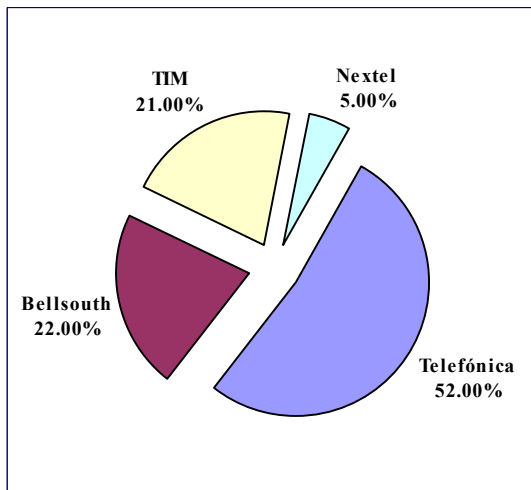


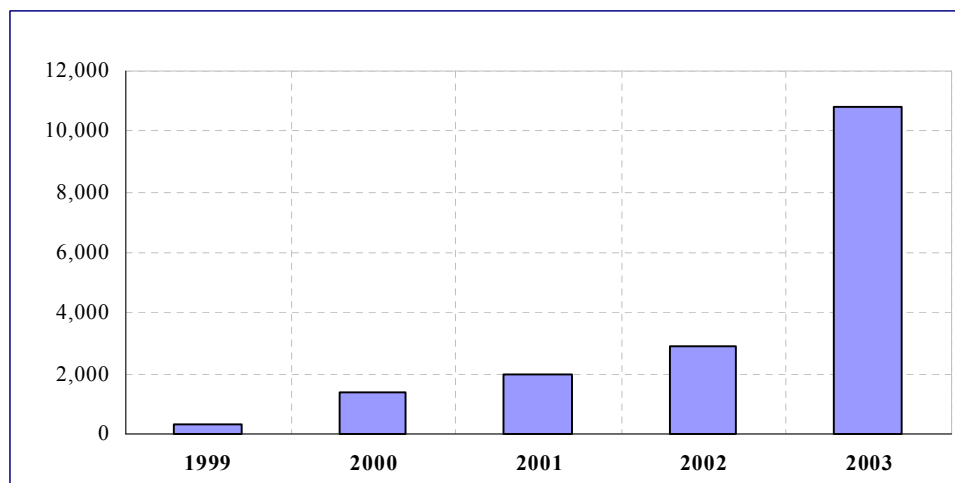
Figure 5.6 illustrates the breakdown of market shares in mobile lines according to OSIPTEL data. Telefonica Móviles is the most important operator and accounts for 52% of the mobile market while Bellsouth and TIM account for 22% and 21%, respectively. In particular, the latter aimed at aggressive penetration into the market, especially in relation to prepaid services. By 2003, prepaid services accounted for around 80% of mobile subscribers in the market. Nextel began operations in 1998 through I-den technology, targeting corporate customers, and holds a 5% market share of LIS.

Source: OSIPTEL

The long-distance market it has been open to competition since 1999 through the pre-selection of long-distance operators. By 2002, long-distance competition had increased significantly through “Call-by-Call” multi-carrier services. New operators entered into the market and traffic increased by 11% between 2002 and 2003, especially through Americatel operations, which showed a traffic increase of 80% in domestic long distance services between 2002 and 2003. The international long-distance market was even more dynamic, increasing by 43% between 2002 and 2003. There also has been an increase in long distance pre-paid card services.

Concession contracts with Telefonica provides that the company should operate telecommunications services and install public pay phones nationwide. By 2003, public pay phones numbered more than 120,000, showing a sharp increase from the 20,000 available before privatization.

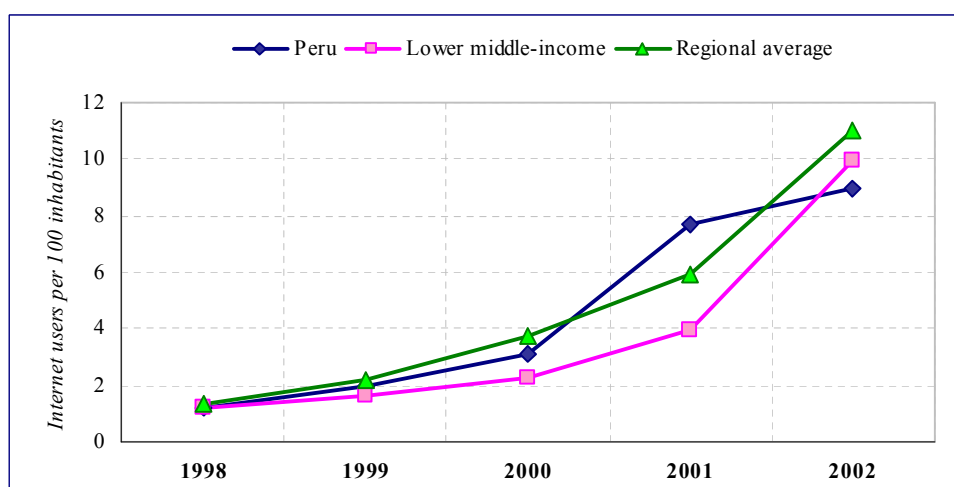
Figure 5.7 – Evolution of Public Cabins - 1999-2003



Source: OSIPTEL

The NGO *Red Científica Peruana* (RCP) strongly promoted Internet services. By 2003, the number of dial-up subscribers exceeded 250,000, mostly supplied by Telefonica del Peru. Internet service is also provided via non-commuted access, through cable television, xDSL, and wireless access. Two companies offer Internet service using cable modems (cable TV access): Telefonica Multimedia (Cablenet) and Star Global Com S.A. However, the most important model for Internet access in Peru through the use of public cabins, based on sharing access models and private initiatives. OSIPTEL estimates that around 11,000 *public cabins* operate in the country and that they provide 33% of Lima's population with Internet access. According to the report on Global Competitiveness, this model has enabled Peru to reach levels of community access ranking with New Zealand and overtaking the United Kingdom in 2001. Figure 5.8 compares *Internet users per 100 inhabitants* in Peru with the comparable countries in Latin America. Peru's indicator is very close to those of the benchmarks, showing that recent efforts have paid off, even though the diffusion of Internet use (around 9%), given its crucial importance, remains an issue to be addressed by the incumbent government.

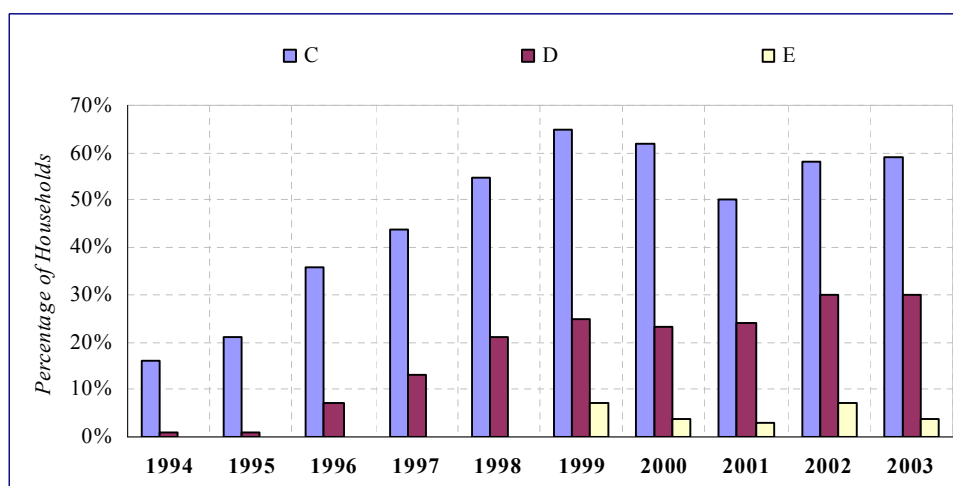
Figure 5.8 – Internet Users



Source: World Telecommunication Indicators 2004 – ITU

With regard to the affordability of services, taking into consideration the cost of local calls and the monthly fees paid for fixed telephone lines, telecom services in Peru are among the most expensive in Latin America. Affordability is one of the key reasons for slow growth. For instance, in Lima, only 4% of the lowest income bracket households (group E) have access to fixed telephone services, down from 7% in 1999. The second lowest income bracket (group D) showed a 30% penetration rate by the end of 2003.

Figure 5.9 – Fixed Lines – Household Penetration in Lima (% per Income Brackets)



Source: *Apoyo Opinión y Mercado*

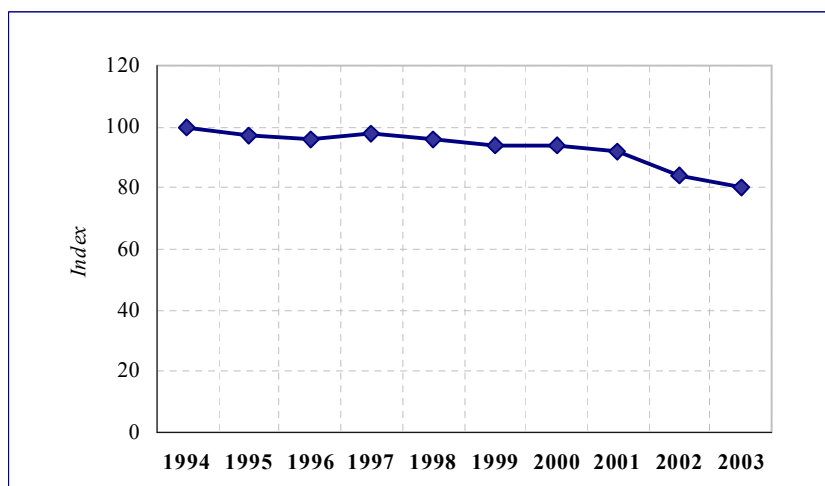
The rate of fixed telephone penetration in the rest of the Peruvian departments is estimated to be lower than in Lima, as prices for telephone services are the same all over the country and the level of the monthly average income in the rest of the country is lower than in Lima. Thus, in departments such as Junin, Ica, and Ayacucho, where the average income is 46%, 57%, and 24% of Lima's respectively, the fixed telephone penetration rate is expected to be lower.

The Telefonica concession contract provided incentives for the expansion of services according to tariff readjustment. Price caps were expected to adjust prices using the X factor since 1999. However, since 1998 tariff increases, due to the change in the pulse duration of local calls and to the permanent indexation of monthly fees on the basis of contract modifications, have negatively affected the affordability of services²⁹.

Overall, according to OSIPTEL the cost of a basket of telecom services (basket A - comprising 500 minutes of local calls, 40 of domestic Local Dial (LD) and 6 of international LD) decreased by 20% in real terms between 1994 and 2003 through the adjustment of regulated tariffs and competitive pressures (see Figure 5.10). OSIPTEL data show that mobile rates (for contract users commonly included in upper income levels) have decreased from US\$ 0.41 per minute in 1998 to US\$ 0.28 in 2001. Mobile penetration has increased due to prepaid services which, by 2003, accounted for 78% of nationwide mobile LIS and for 85% considering areas outside Lima. In particular, mobile penetration exceeded fixed penetration among the lowest income brackets, probably due to prepaid services, which are the dominant type of service used by the lower income population.

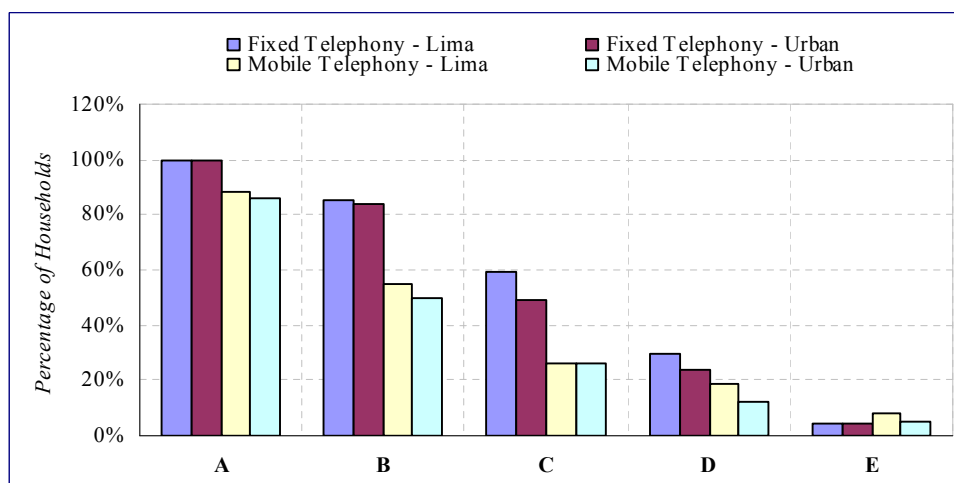
²⁹ Source: "Privatizing Telecommunication in Peru", Máximo Torero, Alberto Pasco-Font and Enrique Schroth; *Economía* Fall 2003, Journal of the Latin American and Caribbean Economic Association. Andrei Velasco, ed. Brookings Institution Press 2004.

Figure 5.10 – Real Tariffs Index of Basic Telephone Services (Index Dic-1994=100)



Source: OSIPTEL

Figure 5.11 – Household Access in Lima and Urban Areas - 2003



Source: OSIPTEL

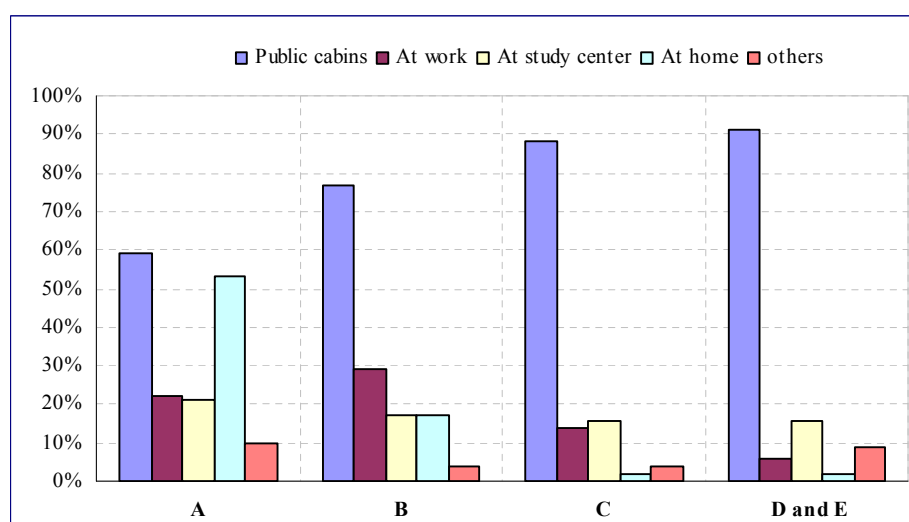
Table 5.1 summarizes the *cost of local phone calls per 3 minutes*: the trend in Peru has basically remained stable. As mentioned earlier, despite the liberalization process this service remained very expensive in relation to the consumption power of the people. In addition, if compared with the benchmark data, local calls in Peru are more expensive than the averages of the regional sample and the peer group.

Table 5.1 – Cost of Local Phone Call (US\$ per 3 Minutes)

	1998	1999	2000	2001	2002
Peru	0.08	0.07	0.07	0.08	0.08
Lower middle-income countries	0.07	0.06	0.06	0.06	0.07
Regional average	0.07	0.07	0.07	0.07	0.05

Source: World Development Indicators 2004 – The World Bank

Figure 5.12 shows locations where people connect to the Internet. It should be noted that access to the Internet through public cabins is extremely important to the lowest income groups; in fact, almost 90% of the population uses this type of service. However, these cabins are also the most important place to obtain Internet connection for upper income households. The case of Peru provides a good lesson in adopting a successful approach to Internet penetration in a poor country. According to a Harvard University study,³⁰ Peru ranks 13th in the world for public Internet access.

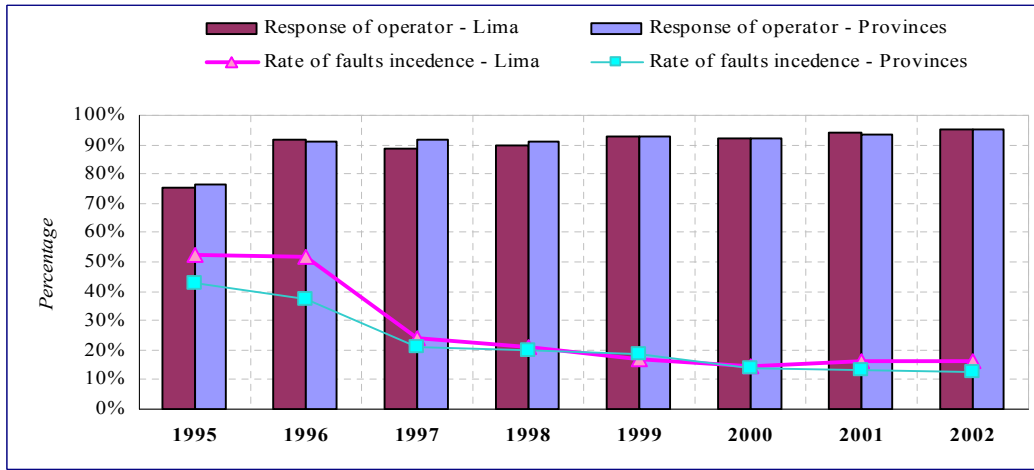
Figure 5.12 – Places Where People Connect to the Internet (Percentage per Socio-Economic Status)

Source: Apoyo 2002

To assess the service quality of fixed telephone lines two indicators have been analyzed, both for Lima and for the rest of the country: incidence of phone faults and operator response.

³⁰ Colin Maclay and Corporación Andina de Fomento (CAF).

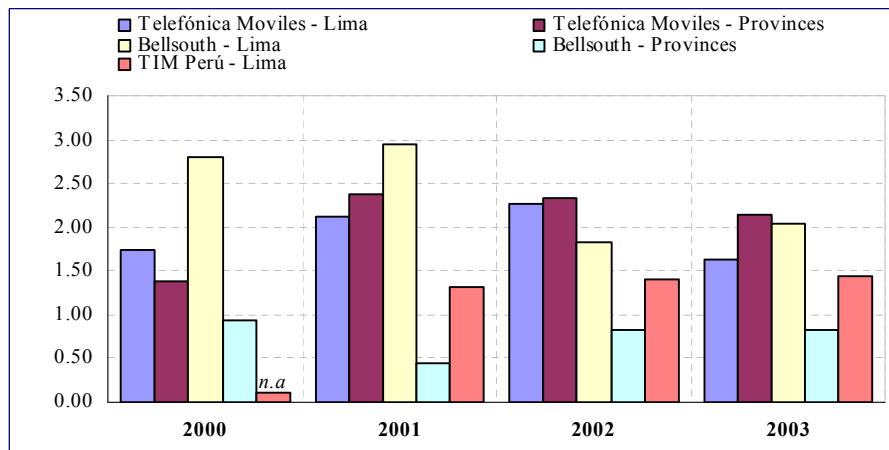
Figure 5.13 – Fixed telephone – Indicators of Quality in Lima and the rest of the country (Provinces) – Incidence of Phone Faults and Operator Response



Source: OSIPTEL

In relation to the first indicator, a sharp decrease in telephone faults was recorded in 1997, in both Lima and the rest of the country (see Figure 5.13); later it stabilized at slightly less than 20%. With reference to the second indicator, it has reached a fairly good level, almost 95%, in both Lima and in the rest of the country. Overall, there has been a steady increase in service quality and Telefonica has complied with all the quality requirements stated in the concession contracts. The quality of mobile services has improved as well. Figure 5.14 shows the rate of unsuccessful attempts (that is, the number of attempts in making a mobile call). In particular, Bell South has improved its performance since 2000, especially in Lima, while TIM (using GSM technology) and Telefonica have not succeeded completely. Since the end of 2003, Telefonica and TIM have provided services in all the urban centers in Peru. The service coverage of Telefonica Moviles, however, remains the best for consumers outside the main urban areas. Nextel operates in areas of the country near Lima.

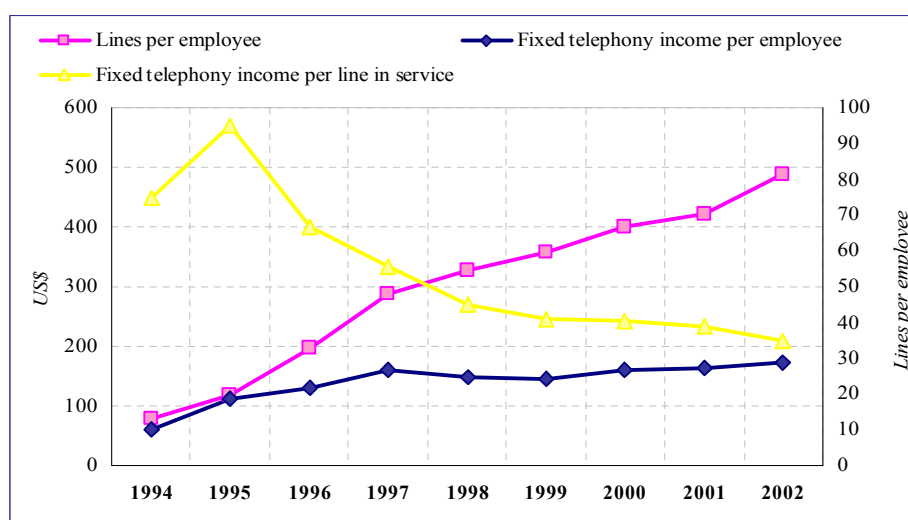
Figure 5.14 – Mobile Telephone – Indicators of Quality in Lima and Provinces – Rate of Unsuccessful Attempts



Source: OSIPTEL

Figure 5.15 shows some indicators of productivity such as fixed telephony income per employee, lines in service per employee, and fixed telephony income per LIS. The first two indicators show that the average worker productivity (measured by ratio of income/employee and LIS/employees) has grown steadily after privatization, while the third, the fixed telephony per LIS, has been decreasing steadily from 1996 onwards.

Figure 5.15 – Technical Indicators



Source: OSIPTEL

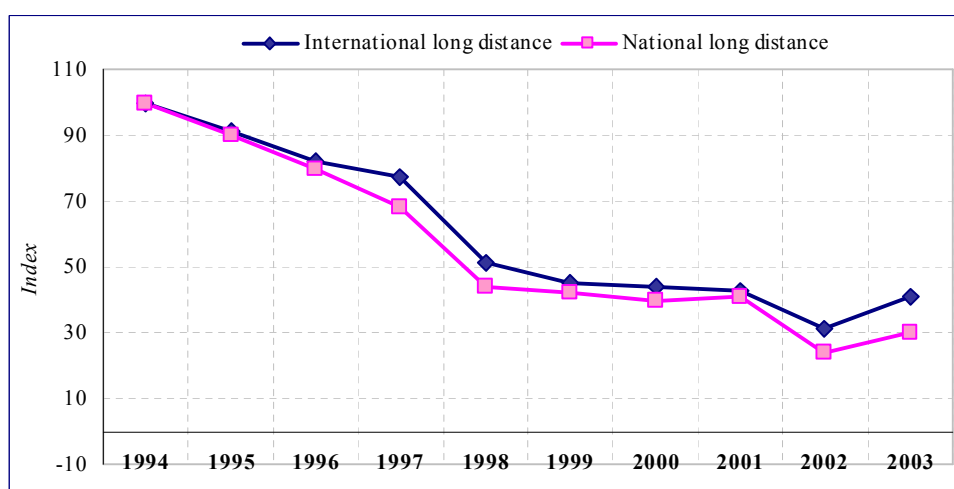
5.2.2. ECONOMIC EFFICIENCY AND PRIVATE SECTOR FINANCING

In 1998, the Peruvian government agreed with Telefonica de Peru (TP) to accelerate market competition one year before the scheduled timetable. Negotiations were based on the introduction of new services to the low-income bracket (*telefono popular*), extending local calling areas, delaying price-cap adjustments for three years and continuing with the CPI indexing rules included in contracts for local services. The X factor has been used since 2001, with a 4% level applied to regulated services. Since 2001, TP has increased the numbers of LIS due to the introduction of new consumption plans. In 2004, OSIPTEL established the second adjustment of the X factor, with a rise of 10.6% for local services and monthly fee and a rise of 7.8% for international and long-distance services. This process raised controversies and may bring about legal disputes.

However, due to the increasing competition in long-distance markets, TP's fixed-line operations are increasingly depending on monthly fees and local charges. At the same time, it is increasing its participation in broadband services through ADSL. Cable modem market and cable TV are also in the hands of TP through its subsidiary Cable Mágico, reducing the possibility of increasing the number of new players in the market. New regulatory proposals by the Ministry have been introduced in order to provide network interoperability and rules for sharing TP infrastructure. Competition has been more intense in mobile markets. In 2004, OSIPTEL decided to intervene in the mobile market as mobile companies had monopoly powers in terminating calls in their networks. OSIPTEL's diagnosis is that the Calling Party Pays (CPP) system does not provide enough competitive incentives as fixed-line customers pay high fees for making mobile calls.

Domestic and international long-distance rates show the effects of competition introduced by the new regulatory framework of the market since 1999. In fact, with multi-carrier “call-by-call” services, the rates for calls to the United States have decreased by almost 50% over the 1994-2003 period.

Figure 5.16 – Real Tariff Index for National and International Telephone Services (Index Dec-1994=100)



Source: OSIPTEL

The high tariff levels, the temporary protection from competition and a growing market allowed Telefonica to achieve good financial results as shown in Figure 5.17 below. In fact, Telefonica’s EBITDA margin is quite impressive, especially regarding 2000 and 2001 performances (around 54%). Nevertheless, regulatory decisions made by OSIPTEL, regarding the adjustment of price caps through the X factor and the opening up of competition in long-distance markets, have slowly eroded margins to 48%, which still constitutes a good performance. OSIPTEL decisions went into arbitration along with the incumbent’s complaints. The financial results have to be analyzed in relation to the high price (US\$ 7.4 according to OSIPTEL) paid for LIS, compared with transactions in the telecommunications industry taking place in other Latin American countries. Telefonica is now one of the largest companies in Peru and enjoys a favorable credit risk perception in the capital markets, allowing it to obtain domestic financing at very competitive levels.

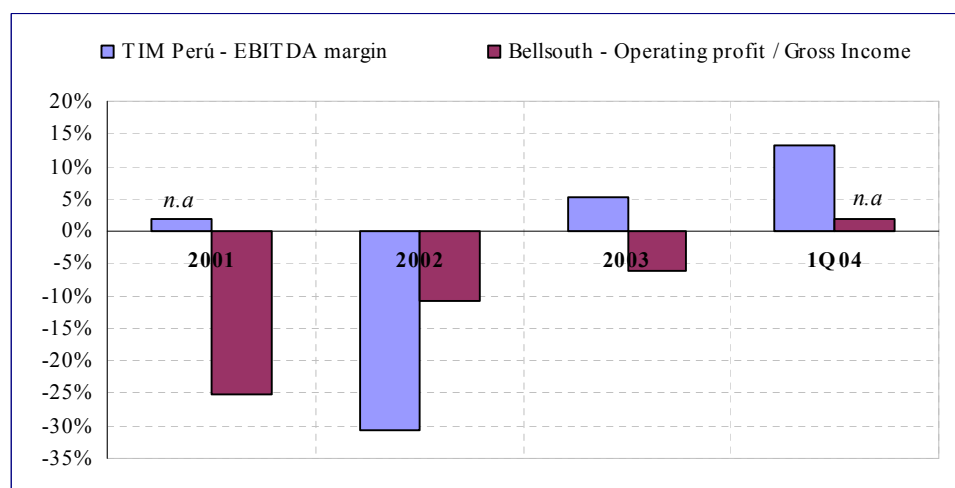
Table 5.2 – EBITDA Margin

	1998	1999	2000	2001	2002	2003
Telefonica de Perú	0.46	0.50	0.54	0.54	0.52	0.48
Telmex	n.a	n.a	n.a	n.a	0.52	0.52

Source: Credit Suisse/First Boston and Fitch Ratings

Mobile operators, other than the incumbent Telefonica Moviles, broke even in 2004. TIM received positive EBITDA by its third year of operation, while Bell South struggled in obtaining positive results after the takeover of Tele2000 company. Currently, Telefonica Moviles is completing the merger with Bell South operations, considerably increasing the degree of concentration in the market.

Figure 5.17 – Financial Indicators (TIM – EBITDA Margin - and Bellsouth – Operating Profit/ Gross Income)



Source: TIM

Peru's macroeconomic indicators show better progress than in other Latin American countries. The average growth of real GDP in the last four years was 3%, compared to 1% growth throughout Latin America. This growth facilitated an increase in demand, mainly in services such as telecommunications, energy, and water. The interest rates showed a decreasing trend, mainly due to low international levels, as well as an excess of local funds, which resulted from some restrictions on the AFP's (Pension Fund Administration) investment in foreign equities. Corporations have taken advantage of the low interest rate, increasing investments in the telecommunications sector.

Moreover, the appreciation of the domestic currency in relation to the US dollar has allowed an increase in revenues denominated in US dollars, as the majority of prices are in domestic currency.

Government participation in the sector is constrained by the financing needs of the Ministry of Transportation and Communications (MTC). Contributions for the use of frequency bands have recently been changed in order to provide additional funding. However, some of the changes are seen by the industry as a "tax", hampering service penetration and affecting the number of handsets or towers for mobile services. Taxes³¹ collected from the telecommunications sector were approximately US\$ 300 million in 2001. This amount accounted for 4.31% of the total government fiscal revenues in that year. On the other hand, telecommunications operators are obliged to pay 1% of their revenues to the *Fondo de Inversión de Telecomunicaciones* (FITEL). This fund is aimed at increasing access to telecommunications services in rural zones.

³¹ The taxes included: *Impuesto a la Renta*, *Impuesto General a las Ventas (IGV)*, *Impuesto Selectivo al Consumo (ISC)*, *aportes por regulación*, *aportes por derechos de concesión*, *Impuesto Ad Valorem* y *tributos municipales*.

5.2.3. REGULATORY FRAMEWORK AND INSTITUTIONAL DEVELOPMENT

The basic legal framework of the sector is summarized in Supreme Decree 027/2004-MTC (last version ruling Decree Law 702/1991, Law of Telecommunications, and amendments). This Decree is supplemented by the Supreme Decree 06-94-TCC (Regulation to the Law, and amendments), Law 26,285/1994 (gradual ending of monopoly in the sector), Supreme Decree 62/1994-PCM (OSIPTEL), and Law 27,332/2000 (general for all regulatory agencies).

The MTC is the main authority for the communications sector; in fact, it is responsible for promoting:

- (i) the development of communications services;
- (ii) universal access;
- (iii) technical progress in the sector.

The Secretariat of Communications (SECOM), under the MTC, is a multidisciplinary body responsible for proposing and evaluating policies aimed at achieving these objectives. Specifically, the SECOM's aim is to generate conditions for innovation and development of communications and information technologies and to promote free competition and private investment through the adoption of norms and policies. The General Division of Telecommunications Management (DTM) under SECOM is responsible for administrative procedures for granting concessions for public telecommunications services, and authorizations and permits for private telecommunications services.

OSIPTEL is a decentralized public entity responsible for regulating and supervising the development of the telecommunications market. It is responsible also for normative control, sanctioning functions, and the solution of disputes between parties. The main goals of OSIPTEL are to:

- (i) increase competition in the telecommunications market;
- (ii) promote universal access to services, assist users, and protect their rights;
- (iii) achieve efficiency and transparency in all functions and processes of institutional management.

Among its regulatory responsibilities, OSIPTEL establishes the tariff structures of public telecommunications services, creating conditions compatible with competition. Law 26,285/1994 establishes the gradual elimination of public telecommunications services in relation to fixed local telephony and long distance (national and international) services.

Telefónica de Peru (TP) was created in 1994 through the merger of the formerly state-owned companies *Compañía Peruana de Teléfonos Limitada* (CPT, serving the cities of Lima and Callao) and *Empresa Nacional de Telecomunicaciones del Peru S.A. – ENTEL* – (serving the rest of the country, and providing domestic and long-distance services to the whole country). The group *Telefónica* of Spain holds a 20-year license and it has gradually increased its ownership of TP to the current level of 97.15%. The reforms in the sector accompanied the wave of deregulation and privatization that took place in several Latin American countries (Mexico, Chile, Brazil, Argentina, etc.). Peru initiated the deregulation and liberalization of the telecommunications market in the second half of the 1990s. However, the main incumbent operator TP retained a dominant position in practically all services until 2002 (fixed local telephone service, domestic and international long-distance services, public payphones, cellular and paging services, cable TV, etc.). In 2003 and 2004, competition began in the domestic and international long-distance markets. Moreover, there has been some competition in the local telephone market, specifically in the area of Lima and Callao (with the entrance of *Telmex*,

Bellsouth and *Americatel*, representing more than 5% of fixed lines in 2004). However, the evolution of the sector may be affected by recent transactions. *Telmex* acquired AT&T Peru (the second largest competitor) and, most importantly, BellSouth was acquired by TP (especially for its market share in the mobile market). This acquisition has caused great concern in Peru; in fact, a consumer group is seeking to mitigate the effects of this acquisition by arguing that under the telecommunications law TP is not permitted to hold two licenses for the provision of mobile telephony, but the lack of a merger control system prevents OSIPTEL from directly reviewing the acquisition's impact on competition and consumers. In the mobile segment, *Telefónica Móviles* Peru (controlled by *Telefónica Móviles* of Spain) is the largest cellular operator in Peru and competed mainly with *BellSouth* Peru, until the merger between them was approved (late October 2004).

5.3. POLICY OPTIONS AND IMPLICATIONS

The telecommunications sector in Peru is dominated by Telefonica de Peru (TP), in fixed, mobile, cable TV and the data communications market. The TP market share ranges from 75% (including Bell South operations) in mobile services, up to 97% in fixed-line services.

Having considered the above data, it is necessary to increase competitive conditions in Peru, although OSIPTEL has chosen to rely more upon regulatory procedures rather than market-oriented solutions.

The promotion of new technologies and services through the allocation of broadcasting frequencies for the new wireless services (as a way to promote universal service) may also enable broader competition. The government, through ProInversión, has planned an additional bid in order to enable the entry of an additional operator into the market. The high penetration of public cabins allows VoIP services to get a foothold into the market and to provide a competitive advantage to the Peruvian market. Nevertheless, rural services should be improved; in fact, of a total of 1,706 Peruvian districts, only 406 have local telephone services.

5.4. PRIORITIES FOR FUTURE REFORMS

Recent decisions by OSIPTEL and the Ministry concerning X-factor calculations and the extension of concession contracts have not been founded on rational considerations. This issue has brought uncertainty into the industry, which could affect investment flows. To avoid a downward trend in investments, the main actions the government should take are summarized here below:

- (i) more emphasis should be paid to “number portability” in order to give more incentives for competition in mobile markets;
- (ii) policies to provide subsidy programs for rural services on competitive criteria from FITEL must be clearly specified in order to continue promoting private sector participation in rural telecom services;
- (iii) informal coordination between OSIPTEL and Indecopi has to be improved. OSIPTEL has antitrust authority in the telecom market while the competition agency (Indecopi) is responsible for all other duties. Substantial increases in the concentration of mobile services, driven by Telefonica's acquisition of Bell South operations in Peru, will require special attention by the regulator in order to maintain a competitive playing field.

(Originally, OSIPTEL did not have such strong investigation or sanctioning powers as Indecopi, but those problems have been solved);

- (iv) the independence of the regulatory body (OSIPTEL) must be carefully maintained, in spite of strong political pressure from Congress in the past years;
- (v) interconnection rates should be based on capacity rather than on minutes in order to promote competition. (Operators complain about the high level of Telefonica tariffs on leased circuits).

6. REGULATION: THE WAY FORWARD

Peru made important reforms during the 1990s to allow for private participation in the infrastructure sector; however, these reforms did not have sufficient popular support to be completed. At beginning of this decade, there was a new impetus wave to revive these reforms.

In the *road sector*, the main factors that played against the reforms were the poor coordination in developing a concession program and limited support from public authorities. After concession contracts were awarded, concessionaires were exposed to contingencies and changes in contractual rules (investment requirements, changes in tolls, taxes, etc.), which resulted in renegotiations or delayed starts. Given the revival of the promotion of private participation in road concessions, important challenges include the achievement of decentralization to local governments for the implementation of private investment programs, an attempt to coordinate and gain government support, minimization of the possibility of renegotiation arising from ex-post contingencies in previous concessions, and minimization of governmental action that may cause such renegotiations.

The concession of the *railway system* and services is relatively new. The government should follow the effects of recent reforms in the evolution of the sector. Special importance should be given to avoiding the possibility of renegotiations due to standard problems (such as optimistic demand forecasts or costs), which could lead to unnecessary renegotiations. The government should also minimize interventions that may create regulatory risk or jeopardize the efficient evolution of concessions. Supervision of commitments for reaching infrastructure, service, and safety standards is important for the adequate development of concessions.

The reform of the *port system* is under way, in accordance with the regulations under Law 27,943/2003. Learning from the positive results given by the international evidence will help to create a positive environment to induce investments in the sector. The same applies to the concession through public-private partnerships of several provincial *airports*.

In accordance with the analysis carried out in the text, in the *electricity sector*, the government should take a position as to whether or not electricity companies should be kept as public enterprises, given the lack of clarity in the past. In the case of concession of generation plants, integration with the natural gas market should be analyzed with care, due to the international evidence of the positive effects of introducing gas-fired plants in the supply of electric power. Interaction with other countries to minimize the costs of seasonal supply is also a positive step towards the improvement of performance in the electricity sector. On the other hand, some concerns arose regarding how to handle short-run excess demand leading to spikes in spot prices (which affect, for example, the operators' capacity to meet committed demand through contracts and the initiation of new contracts given the lack of long-run signals). In the coming years, assessments of the evolution of the sector should be accompanied by analysis of the treatment of short term problems, such as the mismatch between short-run and long-run prices, and of the need for reform to develop a competitive market for generation and supply as well as the expansion of capacity to meet demand.

Given the bad experience of the 1990s in the *hydrocarbon sector*, specifically in the upstream due to poor drilling results and unattractive royalty terms, the government launched a new program to increase exploration and production. The main attraction for investment is a set of measures ranging from new royalty schemes to tax incentives. The result of the recent incentives is a surge in upstream activities, with new exploration and production inland and offshore in 2003 and 2004. The benefits of such changes will be seen in the coming years, and should be assessed (and encouraged if the results prove positive) to ensure greater self supply. In the downstream, the transfer to the private sector of state-owned refineries will complement

this positive action. The **natural gas sector** will grow significantly in the future. Challenges in the normative framework lie in the regulation of the whole value chain (as is currently the case) or the creation of market rules. The review of the distorted upstream pricing policy, which currently differentiates between prices for electricity generators and final gas users, is of particular relevance. Moreover, it appears important to define clear rules for plans for gas-fired generation plants (as mentioned above). Of course, the regulatory agency will play a key role in the efficient development of the sector.

The **water and sanitation sector** faces important regulatory challenges due to the measures taken to decentralize service provision. A revision of the formal inconsistencies between the Law Governing Municipalities and the Law of Regional Governments on the one hand, and the General Law of Sanitation, on the other, enable the definition of clear rules for private investment. In addition, the government should revise the overlaps between SUNASS and the provincial and district municipalities in terms of regulatory activities. Also, a clarification of the scope of powers granted to the health authority, to refer to health aspects of sanitation activities, would be appropriate. All these steps would be helpful in fostering private participation, given the deteriorated economic situation and the lack of necessary funds for investment in infrastructure for sanitation. To face this situation, the regulation of the “Law for Fostering and Development of the Sanitation Sector” should be passed in the coming years.

The **telecommunications sector** is beginning to show the benefits of competition introduced in the mid-1990s. The interaction between the regulatory agency, regarding the supervision of the evolution of the sector, and the antitrust agency, controlling the evolution of competition, will be important in the coming years. This is especially important given the existence of a dominant operator in the market, which forces the regulatory agency OSIPTEL to closely monitor the evolution of the sector. So far, the agency has chosen to rely more on regulatory procedures rather than market-oriented solutions. A combination of both kinds of solutions (regulatory rules to control the dominant operator in fixed link and mobile sectors – in case the merger between TP and Bellsouth is fulfilled – and the development of creative instruments to develop competition, such as some forms of entry assistance) will be necessary to reap the benefits of competition in the future.

In the electricity, road, and railway sectors there have been discontent and opposition to privatization to the point of delaying or halting several concession projects. In addition, there were clear possibilities of contract renegotiations due to standard problems (such as optimistic demand forecasts or costs). These aspects should be tackled and avoided in the future.

The role of regulatory agencies deserves special emphasis. There has been concern for some time about the independence and autonomy of regulatory agencies. These agencies are exposed to interference from enterprises or public officials (e.g. OSIPTEL and OSINERG by Congressmen, or Ositrán by ENAPU).³² A proposed way of solving the problem is the amendment of the Constitution to endow agencies with the character of “autonomous constitutional entity” and regulate the procedure for selection of members and the organization of institutions. This approach should be analyzed in the future.³³

Table 6.1 summarizes the main challenges regarding regulation.

³² The recent refusal by 15 officials of Indecopi (the Antitrust Agency) of the project to amend the Organic Law of the Central Bank provide recent evidence of the same old problem.

³³ This issue had already been raised by Alcázar and Pollarolo (2000), and emerged recently.

Table 6.1 - Regulation: the Way Forward

SECTOR		THE WAY FORWARD	
<i>Sub-Sector</i>		<i>Short Term (0-2 years)</i>	<i>Medium Term (up to 5 years)</i>
TRANSPORT	<i>Roads</i>	<ul style="list-style-type: none"> * Increase government support for the development of private concession programs. * Minimize the possibility of renegotiation of contracts due to ex-post contingencies. 	<ul style="list-style-type: none"> * Decentralize the implementation of private investment programs to local governments (when applicable). * Delineate norms to achieve autonomy and independence of regulatory agencies.
	<i>Ports and Airports</i>	* Complement recent reforms by creating a positive environment to induce private investments in the search for development and competitiveness in these sectors	
	<i>Railways</i>	<ul style="list-style-type: none"> * Assess the effects of recent reforms on the evolution of the sector (especially the infrastructure, service and quality standards) * Avoid the possibility of renegotiations due to standard problems (such as optimistic demand forecasts or costs). 	* Delineate norms to achieve autonomy and independence of regulatory agencies.
ENERGY	<i>Oil</i>	<ul style="list-style-type: none"> * Complete the transfer to the private sector of state-owned refineries. * Assess the new mechanisms for inducing investments in production 	* Delineate norms to achieve autonomy and independence of regulatory agencies.
	<i>Natural Gas</i>	* Development of sector should accompany decision regarding regulation and creation of market rules.	* Delineate norms to achieve autonomy and independence of regulatory agencies.
	<i>Electricity</i>	<ul style="list-style-type: none"> * Define a position regarding the model to be followed (public or private enterprises). * Assess the suitability of integration with the natural gas market * Reinvigorate attempts to increase thermal generation capacity and reduce dependency on hydropower * Foster projects to increase capacity for meeting future demand * Assess the evolution of competition in the sector. 	<ul style="list-style-type: none"> * Assess the need for norms to face short-term problems and to develop a competitive market * Investigate further the possibility of creating a common electricity market with Ecuador and Colombia to overcome seasonal supply fluctuations. * Delineate norms to achieve autonomy and independence of regulatory agencies
WATER & SANITATION		<ul style="list-style-type: none"> * Clarify rules for private investment through revision of possible inconsistencies between different regulations (municipal, regional, law of sanitation). * Revision of possible overlaps in regulatory activities between SUNASS and provincial and district municipalities. * Clarify scope of powers given to health authority. 	* Regulation of the Law of Fostering and Development of the Sanitation Sector
TELECOMMUNICATIONS		<ul style="list-style-type: none"> * Take steps to strengthen competition (including the role of the regulatory and antitrust agencies). * Strengthen regulatory instruments to control the dominant operator. * Develop instruments to assist entry. 	* Delineate norms to achieve autonomy and independence of regulatory agencies

7. ESTIMATES OF INVESTMENT NEEDS

The aim of this section is to provide some indicative estimates of infrastructure investment needs in Peru for the time period 2003-2010. We rely on a fairly simple procedure. First, we estimate the underlying relationship between infrastructural investment and a set of socio-economic variables for a sample of 40 countries. Second, we use these estimates to assess Peru's infrastructural gap in 2002. Third, we project the country's investment needs over the full projection period, from 2003 and 2010. For this latter step, we rely also on projected values of the determinants of infrastructure over the 2003-2010 period. Finally, we convert projected physical investment needs into money terms.

We consider four different types of infrastructure: electricity-generating capacity, roads, railroads, and telephone mainlines. In Table 7.1, we list the sources of all those variables as well as those of the socio-economic variables that are assumed to determine the demand for infrastructure stock.

Table 7.1 – Description of Variables

Variable	Notation	Source
Electricity generating capacity (000s of Kw)	Energy	Calderon and Servén (2004)
Main telephone lines in operation	Tcom	Calderon and Servén (2004)
Paved Road Length (in km)	Road	Calderon and Servén (2004)
Railroad route length (in km)	Rail	Calderon and Servén (2004)
Agriculture, value added (% of the GDP)	Agr	WDI
Manufacturing, value added (% of the GDP)	Man	WDI
Population density (people/sq. Km)	PopDen	WDI
Urban Population (% total)	Urb	WDI
GDP per capita in constant 1995 US\$	GDP	WDI

The first step is the estimation of a statistical relation linking infrastructure with the explanatory variables listed in Table 7.1. Table 7.2 reports the econometric estimates. We rely throughout on the GMM-IV procedure. Our sample spans from 1960 to 2001 and covers 40 countries, including East-Asian, industrialized, and less-developed countries. The choice of the GMM estimator was dictated by the need to control for possible endogeneity problems. Dependent variables are defined as the ratio between a given considered infrastructure stock and total population, in order to avoid problems of non-stationarity in time series.

Table 7.2 - Estimated models for infrastructure predictions

Dep. Var.:	RAIL	ROAD	ENERGY	TCOM
Constant	0.000571 (12,619)***	0.018174 (16,007) ***	-0.000282 (-5,144)***	-3.038919 (-6,140) ***
Lagged dep. Var.				0,000312 (8,657) **
GDPCAP	-8.86E-09 (-3,693)***	9.38E-07 (4,035) ***	1.80E-07 (11,647)***	2.82E-05 (27,264) ***
MAN	5.70E-06 (7,177) ***	3.11E-06 (4,505) ***	1.47E-06 (0,152) ***	-0.00236 (-7,820) ***
AGR	1.00E-06 (1,357)	-8.54E-07 (-1,236)	5.16E-06 (4,569) ***	-0.000423 (-1,352)
POPDEN		2.16E-06 (9,082)***		-0.000246 (-3,163) ***
POPURB	-6.37 (-11,639) ***	2.38E-06 (3,197) ***	9.70E-06 (14,802) ***	0.001499 (4,535) ***
TIME				0.001509 (5,854) ***
R ²	0.985	0.976	0.983	0.976
N. of obs.	1037	1031	1018	1064

Notes: Estimates are obtained with GMM-IV procedure with fixed effect, for which instruments are all lagged variables.

*** significant at 99%; ** significant at 95%; * significant at 90%

To forecast infrastructural investment needs for the period 2003-2010, we must project the values of the regressors in Table 7.2. Fay and Yepes (2003) rely on UN projections for population and on the Global Economic Prospects by the World Bank for the other variables. Unfortunately, those figures are only available at regional level. We follow, therefore, Loayza *et al.* (2004) and rely on the dynamic simulation of simple stochastic processes (ARMA). Results are summarized in Table 7.3.

Table 7.3 – Projected Values

	GDP	Population Density	Man	Agr	Urb
2003	2389.64	21.26	21.06	7.15	73.70
2004	2390.86	21.62	21.07	6.97	73.97
2005	2392.08	21.99	21.09	6.80	74.22
2006	2393.29	22.35	21.10	6.63	74.47
2007	2394.50	22.72	21.11	6.47	74.71
2008	2395.71	23.09	21.12	6.31	74.94
2009	2396.91	23.46	21.13	6.16	75.16
2010	2398.12	23.83	21.14	6.01	75.38

For the percentage of agricultural value added, we simply assume a constant value over the projection period.

We can now project future investment needs in physical terms. To assess the required amount of spending, we use the following unit costs (Fay and Yepes, 2003):

- (i) \$1,900 per kilowatt of generating capacity, including associated network costs;
- (ii) \$410,000 per kilometre of paved road;
- (iii) \$900,000 per kilometre of rail; and
- (iv) \$400 per telephone mainline.

Table 7.4 – Infrastructure Investment Needs (% of GDP)

	Peru		LAC median	EAP median
	Average (2004-2010)	To fill the gap (2003)		
Energy	0.96	1.14	0.98	1.24
Rail	0.07	0.08	0.06	0.06
Road	0.98	1.14	0.89	0.50
Tcom	0.45	0.48	0.41	0.85
Total	2.46	2.84	2.42	3.33

In Table 7.4, we distinguish between the initial level of investment, needed to bring Peru’s infrastructure stock in line with what is warranted by its socio-economic characteristics, and subsequent investment spending required to keep pace with the changes in GDP and other determinants of infrastructural needs. According to our estimates, Peru should invest about 2.84% of its GDP in 2003 simply to bring the country’s infrastructural stock in line with our estimated benchmark. Alternatively, we could have assumed that the large initial investment should be spread out over the full projection period. From 2004 onward, further investment in infrastructure is mainly driven by the demand factors in regressions in Table 7.2 and is therefore designed so as to keep the supply and the demand in infrastructure in equilibrium.

Table 7.4 shows that the initial gap between Peru’s actual and required infrastructure is quite narrow compared to other Latin American countries (column 3). Most of the gap is due to the underprovision of infrastructure in the road and energy sectors.

In addition, according to data in Calderon and Servén (2004), Peru is expected to invest 0.33 percentage points of GDP more than in the period 1994-1998 (the rate was 2.13%).

8. CONCLUDING REMARKS

The aim of this country brief has been to give a snapshot of the current infrastructure outlook in Peru, focusing in particular on key challenges and on the priority for implementing future reforms in order to meet the Millennium Development Goals. In particular, the country has been analyzed by comparing it with two main benchmarks:

- (i) *the regional sample* consists of seven Latin American countries, namely Argentina, Brazil, Colombia, Costa Rica, Guatemala, Mexico and Peru; and
- (ii) *a peer group of countries* (classified by OECD's Development Assistance Committee to be Lower middle-income countries – LMIC) characterized by the same level of development – Colombia, Guatemala, Jamaica and Peru.

The following summarizes the main results of this report.

With regard to the **road sector**, its poor condition is definitely the main issue the incumbent government has to cope with. In fact, Peru has one of the lowest paved road densities in Latin America (13.36% in 2001) and the lowest in comparison with the selected benchmark countries. Given the fact that roads are by far the most important mode of transport both for passengers and for freight, this infrastructure shortage is hampering Peru's competitiveness and economic growth. The investment needs in this sector are huge (approximately US\$ 5 billion), but necessary and, of course, a spillover effect is expected in favor of the whole economy in terms of economic growth, job creation, and sustained development. Given the current fiscal budget constraints, the government should pursue the goal of improving this sector through the implementation of a combination of concessions under a PPP type of scheme.

As for the **railway system**, although the three main railroads have been privatized, Peru shows poor indicators in that sector, for instance *rail density per 100 km²* is far below that of the comparable countries and also the railway traffic density, both in terms of passengers and of freight, is lower than expected. In fact, railroad lines have been negatively affected by growing intermodal competition; in line with the other Latin American countries, the road system has crowded out the railroad system especially in relation to passenger transportation. Finally, it should be noted that, since all the major railroad lines have been awarded in concession, it is the responsibility of the private sector to improve this type of infrastructure in order to meet the quality standard of countries with the same levels of development. In this respect, the government should establish new mechanisms, or improve the existing ones, for monitoring private sector compliance with concession contracts. Moreover, it would appear very important for the competitiveness of the country to pursue greater multi-modal integration, in particular between railroads and ports.

As far as the **port sector** is concerned, the country has 14 ports; among them, the port of Callao dominates maritime traffic with a share of more than 70%, followed by the port of Matarani, which was the only one given in concession in 1999 to TISUR. Besides Matarani, all the other ports are run by ENAPU, although there are plans to award Callao in concession within the next two years. The government should push the concession process in order to cope with the low competitiveness of this sector, well represented by Peru's poor performance by Latin American standards under the indicator *tons per 1,000 people*, and above all by the high logistics costs that negatively affect the price of exported goods, hampering their price competitiveness in international trade.

Finally, looking at the **airport sector**, it is dominated by one airport, Lima International Airport (also called Aeropuerto Internacional Jorge Chavez – AIJC). It handles more than 40% of national traffic and almost 100% of international traffic. AIJC is the only airport given in

concession in 2001 to a consortium: Lima Airport Partners (LAP). Overall performance in this sector, both in terms of *passengers carried per 1,000 people* and of *ton-kilometers of freight per 1,000 people*, is much lower than the benchmarks.

Certainly, the process of liberalization will boost sector performance, especially if the envisaged concession of the other main airports such as Yquitos, Cusco, Trujillo, and Arequipa take place successfully. These concessions will relieve the Peruvian budget from financing investment requirements (US\$ 926 million) in this sector.

The **energy sector** has experienced a sharp reduction in investment (both public and private) in recent years. Nevertheless, the installed capacity and the reserve margin have risen and, owing to the privatization process, the *electrification coefficient* rose from 48% in 1992 (before the Electricity Concession Law) to 76% in 2003. In general, there are two completely different sides to Peru's energy system. On the one hand, in Lima and in the main cities, the service performances are fairly good, both in terms of access (more than 90%) and service quality (frequency of interruption very low), but the service is also expensive (end-user tariffs are the highest observed in the regional sample). On the other hand, in rural areas sector performance is very poor, in terms of access (about 30%) and quality (frequency of interruption very high), but the service at least is much cheaper. Currently, electricity production is mainly dependent on hydroelectric sources, but a natural gas development program has been undertaken by the government. The main achievement is definitely the Camisea project which, in spite of some delays, is now operational and will have a positive impact on efficiency throughout the entire power sector by increasing competition and reducing prices. From the regulatory point of view, the privatization process that started in 1992 has not yet been concluded. However, generation, transmission, and distribution activities now are carried out by different operators (while previously the state through ElectroPeru and ElectroLima had monopoly power in these sectors). The goal was to ensure a competitive generation market, leaving transmission and distribution as regulated monopolies. Ositran was created in 1996 to supervise the privatization process and the firm's compliance with legal requirements; after the merger with CTE (in 2000), it also became responsible for tariff setting. Further steps are needed to increase market competition and efficiency. In particular, the government should be committed to privatizing the remaining state-owned companies operating in the fields of generation and distribution, together with the strengthening of Ositran, to make it independent from political interferences.

The outlook in **the water and sanitation sector** is quite negative. Overall access to the water and sewerage service is in line with that shown by other comparable Latin American countries; however, there is a major discrepancy between urban and rural areas terms of service availability, in line with the income inequality that represents an important issue in Peru. One of the most critical points is represented by the fact that in rural areas more than half of the population in 2000 was still without service, according to the Pan American Health Organization data, which turns out to be the worst performance observed among the comparable countries. One should notice that these services are crucial in improving health and reducing poverty. Considering service quality, in 2000 the two indicators analyzed, namely *water supply time* (13.7) and *disinfection urban system* (80.0%), were below the level of the other countries belonging to the lower middle-income group (except for Guatemala); on the other hand, considering the *percentage of treated volume collected from sewerage systems*, Peru shows the highest value within the peer group (14% in 2000, rising to 20% in 2002). In addition, according to INEI, the quality of service has been improving remarkably in recent years, meaning that the actions taken by the government have been producing results. Moreover, the economic efficiency of the sector is affected both by tariff setting difficulties due to political interference and by widespread poverty, which prevents the setting of tariffs at a level sufficient to enable costs to be recovered.

Of course, in the light of the investment shortage experienced by the sector due to the budget financial constraints it is important to promote private participation in EPS management by

means of new concession schemes, such as public-private partnerships (PPPs), taking into consideration the lessons learned in the other Latin American countries. Tariffs will clearly need to be readjusted or subsidized.

Finally, the most important priorities for the improvement of overall performance in the sector are:

- (i) to complete of the schedule of PPPs currently under way;
- (ii) to strengthen of SUNASS and definition of its role in relation to the health authority;
- (iii) to initiate a reform process to improve “corporate governance” of EPSs. At the same time, management skills should be improved;
- (iv) to cope with the lack of:
 - definite government policy for the sector, and
 - planning and design criteria. (For instance, a national drinking water supply and sanitation plan has not yet been prepared);
- (v) to avoid political interferences by municipalities in EPS management; and
- (vi) to promote the participation of municipalities in rural services.

Peru’s **telecommunications sector** is relatively undeveloped by comparison to the other Latin American countries analyzed in the study. It suffers from the fact that the privatization and liberalization processes started later than in the other countries. In fact, a monopoly situation was in place until the enactment of the *Ley General de Telecomunicaciones* in 1991. Previously, CPT in Lima and ENTEL in the rest of the country, both state-owned companies, were the sole operators in that sector. In 1994 following the privatization process, Telefonica de Peru (TP) was created through the merger of CPT and ENTEL, with a five-year monopoly power in fixed telephony and domestic and international long distance services. In 1998, one year before it was due to expire, TP gave up its legal monopoly. However, in 2002 it still had almost a 100% share in the local fixed telephony market, a 31% share in the international long distance market, and an 86% share in the domestic long distance market. Competition within these markets has improved, but not substantially. The aim of the government was clearly to enable TP to take advantage of an economy of scale in order to expand and improve the **fixed telephony service** before the liberalization of the market. This did indeed occur (also due to the cross-subsidies from long-distance calls): in fact, *fixed lines teledensity* rose from 3% in 1994 to 6% in 1998, yet after the market liberalization the fixed lines in service lagged behind and in 2004 this indicator reached only 7%, far below the other Latin American countries, even than those in the lower middle-income bracket. Three new operators have recently entered into the mainline sector, namely Telmex, Bell South, and Americatel. In October 2004, Bell South’s Latin American operations were acquired by Telefonica leaving only three operators in the market.

With regard to the **mobile sector**, even though mobile teledensity had overtaken the mainline sector by 2001 (due to the prepaid and Calling Party System services), in 2003 it was still around 11%, far below the benchmark averages (around 20%) shown by other Latin American countries. This sector is highly concentrated: Telefonica Moviles is the dominant player. As for the **long-distance market**, both the national and the international markets experienced a boom in growth after being opened to competition in 1999. This outcome is mainly due to the reduction of tariffs. In fact, these markets took advantage of the elimination of cross-subsidies in favor of local calls and of increased competition.

By contrast with the slow penetration rates shown in the fixed and mobile market, Peru is well positioned regarding **access to Internet services**. One of the main reasons behind this good performance is the great number of public cabins available in this country; in fact, for the lower income brackets they provide the main means of access to this type of service.

Although the real tariff index of basic telephone services shows a downward trend, service affordability remains one of the main issues the government has to cope with, especially in the light of widespread poverty throughout the country. Prepaid mobile services and decreasing rates for the international calls have eased market penetration. By contrast, fixed local call tariffs have not decreased and are very expensive also when compared to the tariffs shown in other Latin American countries.

Service quality has improved; in fact, PERU shows a low incidence of faults by comparison with the other Latin American countries.

The *efficiency of the sector*, especially the fixed line market is more than adequate, well represented by the impressive EBITDA margin shown by Telefonica de Peru, while the mobile operators (in particular, TIM Peru) have just reached a positive EBITDA margin.

To conclude, performance in the telecommunications sector in the next years will be strongly affected by the macroeconomic cycle. However, there are some steps the government should take in order to make overall improvements to the sector:

- (i) to enforce competition in the sector through greater investigation and sanctioning by the regulatory body (OSIPTEL), to move toward a more effective control against the abuse of a dominant position;
- (ii) to improve the informal coordination between OSIPTEL and Indecopi; and
- (iii) to give more emphasis to “number portability” in order to provide greater incentives to competition in mobile markets.

Finally, to summarize the main conclusions reached in Chapter 7 regarding *investment needs*, as shown in Table 7.4, the estimated average for the period 2004-2010 is around 2.46% of GDP. The breakdown of this figure is as follows: road, 0.98%; rail, 0.07%; energy, 0.96%; and telecommunications, 0.45%. It is worth mentioning that on average during the period 1995-1998 the total investment in infrastructure in Peru according to Calderon and Servén (2003) was 2.28% of GDP. Furthermore, the initial investment level needed to bring Peru’s stock of infrastructure in line with what is warranted by its socio-economic characteristics accounts for 2.84% of GDP.

MAIN REFERENCES

- Armstrong, M., S. Cowan, and J. Vickers (1994), "Regulatory Reform: Economic Analysis and British Experience", The MIT Press.*
- Calderon Cesar and Luis Serven (2004), The Effects of Infrastructure Development on Growth and Income Distribution, mimeo.*
- Carneiro Echevarría, M. (2003), "Promoción de la Inversión Privada en los Puertos", Oficina de Planificación y Presupuesto, MTC.*
- CIA, "The World Factbook – Peru 2004".*
- Cohen Remy, Faini, Riccardo and Marco Percoco (2004), Public Investment, Fiscal Policy and Infrastructure Needs in Latin America, mimeographed, paper in preparation.*
- Colin Maclay and Corporación Andina de Fomento (CAF) (November 2001). "Andean Readiness for the Networked World, Introduction and Regional Overview".*
- Decree Law 17,752 (General Law of Water), Law 26,388/1994 of Sanitation, and Decree 017/2001-PCM (General Ruling for the regulatory agency of water and sanitation, SUNASS), Law 26,842/1997 (of Health).*
- Decree Law 25,844/1992 of Concessions in the Electricity Sector.*
- DNS-MVCS (Dirección Nacional de Saneamiento-Ministerio de Vivienda, Construcción y Saneamiento) e Indicadores de Gestión 1996-2002, "Plan Estratégico".*
- ECLAC, "Anuario Estadístico América Latina y el Caribe".*
- ECLAC, "Perfiles Marítimos".*
- IDB "Estrategia para el sector Transporte en Perú" 2002.*
- INEI (2003) "Base de Datos de Encuesta de hogares, empleo, demográficos y salud familiar".*
- IPE – Instituto Peruano de Economía (2003), "La Brecha en Infraestructura: Servicios Públicos, Productividad y Crecimiento en el Perú".*
- IRF, "World Road Statistics 2004".*
- ITU, "Chronological Time Series 1993-2002./México"; Yearbook of Statistics.*
- ITU, "World Telecommunication Indicators 2004".*
- Laffont, J.J. and J. Tirole (1993), "A Theory of Incentives in Procurement and Regulation, The MIT Press".*
- Law 26,221/1993 of Hydrocarbons Law, Law 27,133/1999 of Development of the Natural Gas Industry, Supreme Decree 042-99-EM of Distribution of Natural Gas by ducts.*
- Law 26,917/1998 of Supervision of Private Investment in Public Transportation Infrastructure and Promotion of Air Transportation Services.*
- Law 27,261/2000 of Civil Aviation of Peru.*
- Law 27,332/2000 (amended by 28.337/2004) of Regulatory Agencies, which nests Laws of sector Regulatory Agencies.*
- Law 27,781/1999 of Land Transportation and Transit.*
- Law 27,943/2003 of the National Port System.*

Macroconsult (1997). “Retos de la Economía política en los servicios de agua potable: El proceso de reforma de Perú”. Research Network Working Paper R-311. Inter-American Development Bank.

Macroconsult (2000). “Determinantes de los arreglos contractuales en la participación privada en infraestructura: El caso peruano”. Research Network Working Paper R-390. Inter-American Development Bank.

Macroconsult (2001). “Informe de Situación de las Tarifas Eléctricas 1993-2000”. Publicaciones Osinerg.

Ministerio de Energía y Minas. “Anuarios Estadísticos 1998-2003”.

Ministerio de Transporte y Comunicaciones, “Información estadística”.

Organismo Supervisor de la Inversión en Infraestructura de Transporte de Uso Público (OSITRAN), “Información Estadística”.

OSINERG (2003). “Determinantes de la Inversión en el Sector Eléctrico”. Oficina de Estudios Económicos. Draft Working Paper.

OSINERG (2004), “La Industria del Gas Natural en el Peru”, Oficina de Estudios Económicos, Documento de Trabajo Nro 1.

OSINERG (2004). “Problemática de la Supervisión de la Calidad del Servicio Eléctrico en el Perú”. Oficina de Estudios Económicos. Working Paper Nro 6.

OSINERG, “Anuarios Estadísticos 1994-2003”.

PHO (2001); “Disparities in Access, Use and Expenditure in Drinking Water in Latin America and Caribbean –”; Technical Report Series n° 7.

Supreme Decree 027/2004-MTC, Decree Law 702/1991 of Telecommunications, Supreme Decree 06-94-TCC (Regulation to the Law), Law 26,285/1994 of gradual ending of monopoly in the sector, and Supreme Decree 62/1994-PCM (OSIPTTEL).

Torero Máximo, Pasco-Font Alberto and Schroth Enrique, “Privatizing Telecommunication in Peru”; Economía Fall 2003, Journal of the Latin American and Caribbean Economic Association. Andrei Velasco, ed. Brooking Institution Press 2004.

WEF - World Economic Forum, “Global Competitiveness Report 2004-2005”.