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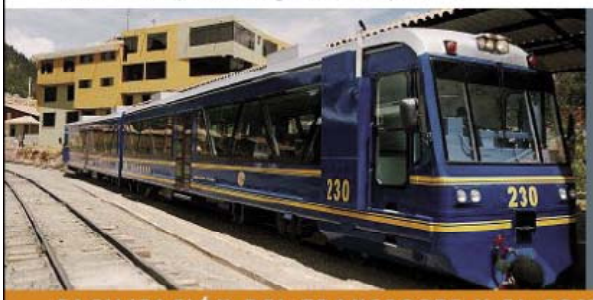

BOLETIN FAL

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FACILITACIÓN DEL TRANSPORTE Y EL COMERCIO EN AMÉRICA LATINA Y EL CARIBE

The Evolution of Modal Split for Goods Transport in South America

This FAL Bulletin analyzes data for commodities traded and transportation used between nine South American countries, during the years 2000, 2006, and 2010. The aim is to identify the current modal split in intra-regional freight transport in South America, and to ascertain the level and evolution of trade flows, imbalances and the burden of transport and insurance costs. The authors conclude with some policy recommendations.

This issue was written by Gordon Wilmsmeier and Lauren Guidry, both of the ECLAC Infrastructure Services Unit.

Antecedentes

Introduction

This Bulletin Fal describes the evolution of modal split in international transport for intra South America trade, covering Argentine, Brazil, Chile, Colombia, Ecuador, Peru, Uruguay and Venezuela for the period 2000 to 2010.

The information covered in this document includes data available from CEPALSTAT and the ECLAC International Transport Database (BTI). The BTI database was created by ECLAC's Transport Unit in 1999 and derives statistics from the Foreign Trade Data Bank for Latin America and the Caribbean (BADECEL) and has been developed for the years 2000 to 2010. Previously, ECLAC has published individual Trade and Transport Profiles for each country. These are available for the years 2000[1], 2006, and 2010. The information contained in the database covers:

- Mode of transport by which the merchandise leaves from or arrives in the country.

[1] http://www.eclac.cl/cid.asp?id=11017

- Product, classified according to a) the harmonized system, and b) the Standard International Trade Classification (SITC), Rev 3.
- Country of origin and departure (in the case of imports) and country of destination (in the case of exports).
- Volume in metric tons).
- Value of exports FOB, value of imports FOB, and value of exports CIF in US dollars.[2]
- Burden of international transport and insurance costs

This FAL compares the data for the years 2000, 2006, 2008 and 2010 including over six million observations in total. The international transport data analyzed in this FAL excludes all shipments of SITC 3 and SITC 9 commodities. These are omitted due to the reporting on these commodities being less reliable and complete than the data for other traffics and also because the energy commodities are unrelated to other trade flows (Hoffmann, Pérez and Wilmsmeier, 2002).

The publication is structured as follows. Section one gives an overview on the relevance of regional trade in comparison to overall global trade and compares the relationship between GDP and transport growth. Section two discusses the modal participation for intra South America trade for the period 2000-2010. Section three presents the regional imbalances in international transport flows. Further, section four describes the burden of transport costs in international transport and section five concludes.

I. Intraregional Transport development

As far as commodity transport is concerned, growth is due to a large extent to changes in the South American economies and their system of production. The economies in the study region have again become prime exporters of primary goods, partly driven by the high demand and commodity prices during the first decade of this millennium.

Before taking a closer look at the modal participation within the study region, the importance of intra-regional trade to the countries shall be pointed out. Intra-regional trade has always been less important in intra-south American trade than in the European Union, but since the foundation of LAIA intra-regional trade has more than doubled its shares until the year 2000. While intra-regional trade in average over all ten countries is at about 26% in 2000 (Wilmsmeier, 2002), its importance reduced to just above over 23% (2010) for further details also see PANINSAL 2013. This development that stands in contrast to that forecasted by the IADB in 2000, who expected intraregional trade to reach 35% by 2010. However, participation varies throughout the region from around 16% to over 50% for imports and exports in terms of value. Brazil, Chile, Colombia and Peru trade over 75% of their overall trade with markets outside the region in 2010. Bolivia Paraguay and Uruguay are the countries with the greatest share of intraregional share in terms of value in 2010.

[2] See http: http://www.iccwbo.org/products-and-services/trade-facilitation/incoterms-2010/ fore a description of INCOTERMS.

The total intra-regional trade[3] amounted to 85.4 billion current USD in 2010. The total value of intra-regional trade has therefore increased 2.9 times since 2000. The volume of trade (tons) in the region increased from 60 million tons in 2000, reaching a level of 64 million tons in 2010.[4]

In the year 2010 Brazil and Argentina generated 42% of all intraregional transport flows in terms of volumes and 48% in terms of value. The structure of freight movements reveals the highest concentration of trade flows is within the southern part of the South American cone.

International transport flows did not only increase, but also changed their structure. In terms of overall traded volumes mineral products were responsible for 46% of all transport flows in terms of volume in 2010. In 2000 the same rubric was responsible for 16% of all international transport flows to and from the region in terms of volume. In Intra-regional trade vegetable products is responsible for the greatest volumes transported, 41% in 2000 and 30% in 2010. The increase in volume in equivalent creates higher demand for infrastructure and this has direct repercussions on the regions transport network, especially port infrastructures, road infrastructures and as well as the related services to move these goods. Thus it is important for countries to use these indicators to make necessary adjustments to the investment in these modes in order to reduce the potential for bottlenecks in the future (compare Perrotti and Sánchez, 2011).

Thus the question emerges by which modes this trade is transported and what repercussions the development in trade has had over the last decade. Therefore it is necessary to look in detail at evolution of modal participation in the region.

Trade to GDP ratio graphs represent the total import and export value of each country compared to the country's total GDP for the year. The import to GDP ratio informs the value of goods being brought into a specific country from the other South American (SA) countries compared in the data set. This ratio reveals the percentage of value of these goods based on the overall GDP for the country. The comparison between this ratio and the export to GDP ratio reveals the effect the value of imports and the value of exports have on the overall GDP. For example, Peru has an average import to GDP ratio of 3.8% and average export to GDP of 2.5% for the four years analyzed. This reflects the value of goods being imported into the country make up a larger portion of the total GDP than the value of goods being exported. When the import value of traded goods is larger than the export value of traded goods, there is a negative trade balance or trade deficit. Having a negative trade balance reduces the GDP as the imported value is larger than the exported value, and therefore reducing the net export which is factored into total GDP. Discussion can be further made to analyze the effect the value of goods being imported or exported have on the total GDP for a country.

II. Modal Split

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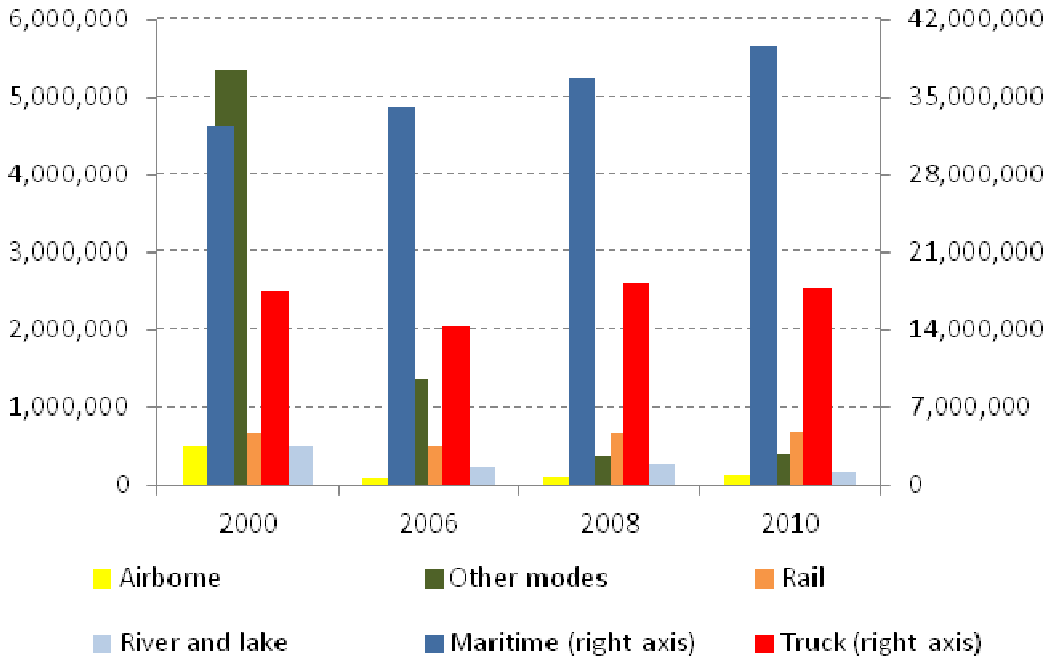
[3] Excluding SITC 3 and 9 Commodity Group Products.

[4] Personal data research based on the International Transport Database of ECLAC's Transport Unit (BTI)

The volumes in intra-regional transport increased by less than 7% between 2000 and 2010, this stands in strong contrast the countries' trade outside the region where international transport volumes increased more than 5 times during the same period. This also shows that the demand for infrastructure development is principally driven by demand for external trade out with the region.

Analyzing the development in the region, maritime transport continues to be the dominant mode, being responsible for transporting 39 million tons of cargo in 2010. It is also important to note that the actual volumes transported by airborne transport have decreased in the period under study. Road transport continues to be the second most important mode of transport in terms of volume (Figure 1).

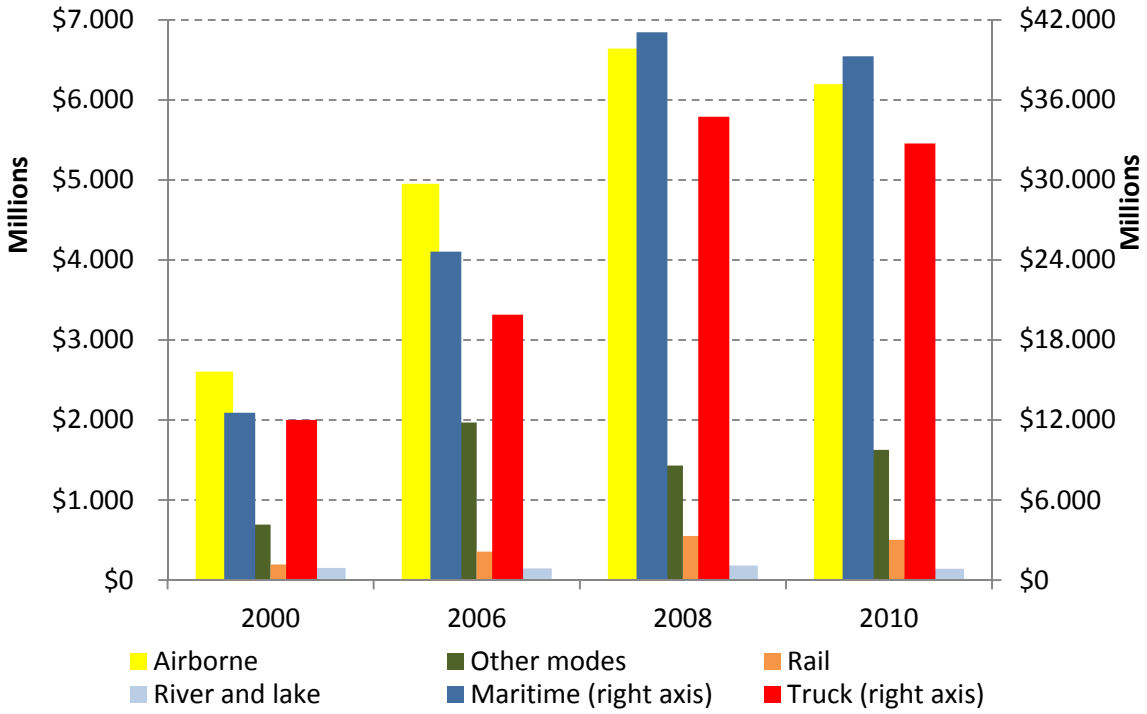
Figure 1: Total Volume of Transport within South American countries (in hundred thousand tons)



Source: BTI, various years.
Notes: Other modes include not declared, postal and pipeline.

The analysis of modal split in terms of value of transported cargoes (Figure 2) shows a different result in comparison to the volume analysis. The value of intraregional air transport flows almost doubles between 2000 and 2006 to almost 5 billion USD and augments further to 6.6 billion USD in 2008. The value of goods transport in maritime transport more than triple between 2000 and 2010 reaching 39 billion USD. Road transport flows follow a similar pattern to that of air and maritime transport, however, road transport flows in 2010 account for 37.2 billion USD. After 2008, there a decreasing trend can be observed for modes (except other and not declared) in terms of value. The value of maritime and road transport decline around 2 billion USD each between 2008 and 2010.

Figure 2: Total Value of Transport within South American countries (in millions FOB value, current USD)

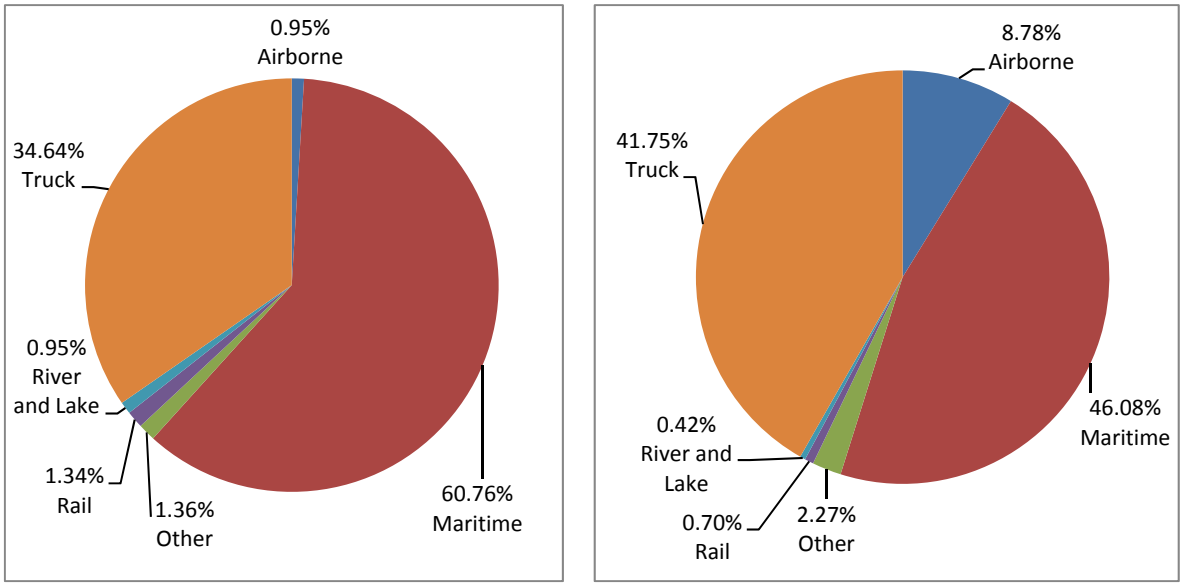


Source: BTI, various years.
Notes: Other modes include not declared, postal and pipeline.

Based on the evolution of transport flows maritime transport remains the most important mode in terms of volume and value in intraregional trade, with a shares of 60.1% (volume) and 46.1% (value) respectively, followed by road transport with 34.6% (volume) and 41.8% (value). Air transport is only of relevance in terms of value as it was responsible for 8.8% of all intraregional trade in terms of value (Figure 3).

Figure 3: Modal split in intraregional trade by volume and value, 2010

Volume (metric tons) Value (USD)



Source: BTI, various years.
Notes: Other modes include not declared, postal and pipeline.

Given the different affinities of cargoes to transport modes the average value per ton of the cargo moved by the different transport modes in intraregional trade was calculated (Table 1). As expected air transport carries the cargo with the highest average unit value. The unit value in road transport reached 1,837 USD/ton in 2010, almost double the unit value in Maritime transport. Rail and inland shipping move cargo with the lowest average unit value. These patterns are consistent between 2000 and 2010.

Table 1: Cargoes Value for South American Countries (in USD per ton)

Mode	2000	2006	2008	2010
Airborne	$18,844	$50,493	$55,869	$46,783
Maritime	$389	$722	$1,118	$992
Rail	$291	$696	$812	$737
River and lake	$296	$658	$704	$797
Truck	$686	$1,390	$1,912	$1,837

Source: BTI, various years.

The airborne transport is used for high value cargoes such as specific chemicals and allied industries, machinery and electrical products, but also fresh produce. While these commodities are of high unit value the overall volumes shipped are low.

The following two tables depict the evolution of modal split at country level for imports and export as well as by value and volume. Waterborne transport flows between 2000 and 2006 for both imports and exports remained stable for all countries with exception of Chile which experienced a

large increase of volume in imports (cereals and animal fats) and exports (mineral products including copper).

Table 2: Modal Split imports in intraregional international transport, 2000, 2006 and 2010

		share by value (USD)					share by volume				
	To	Air-borne	Water-borne	Truck	Rail	Other modes	Air-borne	Water-borne	Truck	Rail	Other modes
2000	**All**	**9.11%**	**44.74%**	**43.04%**	**0.68%**	**2.43%**	**0.84%**	**56.80%**	**32.14%**	**1.14%**	**9.07%**
	Argentina	10.17%	34.47%	53.26%	1.32%	0.78%	2.55%	64.21%	31.46%	1.76%	0.02%
	Brazil	7.16%	51.32%	40.50%	1.01%	0.01%	0.10%	71.07%	26.71%	2.12%	0.01%
	Chile	11.56%	33.52%	54.79%	0.12%	n/a	0.21%	28.42%	71.25%	0.12%	n/a
	Colombia	9.89%	56.23%	32.01%	0.01%	1.86%	0.43%	64.44%	34.74%	0.02%	0.37%
	Ecuador	12.38%	58.76%	28.84%	n/a	0.02%	0.94%	76.47%	22.59%	n/a	0.01%
	Peru	9.76%	81.76%	8.36%	0.01%	0.11%	0.22%	91.08%	8.46%	n/a	0.23%
	Uruguay	6.37%	8.83%	84.63%	0.12%	0.04%	0.19%	28.76%	69.69%	1.34%	0.01%
	Venezuela	11.13%	56.93%	31.92%	n/a	0.02%	0.56%	77.99%	21.44%	n/a	0.01%
2006	**All**	**9.43%**	**47.40%**	**38.72%**	**0.68%**	**3.77%**	**0.18%**	**65.06%**	**31.09%**	**1.02%**	**2.65%**
	Argentina	7.17%	37.90%	39.71%	1.57%	13.65%	0.07%	65.90%	23.68%	1.37%	8.98%
	Brazil	7.38%	45.99%	45.29%	1.32%	0.03%	0.11%	56.47%	40.83%	2.59%	0.01%
	Chile	7.72%	37.00%	55.07%	0.03%	0.19%	0.20%	49.17%	49.19%	0.05%	1.39%
	Colombia	12.80%	59.02%	25.72%	0.04%	2.42%	0.38%	77.44%	21.48%	0.02%	0.68%
	Ecuador	12.18%	60.40%	27.41%	n/a	0.01%	0.35%	77.42%	22.22%	n/a	0.01%
	Peru	8.70%	77.05%	14.24%	n/a	n/a	0.18%	90.76%	9.07%	n/a	n/a
	Uruguay	5.70%	14.61%	78.99%	0.06%	0.65%	0.11%	33.20%	66.06%	0.36%	0.27%
	Venezuela	16.18%	53.74%	30.08%	n/a	n/a	0.47%	72.77%	26.75%	n/a	n/a
2010	**All**	**7.63%**	**48.30%**	**41.45%**	**0.63%**	**1.99%**	**0.22%**	**64.73%**	**33.24%**	**1.17%**	**0.64%**
	Argentina	3.89%	38.86%	48.97%	0.87%	7.42%	0.10%	65.46%	31.92%	1.30%	1.22%
	Brazil	7.17%	49.23%	42.58%	0.66%	0.36%	0.20%	56.52%	41.21%	2.06%	0.01%
	Chile	7.60%	38.39%	54.01%	n/a	0.00%	0.14%	56.07%	41.20%	0.02%	2.57%
	Colombia	12.08%	73.13%	14.56%	n/a	0.23%	0.30%	87.89%	11.75%	n/a	0.06%
	Ecuador	11.49%	54.93%	33.49%	n/a	0.09%	0.36%	75.27%	24.35%	n/a	0.03%
	Peru	7.09%	77.01%	15.90%	n/a	n/a	0.24%	86.23%	13.53%	n/a	0.00%
	Uruguay	4.05%	12.47%	81.49%	0.01%	1.99%	0.13%	24.49%	75.12%	0.02%	0.24%
	Venezuela	16.39%	67.01%	16.60%	n/a	n/a	0.67%	85.45%	13.88%	n/a	n/a

Source: BTI, various years.
Notes: Other modes include not declared, postal and pipeline.

Air transport interestingly has slightly lost in value share between 2000 and 2010. Interesting is the high share of air transport in intraregional transport for Venezuela, Colombia and Ecuador.

Table 3: Modal Split exports in intraregional international transport, 2000, 2006 and 2010

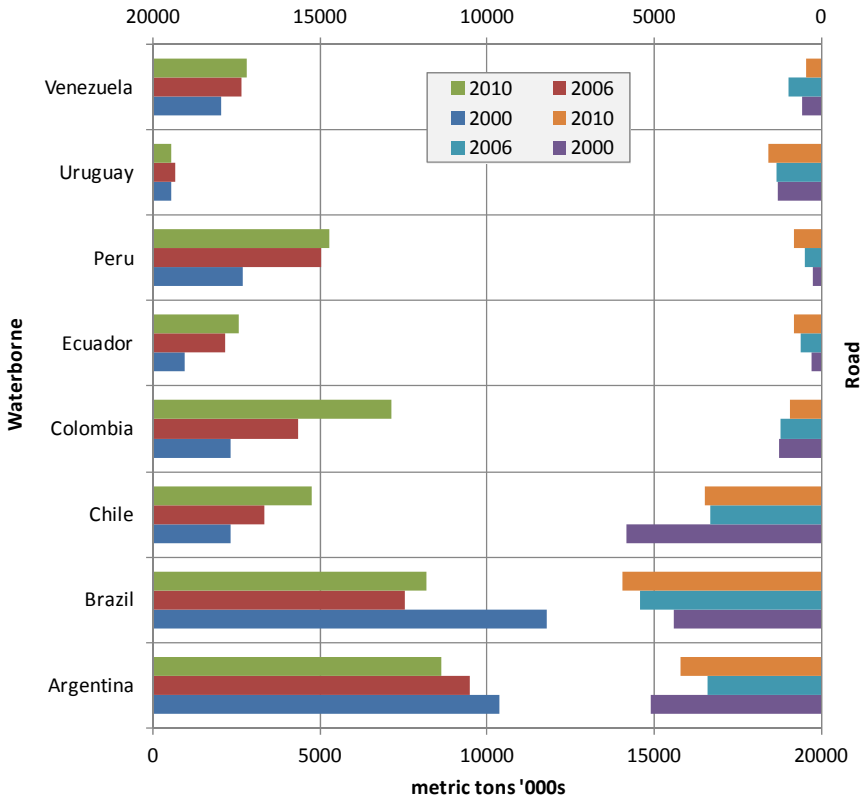
		share by value (USD)					share by volume				
	from	Air-borne	Water-borne	Truck	Rail	Other modes	Air-borne	Water-borne	Truck	Rail	Other modes
2000	**All**	**5.40%**	**42.86%**	**40.32%**	**0.31%**	**11.11%**	**0.11%**	**67.29%**	**20.99%**	**0.77%**	**10.84%**
	Argentina	5.75%	45.93%	48.22%	0.08%	0.02%	0.10%	76.46%	23.33%	0.10%	0.01%
	Peru	11.43%	73.46%	14.98%	0.00%	0.12%	0.37%	86.47%	12.86%	0.00%	0.29%
	Uruguay	6.08%	37.68%	53.56%	2.67%	0.00%	0.29%	57.86%	32.81%	9.04%	0.00%
	Venezuela	0.15%	2.65%	6.58%	0.16%	90.46%	0.01%	1.94%	9.86%	0.01%	88.17%
2006	**All**	**8.33%**	**50.41%**	**39.07%**	**0.98%**	**1.21%**	**0.19%**	**68.73%**	**28.40%**	**1.96%**	**0.72%**
	Argentina	4.23%	43.44%	50.11%	0.74%	1.47%	0.11%	67.38%	31.40%	0.97%	0.15%
	Brazil	12.32%	49.26%	35.94%	1.46%	1.02%	0.20%	72.74%	23.42%	3.17%	0.46%
	Chile	4.66%	66.63%	28.08%	0.12%	0.52%	0.15%	81.14%	18.21%	0.50%	0.00%
	Colombia	6.25%	34.97%	58.78%	0.00%	0.00%	0.65%	48.11%	51.23%	0.00%	0.00%
	Ecuador	6.64%	50.22%	43.13%	0.00%	0.01%	0.40%	52.65%	46.95%	0.00%	0.00%
	Peru	8.30%	78.52%	13.02%	0.00%	0.16%	0.45%	80.58%	18.55%	0.00%	0.42%
	Uruguay	5.43%	33.89%	54.47%	6.14%	0.07%	0.20%	31.23%	54.94%	13.62%	0.01%
	Venezuela	2.11%	63.82%	16.61%	0.00%	17.46%	0.08%	73.08%	10.52%	0.00%	16.32%
2010	**All**	**6.30%**	**49.45%**	**41.77%**	**0.69%**	**1.78%**	**0.40%**	**68.35%**	**29.62%**	**1.34%**	**0.29%**
	Argentina	3.22%	46.03%	48.94%	0.42%	1.39%	0.10%	63.29%	35.37%	1.03%	0.20%
	Brazil	8.24%	47.44%	41.34%	1.04%	1.93%	0.82%	74.49%	21.97%	2.22%	0.51%
	Chile	2.76%	63.29%	28.67%	0.23%	5.05%	0.17%	82.43%	17.25%	0.15%	0.01%
	Colombia	8.70%	47.02%	44.27%	0.00%	0.00%	0.75%	62.61%	36.64%	0.00%	0.00%
	Ecuador	13.53%	52.97%	33.45%	0.00%	0.05%	0.46%	63.12%	36.40%	0.00%	0.02%
	Peru	10.90%	72.06%	16.67%	0.00%	0.37%	0.37%	81.09%	18.02%	0.00%	0.52%

Uruguay	2.69%	38.80%	57.07%	0.83%	0.60%	0.04%	50.67%	47.64%	1.59%	0.06%
Venezuela	8.47%	42.32%	49.20%	0.00%	0.00%	0.19%	55.07%	44.74%	0.00%	0.00%

Source: BTI, various years.
Notes: Other modes include not declared, postal and pipeline.

Argentina and Brazil move the largest volumes by waterborne and road transport. It is important to note that intraregional waterborne trade volumes for Argentina and Brazil actually declined (Figure 4). This development was partly offset by increases in road transport; thus a modal shift from sea to road seems to have happened. This development is in strong contrast to the countries on the West Coast and North Coast of South America for which the volumes in intraregional transport flows grew for both modes.

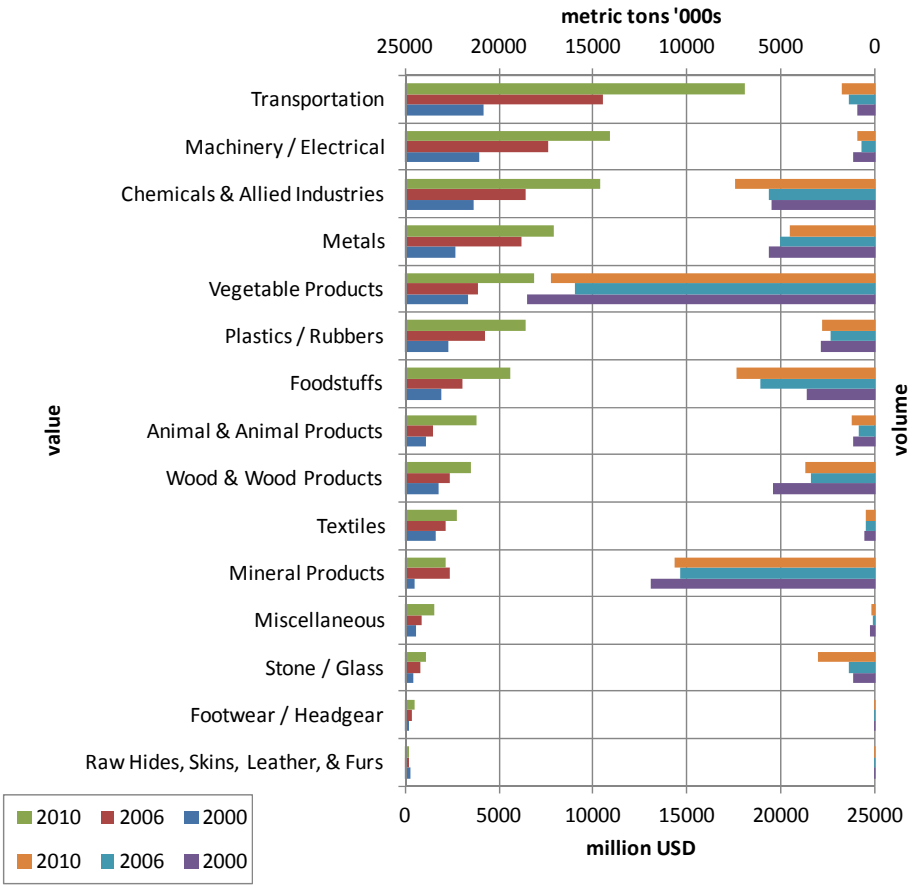
Figure 4: Evolution of waterborne and road transport volumes 2000-2010



Source: BTI, various years.
Notes: Other modes include not declared, postal and pipeline.

To better understand the structure of cargo movements, Figure 5 provides the top ten commodity groups traded between South American countries. Machinery and electrical goods, transportation goods and textiles make up the marjority of the commodities traded within this region over the decade of 2000 to 2010. Considering the volume in tons for these cargoes transported, the high dependence for mostly truck and maritime transport modes used require heavy strains on these individual modes.

Figure 5: Major Commodities Traded: within South American Countries



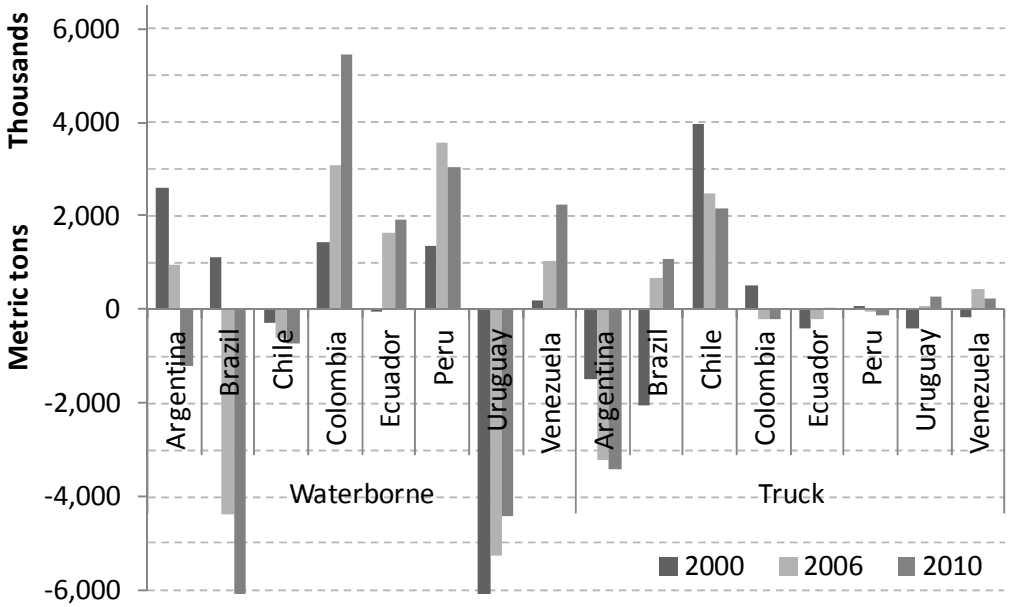
Source: BTI, various years.

Given the significant increases in waterborne and road transport within the region, the development of adequate port facilities and road infrastructure should be of high priority to the countries (Wilmsmeier and Sanchez, 2009; Perrotti and Sánchez, 2011; Sánchez and Wilmsmeier, 2005). The gap in infrastructure poses strong challenges in this regard as the infrastructure in its current state only barely supports the changes in mobility and growth of the region's economies. Perrotti and Sanchez note that investment in infrastructure for period of 1995-2008 was at 1.6% of GDP when demand was much higher at 6.5% of GDP (Perrotti and Sanchez, 2011). Beyond a signficant share of GDP to be invested invested into a country's infrastructure the destination of these investments is important. Given the structure of trade flows investments in rail and inland shipping appear to present soultions to respond to demand for infrastructure in certain corridors. Further, the actual shift from sea to road as occuring in the intraregional trade of Brazil and Argentina should be mitigated (see also Brooks, Wilmsmeier and Sánchez, 2013).

III. Trade Imbalances

Trade imbalances analyzed for the nine South American countries determine the trade surplus or deficit for each country in the period 2000 to 2010. Negative imbalances represent higher exports than imports, thus resulting for example with trucks or ships leaving full of cargo and returning empty. The results for each country reveal potential challenges for repositioning of empty equipment, which can be trucks, rail waggons or containers depending on the mode of transport.

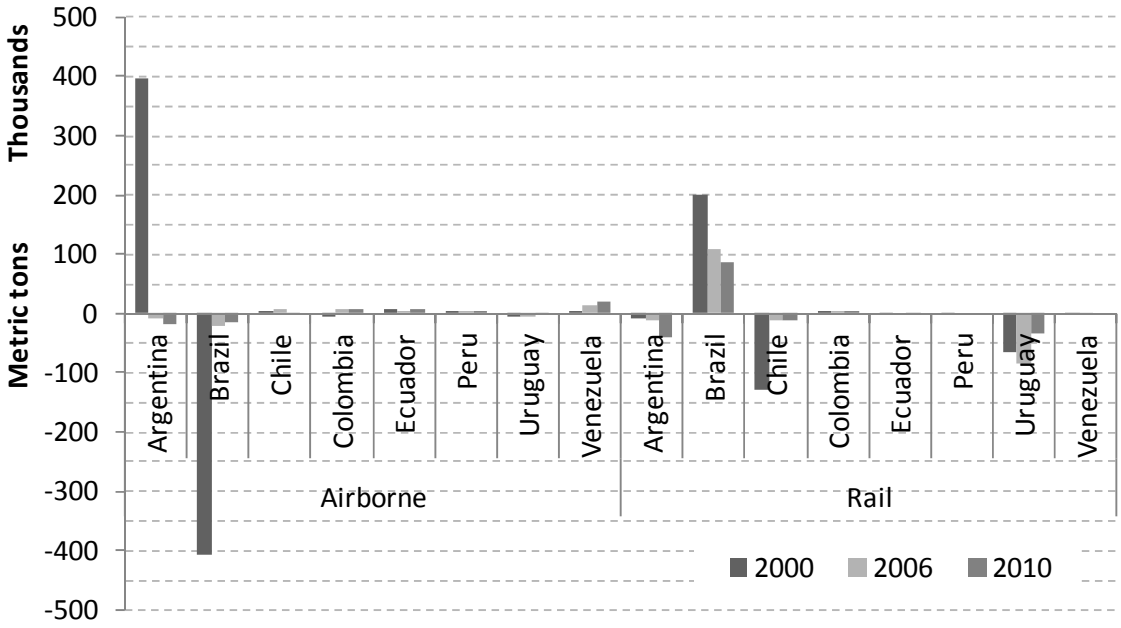
Figure 6: Trade imbalances in volume road and waterborne transport, 2000, 2006 and 2010



Source: BTI, various years.

Regarding trade imbalances by volume and value. By way of example Argentina, Colombia and Chile have large trade imbalances. In 2010 Argentina exported 604,398 tons of freight to Bolivia via truck and 25,637 by rail. In return, Bolivia exported 263,807 tons to Argentina via truck and 6,938 via rail. Considering another trading partner of Argentina, Venezuela imports the majority of cargo from Argentina by maritime transport: 785,945 tons of food and vegetable products; on the return leg, the ships are loaded with only 7,318 tons of chemicals and metals in 2010. Not only are do differences exist in the flows, but also in the structure of the cargo moved. As increasing volumes continue to use maritime sector to capitalize on the economies of scale, infrastructure investments will be required in order to service this volume at the lower cost. Variables as previously mentioned should be considered for these investment needs.

Figure 7: Trade imbalances in volume air and rail transport, 2000, 2006 and 2010



Source: BTI, various years.

To provide a breakdown for the modes of transport, maritime and truck (Figure 6), as well as air and rail (Figure 7), imbalances in volume are depicted. The closer the imbalance is to zero, the less empty movements of empty containers and/or ship capacity is needed to make up for the difference. For example, a ship enters the country's port with 2,000 containers full of cargo and leaves the port with 2,000 containers full of goods from the same country being exported. With this circumstance, the trade balance is zero and there is neither a surplus of containers stacked empty at the port (exists when imports are higher than exports) nor a demand for containers due to higher amount of cargo to export (exists when exports are higher than imports). However, in the case of Brazil and Uruguay, there is a large difference between the amounts of goods being exported than being imported with maritime transport. These countries are experiencing empty repositioning in which container volumes leave the ports full and return empty. This results in a higher demand for trucks and containers to be available at the ports, therefore increasing the price of the containers and drivers to return to Brazil. Freight brokers might arrange for a full truck load (FTL) to leave Brazil with goods for $8,500/FTL and return for only $6,000/FTL as the demand is much lower for goods coming back into the country (prices are for example and do not include fuel and security charges).

The opposite exists for Colombia, Ecuador, Peru and Venezuela; more goods are imported with maritime than exported. This results with ships entering the ports with full containers which are moved within the countries to final destination. Then, the containers arrive back to the ports empty and either remain stacked in the ports (allocating space and causing bottlenecks for the flow of trucks and incoming containers moved throughout the terminals) or loaded empty on the ships (not capitalizing on potential gains in freight costs). For the countries where the occurrence of higher imports than exports takes place, it is necessary to identify the modes chosen for export and consider shifting exports using maritime transport in order to balance the export to import

ratio and avoid the fore mentioned effects of the current situation. It should be noted that this shift towards using more maritime freight will increase the use of ports, terminals, port equipment and resources which require maintenance and investment in order to continue operating in most efficient manner.

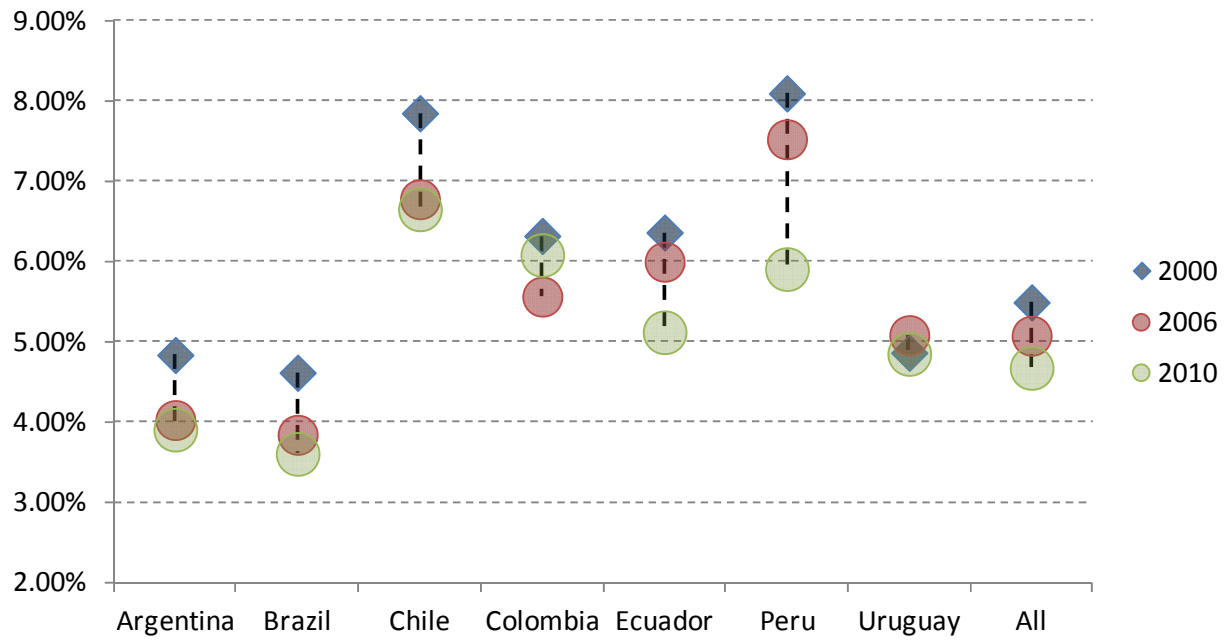
IV. International transport costs

International freight has an impact on trade equivalent to customs tariffs or the exchange rate: a reduction in the cost of transport directly stimulates exports and imports, just as an increase in the exchange rate (the rate at which the national currency may be exchanged against another) makes exports more competitive, and a reduction in national customs tariffs lowers the cost of imports. The burden of international transport costs and its influence on the competitiveness of a country have received a lot of attention over the last decade. Particularly, the study on the determinants influencing international maritime transport has drawn significant attention. These works focus on various issues such as the lack of lack of infrastructure development and performance of infrastructure services (e.g. Micco and Perez, 2001; Limão and Venables, 2001; Martínez-Zarzoso and Wilmsmeier, 2010; Wilmsmeier and Martínez-Zarzoso, 2010; Márquez Ramos, Martínez-Zarzoso, Pérez and Wilmsmeier, 2011), and also on market structures and connectivity (Martínez-Zarzoso, Pérez and Wilmsmeier, 2011; Wilmsmeier and Sánchez, 2009; Wilmsmeier and Hoffmann, 2008).

The impact on trade: the price of the vast majority of traded goods is exogenous for developing countries. If the shipping of imports becomes more expensive, higher inflation ensues as a result of the increased cost of imported goods; in the case of intermediate and capital goods, this also increases the costs of local production. If exports become dearer to ship, the result is a drop in earnings for the exporting country or simply the loss of a market, depending on the elasticity of demand and the availability of substitutes.

The burden of international transport and insurance can be estimated by comparing CIF and FOB values of one product or product group, thus the burden describes the amount paid for transport and insurance in relation to the value of a product or product group. In the period under study the burden of transport and insurance costs in average has reduced to below 5% considering all transport modes and products in intraregional trade. Nevertheless, important differences exist between the countries of the region. By way of example Chile still faces the highest burden of transport and insurance in intraregional trade, after Bolivia. The reason for this can be manifold and are not analyzed in detail in this work. Potential influences reach from the structure and unit value of the cargo trade in the region, specific geographic conditions (e.g. Andean crossing in truck transport), the market structure, imbalance of trade flows etc. Brazilian imports from the region carry the lowest burden of transport and insurance costs in relation to the average product value (Figure 8).

Figure 8: Burden of Transport and insurance for intraregional imports, 2000, 2006 and 2010

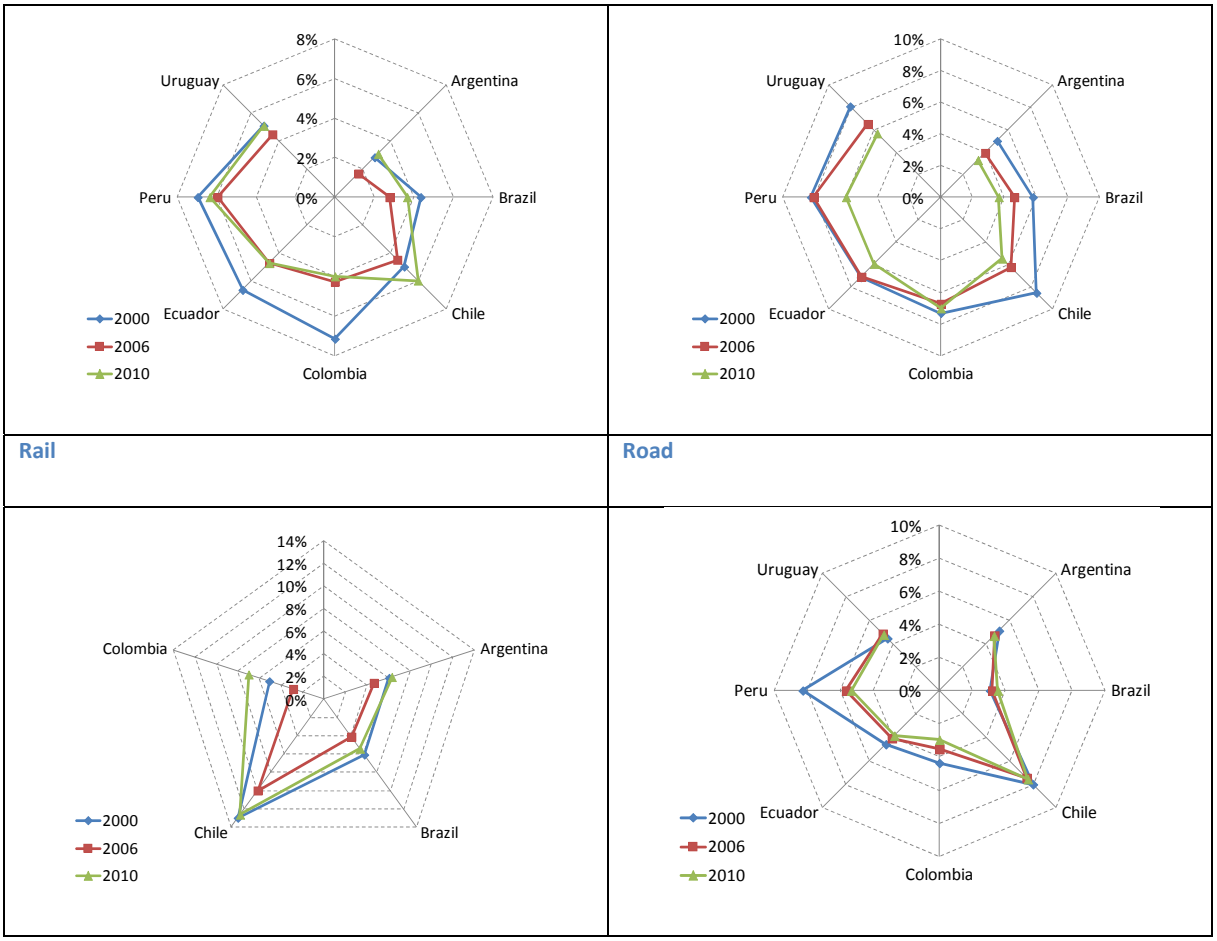


Source: Authors based on BTI, various years.
Notes: No data available for Venezuela.

Significant differences in terms of the burden of transport and insurance can be found when comparing different modes of transport (Figure 9). As a general tendency international transport and insurance burden have reduced for all modes, despite some exceptions: by way of example the burden of transport and insurance for imports from the region by air to Chile has increased in 2010 in comparison to 2000 and 2006 and similar observations can be made for imports by rail to Chile and Colombia. On the contrary the burden in maritime transport has reduced for imports to all countries when comparing 2000 and 2010. Another interesting example is the reduction of the burden of transport and insurance costs for imports by truck to Peru.

Figure 9: Burden of Transport and insurance for intraregional import by mode of transport, 2000, 2006 and 2010

Airborne	Waterborne



Source: BTI, various years.
Notes: No Notes: No data available for Venezuela.

The impact on economic growth: empirical studies have concluded that greater transport costs lead to lower levels of foreign investment, a lower savings ratio, reduced exports of services, and reduced access to technology and knowledge, and a decline in employment. It is estimated that a doubling of transport costs leads to a drop in the rate of economic growth of more than half a percentage point (Radelet and Sachs, 1998). This impact may appear low, but it should be noted that lower growth over the long term results in sizeable variation in per capita income.

V. Conclusions

This FAL Bulletin analyzes data for commodities traded and transportation used between nine South American countries. The aim was to identify the current modal split in intra-regional freight transport in South America, and to ascertain the level and evolution of trade flows, imbalances and the burden of transport and insurance costs.

During the years 2000, 2006, and 2010 data collected reveals the trade imbalances among these countries. With countries such as Argentina, Chile and Colombia, it is clear to see the value and

volume imbalances which exist. The trade within each country compared to the total GDP in value is examined in the trade to GDP ratios per country. This allows a better understanding for the amount of import and export percentage of total GDP within each country. From this information, correlations can be made between the effect trade has on the GDP for the country.

The different modes of transportation are analyzed in order to determine which countries are using the different modes for imports and exports. Waterborne and land/other have a much larger share of total volume transported than air. However, the air shipments used have a greater cargo value per ton. The information gathered within the modal split reveals the maritime and truck modes as the two most frequently used modes for the overall transport by volume (in tons) and by value (in FOB sum of USD). The imbalance between these two modes for each country expose the maritime sector exporting on average higher amount of goods, whereas the trucking sector is used more for imports across all countries in this data set. The evolution of trade between the years 2000 to 2010 for these countries maintained a stable share among the modes. Commodities transported included the highest percentage for machinery and electrical goods, transportation goods and textiles.

All countries of South America are in the need for competitive efficiency, geographical accessibility and environmentally sustained development. Important success factors for the competitive edge of South America are efficiently operating networks in the segmented South American space economy. This goes along with a major concern on geographical accessibility of less central regions in the continent.

Further, transport modes should not be seen as individual transport modes, but should be analysed jointly and in a comparing and integrating manner. National transport policies are one of the examples of fragmented analysis of transport systems. Structured development concepts considering all transport modes have to be developed. The concepts shall consider legal, organizational, information systems, regulatory, and infrastructure developing measures. The transport system in the region underlies the growing burden of lack of financial resources for construction and operation of transport infrastructure. Besides that pressure for sustainable usage of resources and feasibility of projects is an important issue. Not only should the expansion of service offerings be a goal, but also the efficient usage of existing capacity reserves. In this context a more efficient and possibly more sustainable and ecologically wise utilization can have spatial, time relevant and modal aspects for choice of modes or combination of individual transport legs in freight transport.

The interconnection between the conventional transport modes: roads, railways, air, waterborne, pipelines, should be developed in such a manner that the relative significance of the different transport modes is strengthened in their captive markets. A modern transport system in the region should be built on the concept of intermodalism with a high degree of inter-modal choice. The modes have to form counterweights to each other and work in a rather complementary manner. In this way capacity/investment in road construction could be transferred to routes and connections where accessibility and capacity is low and then access to maritime transport is available. In the future inter-modal connections and the reliability of the transportation network and infrastructure can have a profound effect on the region's economy. Containerisation of

transport nourishes this concept, bridging the gap between modes in freight transport, making transport modes complementary and not competitive, facilitating modal change and reducing transfer costs. As intermodal transport gains importance the transport systems shall be developed correspondent to technological capability and economic resources.

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