THE BRAZILIAN RAILWAY MARKET

Facts, Figures, Players and Trends
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With the Multi Client Study “the Brazilian Railway Market”, SCI Verkehr GmbH is responding to the high demand for information on the present and future situation in the Brazilian freight and passenger transport market.

ABSTRACT

Brazil as one of the BRIC states is among the most dynamic rail markets in the world, also driven by the upcoming 2014 FIFA World games and 2016 Summer Olympics. SCI Verkehr paid a close look to those new rail developments and major upgrades, compared to the socio-economic background, political settings, financial possibilities and funding schemes. Against this background, the major market segments and drivers have been analyzed and forecasted for the 2011-2016 period.

In concrete terms, this MC Study „The Brazilian Railway Market“ includes:

• Structure of the Brazilian railway market and its major drivers
• Description of major developments and projects until 2016
• Analyses and forecast of the rail freight and passenger transport market
• Description and evaluation of demand for rolling stock and infrastructure services
• Overview of major players in the Brazilian railway market including detailed profiles of TOP-operators and manufacturers

The study will be available in English from June 2011 at the price of EUR 2,800 plus VAT and postage.

SCI Verkehr is an independent consultancy company for the transportation sector with activities around the world. We specialise in strategic advice to the railway and logistics industry. We have close connections to the rail and logistics industry, with consultants in a wide range of specialist fields. We have an extensive network of experts in Germany and abroad, and we specialise in market and strategy aspects for the mobility sector. Our activities focus on companies in the transport and rail industry, logistics, public and private transport companies and transport and economics departments in public administration at federal, regional and community level.

Your contact
Katja Wittke
Tel. +49-221-93178-25
Fax +49-221-93178-78
E-mail: k.wittke@sci.de
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1 Executive Summary: The Brazilian Railway Market

The Brazilian railway technology market is developing very dynamically in the next five years due to two major drivers. First, increasing volumes of raw material transports influence investments in freight railway lines. These investments are industry-driven, mainly by major mining companies. Second, the preparations for the football World Cup 2014 and the Olympic Games 2016 are influencing the upgrade of suburban and urban transport systems.

The annual market volume for all products and services in the field of railway technology in Brazil currently stands at EUR 2 310 million. This amounts to 70% of the 2010 South American market volume. Main drivers for the dynamic development are the large number of infrastructure projects that are currently implemented by the Brazilian government, the federal states and cities. The national growth programmes PAC, a positive economic development of Brazil and the world-class sports events in 2014 and 2016 drive rail infrastructure expansion.

The market for new products (rolling stock, development and upgrade of infrastructure and systems technology) is worth approx. EUR 1 540 million. The installation of track systems and procurements of new freight wagons have the largest proportion of the market volume. The market for new products will grow at an annual rate of 15.7%, the most dynamically growing markets in the next five years for new products can be found for track systems and passenger rail vehicles.

The after-sales market (refurbishment, maintenance and repair of rolling stock, renewal and maintenance of infrastructure) is worth approximately EUR 770 million. The largest amount for maintenance and renewal will be spent for track systems and mainline vehicles (EMUs and diesel locomotives). This market will grow at an annual rate of 4.5%. The most dynamic after-sales markets are also those for track systems and metro vehicles.

Global leaders in railway passenger transport are currently expanding their business in Brazil. In addition to national manufacturers such as Amsted-Maxion, several notable foreign players in the railway technology market (e.g. Alstom, Bombardier, Knorr-Bremse, GE, CAF) have established production sites in Brazil due to relatively low labour costs combined with a high educational level and a generally good investment climate. Most market players picture a rather optimistic future that the positive market development will sustain in the long term. Market entry opportunities exist for new overseas players through involvement in large consortiums or via own local companies because governmental contracts are generally awarded with major national involvement.
1.1.1. Railway Passenger Transport Market

SCI Verkehr expects that the transport performance in passenger rail services will increase at annual growth rates of 9% to 12% between 2011 and 2016 due to the anticipated introduction of the high-speed line and several metro, light rail and commuter rail projects. After that, the increase of transport performance will slightly reduce to annual growth rates of about 7% to 8% until 2020.

The world class sports events that will take place in Brazil in 2014 (FIFA World Cup in twelve Brazilian cities) and 2016 (Summer Olympic Games in Rio de Janeiro) drive the need to expand mass transit capacity and enable infrastructure investments. Apart from the mid-term increase in transport performance due to these sports events, a sustainable long-term growth is expected that is driven by urbanisation and population growth. Brazil therefore has increasing numbers of new projects in urban mobility under development. There are also contracts in the signalling areas and for providing maintenance services. In the large cities of Brazil, suburban transport plays an important role. Here is also where the highest growth rates are expected for the coming years. In rural areas, the transport volume is very low.

Mainline Long-distance and Suburban Transport

Mainline long-distance rail passenger transport in Brazil is practically non-existent. One reason for this is the dominance of air transport for longer distances with a corresponding well-developed infrastructure and low-fare air connections inland. Nevertheless, in early 2009, Brazil confirmed that it was going to follow through with its plans to construct the high-speed line Rio de Janeiro–São Paulo–Campinas in order to provide an alternative to air transportation. Brazil can be considered the most interesting market for high-speed rail services in South America because of its large population, the well developing economic parameters and the high degree of urbanisation. The country has an extensive manufacturer and operator landscape, and metro services in the cities are being upgraded. These will also have a positive effect on the public and private readiness to implement a high-speed rail service. In the large metropolitan areas of Brazil, suburban transport plays an important role. Here is also where the highest growth rates are expected for the coming years, especially in São Paulo and Rio de Janeiro.

Metro Transport

Brazil has the highest number of metro systems in South and Central America. Nevertheless, it is planning investments in urban rail transport that will lead to a sustainable growth in transport performance. Massive traffic problems in the metropolises are forcing the development of high-performance public transport systems, meaning that metro systems are preferred against light-rail systems. Many cities have published plans to develop or upgrade metro systems.

Light-rail Transit

The LRT market in Brazil is very small at present. Similar to other South American countries and Asia, metro systems are preferred. However, in the wake of the upcoming sports events, several cities are now planning or implementing LRT systems as an alternative to their well-developed bus systems which are reaching their capacity limits, too.
4.4. Rail Freight Transport

Drivers of rail freight transport performance

<table>
<thead>
<tr>
<th>Drivers of rail freight transport performance</th>
<th>Importance</th>
<th>5-year Trend</th>
</tr>
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<tbody>
<tr>
<td>Demographic structure and development</td>
<td></td>
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<tr>
<td>Urbanisation and settlement structure</td>
<td></td>
<td></td>
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<tr>
<td>Scope and quality of rail infrastructure</td>
<td></td>
<td>➔</td>
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<tr>
<td>Intramodal competition</td>
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<tr>
<td>Intermodal competitive position</td>
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</tbody>
</table>

Brazil is dominating rail freight transport in South America and accounts for around 85% of the transport performance in South America. Together with Argentina, the country covers around 90% of transport performance in the region.

The railway is indispensable for the high-volume transport of raw material in Brazil. Around one quarter of all freight is transported by rail. The transport distances from the inland to the coast are long and the proportion of bulk goods very high. A further upgrade of the infrastructure is indispensable for a positive change of the Brazilian transport matrix in favour of rail freight transport. The freight rail network structure currently focuses on connections along the coast. The most important type of freight transported is coal. However, extensions inland are going to be pursued because of the growth of the Brazilian economy in the agricultural sector.

The variety of track gauges in Brazil makes it currently difficult to operate freight traffic across different regions. The majority of routes are narrow-gauge (1 000 mm), the broad-gauge (1 676 mm) and standard-gauge (1 435 mm) networks are much smaller. Most of the routes are single-track lines for raw material transportation. When these lines hit their capacity limits, quick transport expansions are rarely possible.

Due to the PAC programs, the Brazilian freight railways are going through a period of revitalization. Since the beginning of the concession period for private companies in 1997 the sector’s production almost doubled. With this result, the share of railways in the modal split went from 19% to 26% within the last 12 years.

1.1.1 Market Volume

From 2000 to 2008, rail freight transport increased by almost three quarters. In 2008, transport performance was more than 82% above the 2000 level. China has become an important customer. As China has developed very positively during the financial and economic crisis compared to other countries, the Brazilian rail freight transport performance only slumped by 9% in 2009. The transport volumes for 2010 indicated a swift recovery.

The recent substantial growth in freight transport was predominantly due to the rising demand for raw materials and container transport. Throughout the recession in 2009, private companies continued their investments, yet, on a moderate level and with financial support.

SCI Verkehr estimates a continuous annual growth of freight transport performance of about 4% for the next five years.
Development of the performance in rail freight transport in Brazil 2000-2020

Transport performance (in billion tkm)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>146.0</td>
<td>221.6</td>
<td>245.3</td>
<td>271.2</td>
<td>329.8</td>
<td>381.5</td>
<td>6.4%</td>
<td>4%</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

4.4.2. Operators

When the railway sector was privatized in the late 1990s, 12 railway freight concessions were installed, operated by then five private groups and two state-owned companies. Together, the concessionaires operate railways of 28,476 km, along which millions of tonnes circulate every year.

Alongside the (in some cases former) state railways, a number of private freight transport operators have established themselves in the market. In 2009, the three largest Brazilian operators generated around 75% of rail freight transport performance in South America.

The key protagonists include Estrada de Ferro Vitória a Minas (EFVM), Estrada de Ferro Carajás S. A. (EFC), MRS Logística SA, América Latina Logística SA Brazil (ALL Brazil) and Ferrovia Centro-Atlântica SA (FCA).

Operators specialise in raw material transport, mainly iron ore. The owner structures vary significantly. Estrada de Ferro Carajás (EFC), Estrada de Ferro Vitória a Minas (EFVM) and Ferrovia Centro-Atlântica SA (FCA) belong to the mining group Vale. Majority owner of MRS Logística S.A. (MRS) is steel producer CSN Comp. América Latina Logística (ALL) is listed on the stock exchange as the holding company of its subsidiaries ALLMS and ALLMN. Many small operators are also state-owned.

[…]

Last value reported for 2009.
7.5. Electric Multiple Units

7.5.3. Suppliers

The market is open for foreign manufacturers. Western European manufacturers such as CAF and Japanese and Chinese manufacturers have won contracts in the last few years. However, the volume of vehicles delivered is low at around 65 units. Individual contracts won have therefore great impact on market shares.

![Market shares manufacturers 2006-2010 (units)](image)

The following manufacturers have recently been awarded contracts in Brazil:

- CAF has secured a large market share and is current market leader through an order of 40 EMUs by the metro company in São Paulo, CPTM. The vehicles are to be delivered between 2010 and 2012,

- Alstom has been market leader between 2006 and 2010 due to the delivery of 12 Metropolis trains between 2006 and 2010,

- Hyundai Rotem is present in the Brazilian market thanks to the delivery of 13 four-part multiple units to SuperVia.

- Alstom has been having a competitive advantage for years through its production site for multiple units in Lapa. However, CAF has been investing, too, and, in 2010, opened a plant in Hortolandia.

As is already the case with locomotives, passenger coaches and DMUs, Chinese manufacturers have entered the Brazilian market for EMUs. CNR Changchun has secured a first large contract with SuperVia, the commuter rail operator of the city of Rio de Janeiro for delivery starting 2011.

[...]
### 7.10. Metro Vehicles

#### Important current and planned procurement projects of metro vehicles

<table>
<thead>
<tr>
<th>City</th>
<th>Units</th>
<th>Delivery</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belo Horizonte</td>
<td>60</td>
<td>2012–2014</td>
<td>Companhia Brasileira de Trens Urbanos (CBTU) tendered 15 EMUs (Electrical Multiple Units) with four cars.</td>
</tr>
<tr>
<td>Curitiba</td>
<td>60</td>
<td>2015–2017</td>
<td>Expected procurements for the new metro system.</td>
</tr>
<tr>
<td>Fortaleza</td>
<td>80</td>
<td>2010</td>
<td>AnsaldoBreda was awarded a EUR 86 contract for supplying 20 four-car trains.</td>
</tr>
<tr>
<td>Recife</td>
<td>60</td>
<td>2012–2014</td>
<td>In Dezember 2010, Consortium Guararapes has received a EUR 95.7 million order to supply electric trains for Recife’s metro. CAF will provide 15 electric-driven which will be made up of four cars running on the 3 000V DC system with a 1 600mm gauge.</td>
</tr>
<tr>
<td>Rio de Janeiro</td>
<td>300</td>
<td>2016–2020</td>
<td>Procurements expected due to infrastructure expansions and replacement procurements.</td>
</tr>
<tr>
<td>Rio de Janeiro</td>
<td>120</td>
<td>2011–2012</td>
<td>CNR Changchun was awarded the contract by Metro Rio to supply 120 metro cars. The contract amounts to around EUR 110 million. This concerns six-car metro vehicles with four powered and two unpowered coaches, which can be operated at speeds of up to 100 km/h.</td>
</tr>
<tr>
<td>São Paulo</td>
<td>840</td>
<td>2016–2020</td>
<td>Procurements expected because of infrastructure expansions and replacement procurements.</td>
</tr>
<tr>
<td>São Paulo</td>
<td>156</td>
<td>2013–2014</td>
<td>In August 2010, São Paulo Metro has opened the international bid for the acquisition of 26 trains, with six coaches each, and signalling for line 5. For the project funding the São Paulo State Government, through the Metropolitan Transportation Secretariat (Secretaria dos Transportes Metropolitanos) and Metro is getting a loan from the International Bank for Reconstruction and Development (IBRD) and the Japan Bank for International Cooperation (JBIC).</td>
</tr>
<tr>
<td>São Paulo</td>
<td>54</td>
<td>2012</td>
<td>In October 2010, CPTM has placed an order with Alstom Transport for 9 Metropolis trainsets for a total amount of around EUR 80m. Delivery will take place by mid 2012. The trains will operate on the existing line 11.</td>
</tr>
<tr>
<td>São Paulo</td>
<td>216</td>
<td>2011–2013</td>
<td>The diamond line 8 between the Julio Prestes station in the city centre and Itapevi is said to be the most inefficient line. Therefore, a refurbishment has been agreed upon in 2010 that will be executed in a public private partnership (PPP) between CPTM and the Paulista consortium. The partnership guarantees 36 new trains and the maintenance of the equipment for the next 20 years. The trains will be delivered between 2011 and 2013 and will replace the existing fleet which is more than 30 years old. Investments are also required for signalling and power supply of the line. The Paulista consortium consists of the CAF S.A., CAF Brasil and ICF. The project has a total volume of around EUR 792 million (BRL 1.8 billion).</td>
</tr>
<tr>
<td>São Paulo</td>
<td>84+540</td>
<td>2010–2014</td>
<td>The new line 4 will initially be worked by 14 six-car trains supplied by a Siemens Mobility and Hyundai Rotem consortium. The trains were constructed in South Korea and shipped via the port of Santos to São Paulo. A further 90 cars are to be acquired for Phase II. The first trains arrived by the end of 2009 and feature a driverless system developed by Siemens – so far the only one in Brazil.</td>
</tr>
<tr>
<td>São Paulo</td>
<td>102</td>
<td>2008–2010</td>
<td>CAF will supply 17 six-car vehicles to the value of EUR 184 million which are mainly manufactured in the Brazilian production site of CAF.</td>
</tr>
<tr>
<td>São Paulo/Recife</td>
<td>25</td>
<td>2010–2011</td>
<td>Together with Alstom, Siemens is currently refurbishing 25 trains of metro line 1 in São Paulo, 10 trains of the 4400 series of Companhia Paulista de Trens Metropolitanos (CPTM) and 10 trains of the metro in Recife. According to the company, the refurbishment includes new air-conditioning systems, new interiors and outer paintwork.</td>
</tr>
</tbody>
</table>
## Annex B: Maintenance and Refurbishment Projects

<table>
<thead>
<tr>
<th>M</th>
<th>R</th>
<th>O</th>
<th>No. units</th>
<th>No. cars</th>
<th>Segment</th>
<th>Type of vehicle</th>
<th>From</th>
<th>To</th>
<th>Costs (in million €)</th>
<th>Operator / tender institution</th>
<th>Main supplier</th>
<th>Locations</th>
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</thead>
<tbody>
<tr>
<td>x</td>
<td>36</td>
<td>288</td>
<td>EMU</td>
<td>n/a</td>
<td>2011</td>
<td>2030</td>
<td>CPTM</td>
<td>CAF</td>
<td>Hortolândia (São Paulo)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>8</td>
<td>48</td>
<td>Metro</td>
<td>EMU</td>
<td>2010</td>
<td>n/a</td>
<td>CMSP</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>25</td>
<td>150</td>
<td>Metro</td>
<td>n/a</td>
<td>2009</td>
<td>2014</td>
<td>CMSP</td>
<td>Siemens, Alstom</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>x</td>
<td>26</td>
<td>156</td>
<td>Metro</td>
<td>EMU</td>
<td>2009</td>
<td>2013</td>
<td>139.00 million €</td>
<td>CMSP</td>
<td>Bombardier, Temoinsa, Tejofran</td>
<td>Hortolândia (São Paulo)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>10</td>
<td>40</td>
<td>EMU</td>
<td>Series 3000</td>
<td>2008</td>
<td>2017</td>
<td>20.80 million €</td>
<td>CPTM</td>
<td>Siemens</td>
<td>Presidente Alto</td>
<td></td>
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<tr>
<td>x</td>
<td>17</td>
<td>102</td>
<td>Metro</td>
<td>n/a</td>
<td>2008</td>
<td>2010</td>
<td>CMSP</td>
<td>CAF</td>
<td>Hortolândia (São Paulo)</td>
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<tr>
<td>x</td>
<td>20</td>
<td>80</td>
<td>Metro</td>
<td>n/a</td>
<td>2008</td>
<td>2015</td>
<td>Metro DF</td>
<td>Metroman</td>
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<td>x</td>
<td>48</td>
<td>384</td>
<td>EMU</td>
<td>n/a</td>
<td>2008</td>
<td>2010</td>
<td>CPTM</td>
<td>CAF</td>
<td>Hortolândia (São Paulo)</td>
<td></td>
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<tr>
<td>x</td>
<td>25</td>
<td>EMU</td>
<td>EMU</td>
<td>2007</td>
<td>2010</td>
<td>Metorec</td>
<td>Siemens</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>x</td>
<td>x</td>
<td>30</td>
<td>120</td>
<td>EMU</td>
<td>2000</td>
<td>2007</td>
<td>86.00 million €</td>
<td>CPTM</td>
<td>Cobraman II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>x</td>
<td>48</td>
<td>144</td>
<td>EMU</td>
<td>2100</td>
<td>2007</td>
<td>2010</td>
<td>104.00 million €</td>
<td>CPTM</td>
<td>COMAFER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>12</td>
<td>EMU</td>
<td>Series 5.000</td>
<td>2006</td>
<td>2006</td>
<td>22.00 million €</td>
<td>CPTM</td>
<td>BT-Brazil (Tejofran, Bombardier)</td>
<td></td>
<td></td>
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<tr>
<td>x</td>
<td>12</td>
<td>EMU</td>
<td>4.400</td>
<td>2006</td>
<td>2006</td>
<td>20.00 million €</td>
<td>CPTM</td>
<td>Siemens</td>
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<tr>
<td>x</td>
<td>n/a</td>
<td>LRV</td>
<td>n/a</td>
<td>2005</td>
<td>2006</td>
<td>2.69 million €</td>
<td>Operator Santa Teresa Tramway Rio de Janeiro</td>
<td>n/a</td>
<td></td>
<td></td>
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<td>x</td>
<td>10</td>
<td>40</td>
<td>EMU</td>
<td>Series 3000</td>
<td>2002</td>
<td>2007</td>
<td>9.50 million €</td>
<td>CPTM</td>
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<td>Presidente Alto</td>
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[...]

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Total price*

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