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IÑIGO SANCHEZ

FUTURE SCENARIO PLANNING IN BRAZILIAN LOGISTICS AND
TRANSPORTATION SECTOR

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Academic Year 2012-2013

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Thesis developed and presented to Escola de Administração de Empresas de São Paulo of Fundação Getulio Vargas, as a requirement to obtain the title of Master in International Management (MPGI).

Knowledge Field: Prospective scenarios

Adviser: Prof. Dr. Gilberto Sarfati

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Approval Date ____/____/____

Committee members:

Prof. Dr. Gilberto Sarfati (adviser)

Prof. Dr. Servio Prado

Prof. Dr. Ricardo Rochman

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*To my mother, grandmother and sister
which are sources of inspiration and
examples of life to me.*

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Abstract

In the last decades, the logistics sector is experiencing a great transformation worldwide. Thus, today, the efficiency of the whole logistic system for economic growth, diversification and operational costs as well as poverty reduction is widely recognized.

According to the World Bank, Brazil is one of the largest economies in the world, but high logistics costs are still endangering this growth. These high costs are largely the result of strong regional differences in infrastructure, along with the burdens of the road sector, which comprises sixty percent of the country's total freight volume transportation and the difficulties to get projects off the drawing board. Yet, nowadays, the Brazilian logistics is at the doorstep of a new revolution, in business practices, efficiency, as well as in quality and availability of infrastructure for transports and communications as new projects and practices to overcome the situation are being applied.

The purpose of this study is to analyze not the present or the current trends of Brazilian logistics and transportation sector, but instead prospect possible future scenarios for the coming years. In other words, this work shows different possibilities of how the logistics and transportation sector can look in the future. To do so, this paper will use scenario planning methodology and in-depth interviews with experts related with the field to help clarifying these alternative scenarios.

Keywords: Prospective Scenarios, Logistics and Transportation sector

Resumo

Nas últimas décadas o setor de logística passou por grandes transformações pelo mundo. Assim, a eficiência do sistema logístico é importante para o crescimento econômico, a diversificação, redução dos custos operacionais e da pobreza.

Segundo o Banco Mundial, o Brasil tornou-se uma das maiores economias do mundo, mas os custos logísticos elevados colocam em risco esse crescimento. Estes custos são em grande parte o resultado de diferenças em infraestrutura de cada região, juntamente com os encargos do setor rodoviário, que corresponde por 60% do total do transporte de carga do país. Entretanto, a logística brasileira está às portas de uma nova revolução, em práticas de negócios e eficiência, e também na qualidade e disponibilidade da infraestrutura de transportes e comunicações, e novos projetos e práticas para superar a situação.

O objetivo deste estudo não é analisar o presente e as atuais tendências de logística do Brasil e do setor de transporte, mas sim modelar possíveis cenários futuros para os próximos anos. Em outras palavras, este trabalho mostra diferentes possibilidades de como o setor de logística e transporte poderá ser no futuro. Para isso, este trabalho irá utilizar a metodologia de cenários prospectivos e entrevistas com especialistas relacionados da área.

Palavras-chave: Cenários Prospectivos, sector Logístico e de Transporte.

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List of Abbreviations and Acronyms

ANTAQ	National Agency of Waterborne Transportation
ANTT	National Agency of Land Transport
APICS	Association for Operations Management
CNT	National Transport Confederation
CONIT	National Council for Transport Policy Integration
COPPEAD	Business School of the Federal University of Rio de Janeiro
CSCMP	Council of Supply Chain Management Professionals
DENATRAN	National Department of Motor Vehicles
DNIT	Department of Transportation Infrastructure
ECR	Enterprise Change Request
EDI	Enterprise Data Integration
GDP	Gross Domestic Product
GEIPOT	National Transport Planning Agency
ILOS	Institute of Logistics and Supply Chain
IPEA	National Institute for Applied Economic Research
LPI	Logistics Performance Index
OECD	Organization for Economic Co-operation and Development
MTO	Multimodal Transport Operator
PAC	Growth Acceleration Program
PNLT	National Plan for Transport Logistics
PPP	Private-Public Partnership
RFB	Brazilian Republic Federation
SECOM	Secretariat for Social Communication of the Presidency of Brazil
SINCTRAN	National Transportation Costs System
TEU	Twenty Foot Equivalent Unit
TKU	Net Ton-Kilometers

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1. INTRODUCTION

In the current economic scenario, logistics has become a fundamental requirement for the countries to succeed and prosper as it helps to optimize the national efficiency and competitiveness. In this way, Brazil is now in the need of an environment that fosters these improvements by culturally perceiving the relevance of an effective logistics infrastructure investment to sustain the country's growth patterns.

The actual interest of this paper lies in the importance of identifying the different factors and characteristics that drive Brazilian logistics and transportation sector in order to effectively construct future prospect scenarios.

Three steps are followed. The first step that needs to be fulfilled is a profound literature review analysis related to the topic. Hence, this paper is divided into four main categories - literature related to the logistics sector, the existent different factors and trends, the transportation sector, and the description of prospective scenarios methodology. The first three categories are the basis of this paper as they will allow the formation of a solid understanding for the author, thus helping to prepare expounded questionnaires that will be applied in this work. Regarding the fourth category, it is also important for the work as it gives the necessary information to understand the process and methodology of future prospective scenarios.

The second step focuses on the development of the questionnaires that will be used at the in-depth interviews. Thus, the author contacted different experts from different logistics and transportation sectors to develop the future prospective scenarios (both from the private sector and public sector). In addition, during the realization of this research, the author was working hand-to-hand with a logistic company, which helped to get first-hand information.

The third and last step is elaborated with the combination of the information obtained from the literature review and the in-depth interviews. Once the information is gathered, the analysis begins and the future prospective scenarios are described by cross checking all the data.

Today, Brazilian infrastructure system and logistics in particular faces many challenges. Hence, this work is very important as it may provide a greater understanding of how the logistics and transportation sector may develop in the future by using the prospective scenarios methodology. Furthermore, this research also tries to foster discussion, reflections and meet interests of the major stakeholders in this matter, because despite the fact that Brazilian logistics infrastructure is improving and new investment tools are being developed, they are not yet compatible with the level of the economic expansion of the country.

The structure of the thesis begins with a theoretical review of the most relevant topics in order to provide a better understanding and comprehension to the reader about the topic. In this first section, the logistics and some important concepts and characteristics that influence the sector will be discussed. In the 2.2 section, the paper describes more specifically the factors and trends that drive the Brazilian logistics, through presenting the different players, processes and characteristics. In the 2.3 section, the paper discusses the transportation importance within logistics and the Brazilian transport matrix main characteristics. In the third chapter, the paper describes the procedures used for drawing up the work and the methodology used to compose the future prospective scenarios for logistics and transportation sector. In the fourth chapter, the methodology is applied and the four prospective future scenarios are described together with a narrative of possible facts for each scenario. The fifth and last chapter describes the conclusions of logistics and transportation future in Brazil.

2. LITERATURE REVIEW

2.1 Logistics

Logistics is defined by the Council of Supply Chain Management Professionals (CSCMP, 2012) as the management of the flow of goods, information and other resources from point of origin to the point of destination. Previously seen as a classical function involving adversarial relationships among suppliers, customers and transportation providers, after 1950s it emerged as the key source of competitive advantage and a leading reason for strategic alliance between companies and their logistics providers. Today, as Lambert (1998) described, logistics processes embrace almost all spheres of the human activities. Independently of the role of the educator`, consumer`, executive` or employee, it is important to understand the role of the logistics.

Yet, early references to logistics are found primarily in military services at the end of 19th century. As Simpson and Weiner mentioned on their publication of the science of war, while strategy is the art of handling troops in the theatre of war; tactics that of handling them on the field of battle [...] The French have a third process, which they call logistics, the art of moving and quartering troops (Simpson and Weiner, 1989). Therefore, it was during the both World wars that logistics received much attention due to the necessity of great movement of troops and supplies. Similar theory is described by Martins and Alt (2001) where logistics was meant to put the right resources in the right place at the right time with a single goal: winning battles. Other researchers, such as Razzolini, argue that logistics have always existed, evolved and currently it is related to the design and operation of a system capable of providing and managing flows of materials and information in any transaction, project, program, organization or business process that has a clear mission to be accomplished (2006).

After the 1950s the concept of logistics moved from its unique military use into both military and business areas. Thereby, APICS organization (Cox et al., 1998) defines logistics as the art and science of obtaining, producing, and distributing material and

product in the proper place and in proper quantities. In a military sense, its meaning can also include the movement of personnel. Similarly, other authors such as Christopher (1998) described logistics as the process of strategically managing procurement, movement and storage of materials through organization and its marketing channels thus to maximize present and future profitability by attending the applications at low cost.

A broader definition of logistics management that is widely used comes from The Council of Logistics Management (CLM), a trade organization based in the United States. It defines logistics as the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose (CSCMP, accessed September 2012). In this definition, flows of goods, services, and information are included in the sectors of manufacturing and service. Yet, during the last decades important aspects such as quality and information have arisen within this field. As Lumsden (1998) mentioned, since these aspects have a direct influence on companies' flows efficiency. It is not enough to know what has to be done; there must also be knowledge about how it should be done.

Other authors, such as Faria and Costa (2007) stated that the concept of logistics has evolved and today it encompasses many segments including the procurement, movement and storage of materials and products, involving the physical flow of goods and their information from suppliers, production processes, to the final consumers, requiring that all sub-processes of transporting, storing and handling as well as the activities of receiving / shipping have to be planned and managed as an interconnected system between the supplier market and the consumer market. Hence, the goal of logistics is delivering the right product in the right quantity and in the right condition with the right documentation to the right place at the right time at the right price.

The evolution of logistics concept and its impacts on society was described by Ballou (2008) in three phases:

- **Before 1950s:** logistics was under dormant condition where production was the main part of the managers concern and industry logistics was regarded as necessary evil. There was no existence of philosophy to command the logistical activities at the companies and each division was responsible for commanding the transport production management, thus generating conflicts between them.
- **1950-1970:** known as the development years and the consolidation of the logistics, the total cost concept was mentioned describing the notions of trade-off between inventory and transportation. Additionally, marketing was well established in business already, representing the true development of the logistics area.

1970-Today: known as the take-off years, companies started using the logistics concept with greater confidence. The areas of cost control, productivity and quality control began to be taken into account in the industries to address the flow of imported goods at the time. As a result, logistics became an essential item for business activities as a factor for generating profit, reducing costs and increasing productivity.

Yet, as Chang (1998) states, in the 21st century the logistics tendency is driven by different alliances, Third Party Logistics (3PL) and globalized logistics. Logistics circulation represents an essential aspect of business activities and sustaining competitiveness, however conducting and managing a large company is cost consuming and not economic. Therefore, alliance of international industries could save working costs and cooperation with 3PL could specialize in logistics area.

2.1.1 The Logistics Players- From 1PL to 5PL

In 2001 Morgan Stanley described the logistics classification grouping from 1 Party Logistics (1PL) to 5 Party Logistics (5PL), and afterwards other authors have also

written in the same direction. The 1PL to 5PL description is based upon the degree of complexity and the number of business functions located under the logistics provider's control.

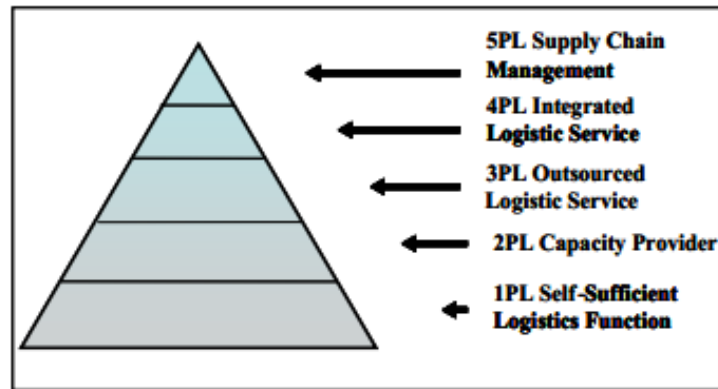


Figure 1: The Morgan Stanley 5PL Model.

Source: Morgan Stanley 2011

1PLs are most of the small businesses that buy and sell into the same location. As the business expands and the manufacturer's logistics border grows it surpasses the self-sufficient logistics function and it becomes a commodity capacity provider, such as trucking company or a warehouse operator by providing service for a single or a small number of functions in the supply chain. In addition, with the increase in demand, many 2PLs develop into 3PLs by adding new logistics capabilities and integrating some new operations. The 4PLs provider is essentially a logistics integrator or a one-point contact for the manufacturer's logistics outsourcing requirements. The 4PLs are also responsible for contracting various 2PLs and 3PLs providers. The 5PLs will aggregate the demands of the 3PL and others into bulk volume for negotiating more favorable rates with the transportation companies. The Morgan Stanley classification is as follows (2001):

A self-sufficient logistics function is a firm or an individual that needs to have a cargo, freight, goods, produce or merchandise transported from a point A to a point B. The concept of first-party logistics provider stands both for the cargo sender and for the receiver. A 1PLs can be a trade importer / exporter, manufacturer, wholesaler, retailer or distributor, but most of them buy and sell in the same location. It can also be institutions

such as government department or an individual or family removing from one place to another.

The 2PLs or commodity capacity providers face the worse return outlook, with high levels of asset intensity but low entry barriers. In this category air freighter, truckers and container lines can be included. They usually have a high fixed costs based on a volatile revenue stream and the outcome is usually low and unpredictable too (Morgan Stanley, 2001). Airports and seaports are also categorized as 2PLs, but usually, their returns are generally better and more stable compare to basic transportation providers, due to their relative scarcity and questionable insulation from the fluctuations of fuel prices.

3PL or outsourced logistics service is a broader term frequently used to cover businesses in freight forwarding or contract logistics. It usually performs all or a large portion of a client's supply chain logistics activities, and its value adding is based on information and knowledge versus a non-differentiated transportations service with lower costs. Most of the 2PLs aim to become 3PLs due to the higher returns. 3PLs usually owned a trucking fleet or a distribution center, however, they usually outsourced most of their capacity needed by 2PLs. In addition, they focus on logistics solutions and look for the optimal combination of assets available from capacity providers. 3PLs are less as set intensive and are thus nimbler in the operation of assets available from capacity providers, and therefore they have higher return on assets employed.

In addition, 3PLs companies' margins sometimes are not high because they are directed to make money through helping customers' saving. Hence, economies of scale and closeness to the customers are crucial for 3PLs in order to be profitable and maintain extensive logistical networks. Lack of both makes some 3PL businesses see lower profitability in their operations. In some cases, the closeness makes 3PLs indispensable to the customer because 3PL provider tends to behave more as a partner than as a supplier, incurring in higher customer loyalty. The services of 3PL sometimes overlap with the 4PLs and currently 3PL companies are trying to turn themselves into 4PL companies in providing better service satisfaction to their related customers.

Integrated logistics is the disciplined and unified management of the technical logistic disciplines. In a commercial context it means to coordinate logistics activities with other functional areas of the firm as well as with customers and suppliers. According to Gomes, Ribeiro (2004, p7) integrated logistics stands for [...] the relationship between supplier, supplies, production, customer distribution, materials and other information. The purpose is not only to reduce cost of an individual activity, but the total logistics costs of the company itself. Similar idea is described by Fleury et al (2000), where activities and functions are no longer isolated and they are perceived as an operational component of marketing strategy.

Integrated logistics made companies enter a new style of management. Today, companies need to integrate the flows between the material, information and money in order to accomplish a single logistic process. Thereby, functions as procurement, ordering processes, inventory control, production, transportation are now managed within a single process, known as the integrated logistics. As a result, in the end of the 1980s a new management information system known as ERP (Enterprise Resources Planning) emerged. As the name suggests, it pervades the whole company and shape the way the business works at many levels by increasing the speed and accuracy as well as the productivity of the whole corporation.

The 5PL solutions focus on providing overall logistics solutions for the entire supply chain. It can be defined supply chain as the integration of the activities associated with the flow and transformation of goods in the respective logistics networks through improved supply chain relationships based on a common collaborative performance measurement framework for attaining close, collaborative and well-coordinated network relationships to achieve a competitive advantage (Hieber, 2002). Similarly, Houlihan (1987) stated that supply chain strives to balance conflicting activities such as promotion, sales, distribution and production.

Today, many firms have realized that creating an integrated relationship with their suppliers and customers is crucial to increase their competitiveness by reducing uncertainty and enhancing customer service. Therefore, as companies are more

specialized in their core competences, the information exchange is at the most important point, because the property of each product is attributed to different companies in various stages. Furthermore, supply chain is likely to be the tool that can reunify the separate functional specialists as before. Thus, the goal is shifting from outsourcing to strategic alliance in creating win-win situations for all supply chain members, so the information can be freely exchanged.

2.1.2 Competitive advantage and the value of logistics

Logistics has great importance in companies as it holds the competitive advantage, reduces operational costs and adds value to the final product. Therefore, in today's highly competitive environment, companies have to maintain their competitive advantage by recognizing the value of logistics. As Faria and Costa (2007) explained, logistics is the area where you can get better results by maintaining a correct administration and coordination between operations. Other studies together show up similar results by contributing to state that the challenge of modern logistics is to create value that can be shaped for both the customer and the shareholder (Bowersox, Cooper and Closs, 2001). Moura also explains that logistics value should be developed throughout the value chain to which it belongs, defining value chain as [...] a set of related activities developed by the company, which go from the relationship with suppliers, the production cycles and subsequent distribution and delivery to the final customer (2004).

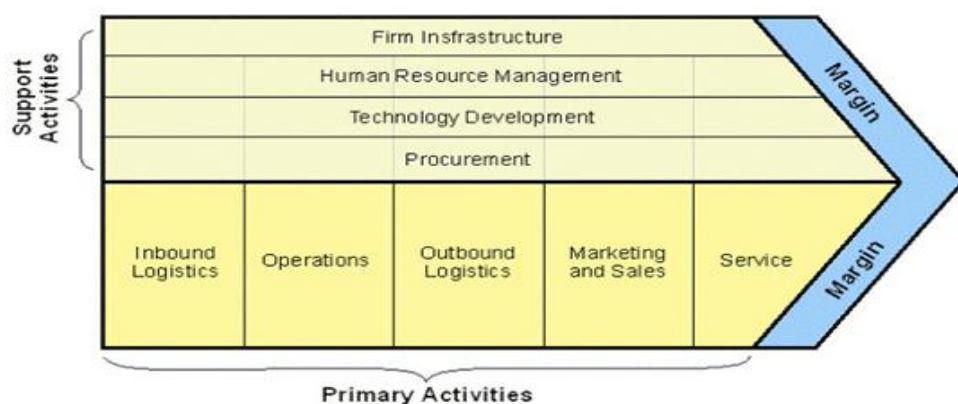


Figure 2: The value chain

Source: Porter, M., 1985.

Porter distinguishes between primary activities and support activities. Primary activities are the ones concerned with the creation or delivery of a product or service. They can be grouped into five main areas: inbound logistics, operations, outbound logistics, marketing and sales, and service. Each of these primary activities is linked to support activities which help to improve their effectiveness or efficiency. There are four main areas of support activities: procurement, technology development, human resource management, and firm infrastructure (Porter, 1985).

The efficiency of the whole logistic system for economic growth, diversification, and poverty reduction has long been recognized as one of the most important tools. The World Bank annual review of the Logistics Performance Index (2012) explains that the efficiency of logistics depends not only on the private sector but on government services, investments, and different policies development. Building infrastructure, developing a regulatory regime for transport services, and designing and implementing efficient customs clearance procedures are all areas where governments play an important role. Governments also are able to mobilize actor across traditional sector silos by involving the private sector.

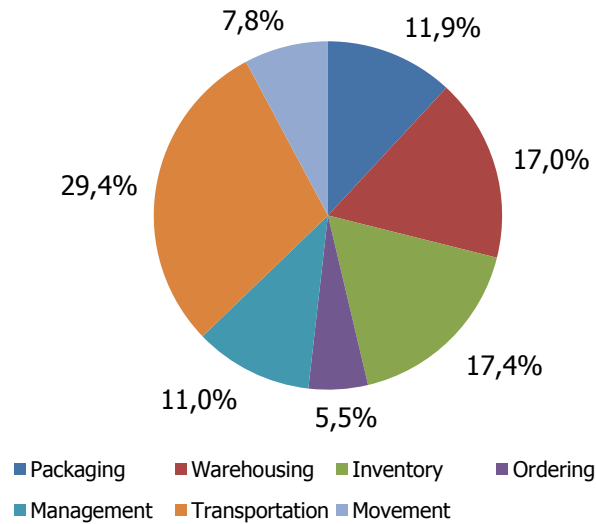
2.1.3 The Logistical Measurements

The logistics of an enterprise is an integrated effort aimed at helping create customer value at the lowest cost level. Strategically, logistics managers seek to achieve a previously agreed quality of customer service through state-of-the-art operating competency, thus, the challenge is to balance service expectations and cost expenditure in a manner that achieve business profitability (Bowersox, 1996). Similarly, according to Lumsden (1998), to measure the logistic effectiveness, it ought to be aware of the elements that affect its performance profitability. Thereby, efficiency can be explained in terms of costs, service and tied up capital. In order to have a full understanding of the three efficiency sides, they should not be considered as isolated parameters without interaction among each other. They are interconnected and the final goal is to make a good balance among these three dimensions to optimize the total results.

2.1.3.1 Logistical costs

According to the World Bank (2012), *Brazil* has become one of the largest economies in the world, but high logistics costs are still endangering this growth. These high costs are largely the result of strong regional differences in infrastructure, along with an underdeveloped rail network, high harbor fees and difficulties with the development of the middle-west, north and north-east regions. Furthermore, the continued expansion of Brazilian economy and subsequently the logistics is also impacting the environment and elements such as congestion, noise, air and water pollution, hazardous waste and infrastructure damage are increasing. Hence, innovative policies and technologies that can reduce these impacts are extremely urgent and necessary. *Also according to the World Bank (2010) logistics costs as a percentage of GDP calculates that Brazilian logistics costs are approximately 15.4% of GDP (see figure 5), which is almost twice of the United States (8%). This index includes administration, warehousing, inventories and transportation. This can be explained by a number of factors, such as poor road maintenance, low utilization of the navigable rivers, insecurity roads and lower investment in infrastructure among others.*

The Institute of Management Accountants - IMA (1992), defines logistics costs as the costs of planning, implementing and controlling all incoming inventory (inbound) in checkout process (outbound), from point of origin to point of destination. Furthermore, logistics costs are an important factor affecting the competitiveness of both firms and countries. If firms reduce their logistics costs, the total costs of goods and services can be lowered. At the same time, greater market competitiveness among a given nation's firms can then give rise to greater national industrial competitiveness on a global scale. The logistics processes include packaging, warehousing, inventory, ordering, management, transportation and movement.



Graph 1: Cost ratio of logistic items (Tseng et al., 2005).

Source: Tseng et al., 2005. Modified.

Logistics plays an important role in economic systems and in everyday life. Given the significant cut back in manufacturing and labor costs, reducing logistics costs has become an increasingly important task for managers. On account of the complex supply chains and globalization, the cost of logistics operations could comprise as much as half the value of general commodities (Dianwei, 2006). Therefore, total logistics cost analysis is the key to managing the logistics function. The latter holds a great importance because it determines which decisions must be made regarding the type of transportation to be performed.

2.1.3.2 The Logistical Service

Almost any level of logistical service can be achieved if a firm is willing to commit the necessary resources. In today's environment, the major limitation is the economy and not the technology, thus, the logistic service is a balance of logistic service priority and cost (Bowersox, 1996). The key point of the logistic service control is not only one party but to choose a suitable logistic service so that all parties in the supply chain are better off and the overall benefit can be realized in the supply chain as well (Hieber, 2002). Besides delivery service, the concept also consists about the information flow service as well as consultancies on supply chain design.

According to Lumsden (1998) the traditional logistic delivery service that deals with the physical flow can be evaluated in parameters as it follows:

- Lead-time: Defined as the time from the order to the delivery.
- Delivery reliability: Refers to do delivery at the right time as scheduled.
- Delivery accuracy: Describes the ability to deliver the right product in the right quality and quantity.
- Storage availability: Describes the ability to delivery directly from the stock, it also reflected by the frequency of out of stock happening.
- Flexibility: Refers to the ability of adjusting the delivery according to the customer desire on delivery batch size, destinations, frequencies or documentations.
- Information: Is about what type of information exchanged between customer and suppliers about delivery service.

In logistics short and safe lead-time results in higher value added for the customers and the poor delivery performance could end up with great loss when it causes production idleness. Thus, the time based performance has become one of the most important criteria for the super logistic achievers (Bowersox, 1996). Finally, there exist two ways to overcome lead-time problems, carrying enough inventories or shortening the logistic lead-time.

2.1.3.3 Tied-up Capitals

The tied-up capitals in logistic operations are mainly caused by the inventory, work in process materials and the facilities that related to product holding. The inventory tied up capitals causes capital cost. On the other hand, they cannot be used in circulation and creates new valued for the owners (Lumsden, 1998). Also according to Lumsden, the capital tied-up can be categorized into three:

- Inventory: Refers to the stocks in the warehouse and the safety stock, which backup the short-term manufactory. Moreover, the level of the safety stock is determined by the delivery frequencies, the more frequencies the less stock. The

lead-time also has a direct impact on the inventory level, the shorter lead-time the lower the level of inventory.

- Work in progress (WIP): Includes any material under operation in the working plants.
- Store: Inventories in the selling site to avoid the out of stock.

2.1.4 Global Trends in Logistics

The worldwide logistics sector is experiencing a great change in the last decades. According to Amos (2007), these changes may be attributed to globalization, the increase of competition and additional security requirements among these others:

- Markets: The rapid expansion of international trade in most regions, and particularly in Asia, means that many supply chains are now truly global.
- Expectations: The global competition in product and service markets is demanding higher standards and lower costs in logistics supplier markets.
- Competition: Despite some industry concentration (i.e., ports), the opening of transport markets is creating greater competition in logistics services and submarkets.
- Technology: all transport modes are investing heavily in technology development to obtain more efficient and larger vessels and vehicles as well as improved methods for traffic dispatching, monitoring and control capability.
- Intermodality: The industry is focusing more on intermodality worldwide, which means that standard and specialized containerization continues to grow to better facilitate intermodal transit and multimodal allocation of traffic.
- Energy: Energy prices are having an impact on the sector due to more expensive and declining fossil fuel stocks and expectations of higher energy taxes in response to global warming.
- Security: International shipping and aviation, in particular, are requiring higher standards of security in freight.
- Bottlenecks: The industry is requiring better amounts and quality of public infrastructure to reduce bottleneck in roads, railways, ports, airports and shipping channels.

In developing countries the quality of infrastructures is low and the available options appear to be fewer, thus resulting in higher logistics costs compare to those OCDE countries. In addition, delays, long pre-shipment inspections, robberies, inefficient telecommunications and other services often occur. Improvements are being made in customs clearance, regulatory regime and governance as a means of these countries to catch up their OECD competitors.

According to Batista and Renato (2005), the implications and needs in order to respond to the above global trends are the following ones:

- Design and adopt plans for logistics systems to serve both the internal and external consumer market.
- Build efficient integration and coordination supply chains spread geographically.
- Improve knowledge management and build skilled manpower.
- Enhance government efficiency and efficacy, namely: strategic planning, cost reduction, speedy decision-making, governance, economic, social and environmental criteria to decide on investments, and clear rules for environmental licensing.

Cut red tape and paperwork and create the proper fiscal incentives for private sector participation.

Environmental awareness also has evolved from a minority issue in mature western societies to a top global consideration for consumers, media and policymakers. Today, there are many trends and developments indicating that, for most companies, long-term success will be strongly linked to more sustainable business concepts. The following are some of the trends and developments that are likely to shape businesses by 2020 according to Tomoff (2010):

- Customers will place sustainability factors higher on their strategic agendas, creating demand for and incentivizing the production of sustainable products and services.

- Investors expect companies to adopt new business models that take into account the sustainable issues by producing goods and services with fewer natural resources.
- Employees will be encouraged to transfer their sustainable behaviors from the home to the workplace. Moreover, sustainability-related performance will become more important in recruiting and retaining employees.
- Political leaders will also support increasingly stricter sustainability legislation by fostering alternative technologies and resources.
- Industry alliances will also be even more organized to set standards and promote new greener ways of thinking.
- The transport and logistics sector transformation to a greener business is right on our doorstep.

2.2 Main Brazilian logistics factors and trends

In JPMorgan Chase words (2010), the medium and long-term perspective of logistics in Brazil appears to be very positive due to the fact that Brazil today is both the country of the future and of the present. Nevertheless, the Brazilian logistics sector is going through a period of changes and today it is in a limier of a new revolution, in business practices, efficiency, as well as in quality and availability of infrastructure for transports and communications. This period thus shows up a twofold dimension: both risky and fruitful. Risks regarding the remarkable changes that companies need to implement and fruitful due to the prominent space for improvements occurred in quality and productivity.

Yet, according to the American Chamber of Commerce for Brazil (AMCHAN, 2010) the pace of change is still recent. In fact, until few years ago, Brazilian logistics was the lost link of business modernization in Brazil. Today, besides the factor's concerning the improvement of logistics, some trends that help us to better understand the future of logistics, are visible.

2.2.1 Government Role

The Brazilian government has been aware of the inadequacies of the logistics system for some time. Nevertheless, in the last thirteen years little has been done to rectify the situation. The country seems to be good at planning, however, implementation is a pitfall, primarily due to politics, red tape and the growing topic of environmental issues (Informa economics, 2012). Despite the development of the *Accelerated Growth Program* (PAC), the long-term *National Transport and Logistics Program* (PNLT), the *Logistics Investment Program: Roads and Railways* and the *Logistic Planning Company* (EPL), yet tangible results have been few to this moment.

As a result, there is a remarkable work needed to improve Brazil's infrastructure and logistics system and the involvement of the government is capital. In addition, a strong, well-functioning regulatory environment that considers the long term nature of infrastructure projects and incorporated risks of such investments is one critical success factor necessary to attract foreign investment to the transportation and logistics sector in Brazil (Informa economics, 2012). Increasing concessions and public-private partnerships programs will also be important.

2.2.1.1 Accelerated Growth Program

The PAC or Accelerated Growth Program aimed at assisting the country's future economic progression by enhancing the Brazilian infrastructures through a variety of means. The first phase commenced on 28th January 2007 with President Lula da Silva, and in 2010 the program was further emphasized by launching the second phase. This first phase was emphasized in infrastructural measures mainly focusing in energy (interest payment reductions as well as gas industry subsidies and tax reliefs), transportation (roads, highways, ports, airports, and urban transport improvements), housing and sanitation. Other measures such as credit and financing facilitations, fiscal measures spread, or improve the environmental regulatory frameworks to further develop the industry were also relevant. However, its slow implementation arose many criticisms, but despite these issues, the overall impact of the first phase has been viewed

as a positive step for Brazil from all sections of society. Launched amidst the global economic crisis, many have considered the program as a major contributory factor which assisted in Brazil's excellent recovery, particularly as a result of the increase in employment opportunities and company subsidies (EDC, 2012).

In March 2010, part two of the PAC was launched with an infrastructure investment plan of R\$ 958 billion. Given the rapid pace of GDP growth and improved income distribution, infrastructure is a bottleneck that Brazil needs to tackle. Thereby, the program is to be directed to increase the country's energy production capacity, building homes and schools, improving transportation, water, electricity, sewage, security and urban mobility. This is driven, in part, by preparations to host two major sporting events: the World Cup in 2014 and the Olympic Games in 2016. Therefore, hosting the major sporting events increases the impetus to the implementation of infrastructure projects, and at the same time, it also helps attracting new investment and trade to the country as a whole. The sheer infrastructure needs surrounding the two sporting events will likely require national firms that traditionally lead the industry to look outside Brazil for help (EDC, 2012).

2.2.1.2 Brazilian Logistics and Transportation National Plan (PNLT)

The Brazilian Logistics and Transportation Plan is part of the PAC and before it was launched, the Ministry of Transportation was considered the reference in transportation planning. Two tools were important by that time:

- GEIPOT - The Executive Group for the Integration of Transportation Policy, created in 1965, as an important part in the Brazilian transportation planning process.
- PRODEST - The Plan for Transportation Sector Development. The last initiative towards a multimodal plan integrating the effective participation of all the Transportation Secretaries of the Brazilian provinces.

The National Plan for Logistics and Transport provides a framework for the evaluation of public and private initiatives to increase the competitiveness of the logistics within a time horizon of 20 years. It visualizes a stronger role for railways and waterways which is also motivated by the country's environmental policy and the coordination of different players top-down. It was elaborated with the support of CENTRAN (Excellence Center for Transportation Engineering) and is based on five main objectives:

- Recover the planning process within the transportation sector, giving it a permanent management structure and an updating mechanism based on GIS (Geographical Information System).
- Consider all the costs of the logistics chain, involving the real prices of moving flows from origin to destination. The so-called "*custo Brasil*".
- Achieve an effective change in the existing transportation cargo matrix for the country, as its optimization and rationalization are associated to the more intensive and adequate use of the railways and waterways.
- Consider the restrictions and control legislation, such as the use of land and soil, either in production of goods, or in infrastructure construction.
- Establish the new classification of the structural projects for the social and economic development of the country: Increase the productive efficiency in consolidated areas (AEP), Induction to development in areas of agriculture and mining expansion (IDF), reduction of regional underdevelopment in depressed areas and South American Regional Integration (IRS).

In addition, the PNLT uses the Strategic Environmental Evaluation (SEE). The SEE is an instrument developed by the government to prioritize transport projects by taking into consideration social and environmental costs and benefits derived from policy measures, plans and programs. The focus is based on the expansion of the rail network capacity along the North-South and East-West axes and on the integration with other modes. Further aspects are partnerships between the public and private sector, such as the high speed train line Rio de Janeiro-São Paulo-Campinas that is planned.

Finally, the PNLT sets out clear measurable objectives for the modal shift by 2025. The use of sustainable modes of transport will further contribute to achieving the environmental targets, namely a reduction in fuel consumption by 41% and GHG emissions by 15%.

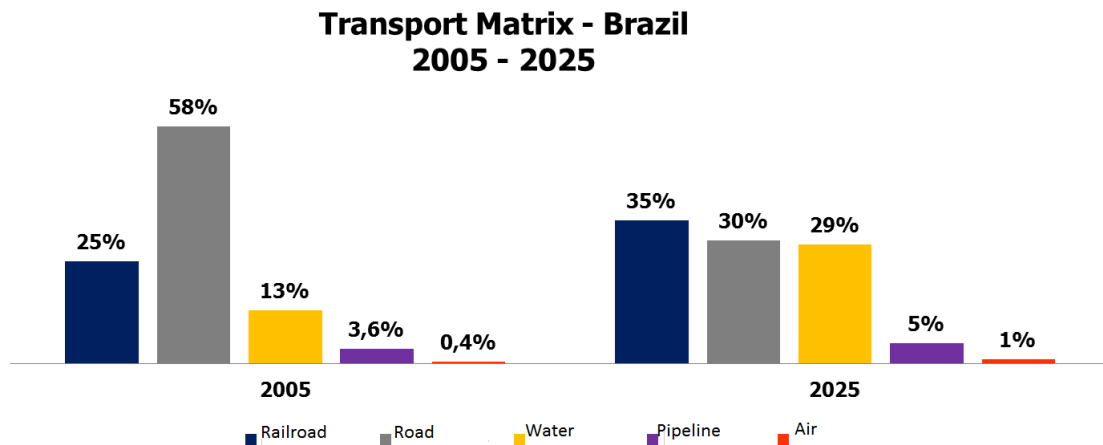


Figure 3: The transportation matrix comparison 2005 vs. 2025, according to PNLT.

Source: PNLT 2012, adapted.

2.2.1.3 Logistics Investment Program: Roads and Railways

Brazilian Logistics Investment Program was launched by the federal government on 15 August 2012 with the aim of implement an investment model (R\$ 133 billion) that helped Brazilian concessions contracts for highway projects and public-private partnerships for railway projects. Using the words of the President Rousseff (SECOM, 2012), the program aims to strengthen the competitiveness of the Brazilian economy by reducing transport-related costs by developing a transportation system that is compatible with the country's size.

In addition, through the Logistics Investment Program, the federal government aims to achieve the following national objectives (SECOM, 2012):

- Scale up infrastructure and transportation investment, providing Brazil with an expansive, modern network with modest fees.
- Strengthen the States' planning capacity and promote the integration of roadways, railways, waterways, ports, and airports in conjunction with supply chains.
- Lay the foundation for fostering sustainable growth in Brazil over the next 50 years by beginning a continuous process of planning and development of the logistics infrastructure.
- Reduce costs and enhance the country's transportation capacity, leading to greater efficiency and competitiveness.

Hence, the Logistics Investment Program pretends to generate an immediate impact by stimulating the creation of jobs. Moreover, in the future, the program will help to develop the technological know-how and establish the necessary conditions to begin manufacturing rails and other products domestically.

2.2.1.4 The Logistics Planning Company (EPL)

The Logistics Planning Company was created in August 2012 by the Government as a part of the Logistics Investment Program. According to SECOM (2012), the company undertakes studies and assessments to strongly assist and support the transportation sector in Brazil, being responsible for planning the activities and tracking the progress of the projects initiated under the Logistics Investment Program. In addition, EPL's mission is to develop an integrated plan for Brazil's transportation modes that will advance the national supply chains and meet the needs of each region according to their economic potential by, at the same time, enhancing the State's ability to plan, organize and partner with the private sector to make investments and deliver services (SECOM, 2012).

Furthermore, SECOM (2012) also explains the EPL's responsibilities as follows:

- Providing information for the formulation, planning and implementation of transportation policy.
- Preparing economic feasibility and engineering studies required to implement transportation projects.
- Promoting technological know-how and skills transfer in Brazil's transportation sector.
- Promoting capacity-building and research and development activities in the transportation sector.
- Obtaining environmental permits for the projects, apart from preparing social and environmental impacts studies for the transport projects.

2.2.1.5 Private Sector Participation, Public Private Partnerships (PPPs) and Private Sector Role

The increasing role of the private sector in the provision of transportation infrastructure and services came as a result of the limits imposed on the government's fiscal policies that led to a substantial drop in government investment in infrastructure (World Bank, 2010). Most importantly, private sector participation has become a positive response to the need of improving efficiency, technology, service levels and labor training. Moreover, by privatizing the transportation systems, public sector expenditures are fewer, incurring in greater room for public investments in other areas.

Regarding the Brazilian ports, the first private sector participation began with the Port Modernization Law of 1993, which emphasized privatization, private sector participation, decentralization and competition. As a result, the overall operating costs decreased and the efficiency increased. However, necessary policies to continue the process of decentralization and privatization have not been clearly defined due to the government reluctances to advance in concessioning to the private sector mainly because of their precarious financial situation and longstanding labor disputes. As a result, only secondary ports are likely to be concessioned in the near future (World Bank, 2010).

According to Rodrigue et al. (2006), the railroad sector privatization started in the late 1990s involving the four major government-owned railway companies, together accounting for about 95 percent of the total freight transported in this mode. However, due to several regulatory loopholes, lack of adequate structure and lack of rules for tariff calculations and access prices, the railway sector failed to develop as it was expected in the first years of private sector participation. Nevertheless, in 2003 some changes in the regulatory environment as well as greater capitalization along with a sharp increase in investment and volume transported made the sector more efficient. In addition, with the PAC 2, the PNLT programs and the private participation, railroad sector weight in the transportation mix is supposed to more than double by 2025.

Regarding the road sector, the Federal Highway Concession Program was originally launched in 1993, but the first concessions were made in 1996. There have exist three different phases of concessions and the fourth one is being planned. In the first phase, the average toll paid by a car per km travelling on a concession road was 10 cents of Real. In the second phase the average is 2.69 cents of Real due to the existing competition which lowered prices. The third phase of highway concessions involved 6,700km and its implementation started in 2009 and is still taking place. The fourth phase was established in August 2012 and its implementation will depend on the success of the third phase.

The Public-Private Partnership projects are also important tools to enhance the Brazilian infrastructure sector. The appropriate regulatory framework has recently been developed, together with the acquisition of the fiduciary and necessary resources necessary to support the PPPs (World Bank, 2010). PPP activities in Brazil began in the states of Minas Gerais and São Paulo. The first project is a 25-year concession in Minas Gerais for the highway connecting Belo Horizonte to the north of São Paulo state. The second project is a 13km subway stretch in the capital city of São Paulo state.

2.2.2 Brazilian Logistics in a Sustainable Environment

In the highly interconnected world that we live today, the next business opportunity may be just a few clicks away and logistics sector plays an increasingly important role. Society has also become keenly aware of systems whose functioning is critical to the survival not only of individuals, but also entire populations as logistics does. Thus, as Tomoff explained (2010) the concept of a sustainability-oriented society is not only characterized by the pursuit for prosperity, progress and social participation by all, without detrimentally exploiting natural resources. It also seeks for a society that neither creates nor accepts risks that threaten its existence or that of future generations. Thereby, logistics sector must now equally understand its responsibilities for the environmental impact of worldwide trade and transport.

Over the past decade, the transport sector's GHG (Greenhouse gas) have increased at a faster rate than any other sector that uses energy due to the globalization and economic growth. It is also expected that the logistics industry continues growing, so will its energy consumption and GHG emissions unless some changes are introduced. Hence, logistics should look for flexible transport modes that unfortunately are not yet widely available. For instance, in Brazilian transportation matrix, switching from a more carbon intensive transport mode to rail depends on the railway infrastructure being in place.

Improving the efficiency of the different transport modes also represents a huge challenge. Today, there are only a few market-ready technologies and solutions that can meet the specific needs of the transport and logistics sector. This is especially true for air freight and long-distance road transportation, where there is currently a lack of alternative technologies and fuels. In the last decades some improvements have been made in fuel efficiency of commercial vehicles and aircrafts, however, these gains are more than offset by the increase in their amount and the total distances they travel (Tomoff, 2010). As a result, if compared to 2000, forecast of energy use in transport sector are supposed to double in 2050.

Already demonstrates by many companies and organizations, today, sustainability can be a trend-setting business model by opening up new market opportunities and preparing for future scenarios. With business customers, the evidence is even more telling as the end consumers are now more aware about environmental issues than in any other period before. As the Brazilian office of UNESCO explains, the preservation of the threatened heritage of Brazil will only be possible with the comprehension and the shared responsibility of different generations and players involved.

Nicholas Stern explains (2007) that the economic consequences of climate change worldwide are estimated at about 5%-20% of global GDP. This scenarios do not even include the fact that the production of the key natural resources currently requires for most transportation will decline dramatically, increasing the prices. According to the World Economic Forum (2009), the logistics industry is responsible for around 5.5% of global GHG emissions and road freight accounts roughly for 60% of total emissions. The most carbon-intensive transportation mode per ton kilometer is air freight and the most efficient transportation modes are railroad and maritime.

Finally, sustainability seems to be a cultural issue and Brazil is not an exception. Today, many people still see a contradiction between economic growth and environmental protection, rather than realizing how they might go hand-in-hand. Although combating climate change has become a key topic of public discourse and media coverage, governments still have a hard time reaching global political agreements on reducing greenhouse emissions. Companies or individuals who already act in environmentally aware or sustainable way are still considered to be tree huggers (Tomoff, 2010).

2.2.3 Intermodal transportation development

The term intermodal has been used in many applications that include passenger and freight transportation. Today, intermodal freight transport is defined as the use of the two or more modes to move a shipment from origin to destination. A more descriptive term for this process would be *multimodal* because of the lack of effective and efficient

connectivity for both freight and information among and between the various modes on shipments under a single freight bill (Muller, 1999).

Today, competition between the modes has tended to produce a transport system that is segmented and un-integrated. This is because each mode has sought to exploit its own advantages in terms of cost, service, reliability and safety (Rodrigue et al., 2006). The lack of integration between modes was also heightened by public policy that has frequently banned companies from owning firms in other modes or has placed a mode under direct state monopoly control. Intermodalism has also been favored by to the existent difficulties of transferring goods from one mode to another, incurring in additional terminal costs and delays (Rodrigue et al., 2006). Hence, in the last forty years efforts have been made to integrate separate transport systems through intermodalism, and Brazil is not an exception. Intermodality enhances the economic performance of the transportation modes by using them in the most effective manner. For example, by seeing the entire trip as a whole, railroad transport may be exploited for long distances, with the efficiencies of trucks providing door-to-door delivery.

The emergence of multimodalism can be explained in part by technology development as new techniques for transferring freight from one mode to another have facilitated intermodal transfers (Muller, 1995). The major development has been taken place in container transportation, which allows easy handling between modal systems, becoming the most important component for rail and maritime intermodal transportation. As Slack et al. (2002) explained, in this way, goods that might have taken days to be loaded or unloaded from a ship can now be handled in a matter of minutes.

In the future, the speed -or total transit time- will continue to be a necessary factor for intermodal transport. Customers will demand better execution of the supply chains, represented by quality and reliability. Moreover, as customers will also have more access to information through the use of information communications capabilities only dreamt of in the past, that information will drive higher expectations of performance as well as provide the foundation for alternatives, options, and continued change. Besides, customers will want all such dynamics to be accomplished more cheaply and more

profitably (Witt et al., 2007). Consequently, an increase in the awareness of the scope and magnitude of broadly defined and measured multimodalism should happen to understand the marketplace, technologies and the different challenges.

In Brazil, the deregulation -although slow compare to developed countries- of the sector has also influenced the development of intermodalism. Today, companies are no longer banned from owing across modal types, and there exist a strong impetus towards intermodal cooperation. Likewise, new data handling, processing and distributing systems were necessary in order to ensure the safe, reliable and cost-effective control of freight movements across several modes. Consequently, the Electronic Data Interchange (EDI) technology was developed.

Despite the significant progress made until now, according to World Bank (2010) several bottlenecks impede the further development of Brazilian intermodalism:

- Underinvestment: Today, railroads and waterways are in no position to be the trunk lines for freight transport in a country the size of Brazil. As a result freight uses mainly trucks for long distance hauls. Thus, a multimodal approach is needed for these long shipping distances in which trucks collect the freight and then transfer it to trains or barges which will more efficiently transport the freight over the bulk of the distance it need to travel.
- Lack of transfer terminals: Freight transfers need to be unified and adequate terminals contribute to reduce the costs of transferring freight between modes.
- Separate insurance: Insurance companies do not issue policies to cover all modes involved in a multimodal shipment, but instead require purchasing a separate policy for each mode.
- Excessive paperwork: Government regulations and current legislation allow the use of a single waybill for multimodal transport but do not prohibit states from requiring separate waybills for each mode of transport. Today, few states fully recognize the multimodalism transport waybill, incurring in additional paperwork and sometimes paying the waybill twice.
- Labor: The Brazilian Central Bank does not recognize multimodal transport operators, making it impossible for them to carry out transactions in foreign currency, impeding multimodal transport across borders.

- Taxes: The tax on goods and delivery service (ICMS), varies from state to state, providing incentives to shippers to avoid states with higher taxes and in doing so, often they do not use the most efficient routes and combination of modes.

2.2.4 Integrated Business Models

Besides the Brazil's current logistics environment shows an infrastructure bottleneck, companies have already started thinking of integrated solutions by investing in operations and services that do not render today. Companies are now implementing freight forwarding, technology-based services, warehousing, trading and software to enhance the logistics of the clients in order to offer a complete integrated solution. However, each industry has its own and unique features, attributes and needs in relation to operations, as well as different products. Thus, the very concept of integration is inseparable to the idea of tailor-made solutions.

The vibrant auto sectors, which have emerged not only in Brazil but also in China, Turkey or South Africa, demonstrate the development of dividends, which accompany the development of a strong service sectors markets with world class integrated logistics service providers in their mix. Freight brokerage is also a big service that some Brazilian companies are able to do very well due to their closeness to the government agencies and their understanding of what is happening on the ground better than anyone else out there. Hence, the belief of Brazil's companies is that the more integrated they become, the more their clients will value them as a single service provider and the more willing they will be to consolidate their business with them, and consequently pay a little more for the service.

2.2.5 Technology Development

Today, companies recognize technology as a core part of their business. They understand that they must continue to invest in their proprietary technology for their operating systems in order to allow them gain more flexibility. Hence, Brazil's logistics

technology implementation has evolved during the last decade and today is fully managed by high technology systems featuring modern architecture, bringing transparency and efficiency to import and export transactions in most of the part. Some systems are also connected to each other, inspiring safety and visibility for the whole process.

The main technological systems are:

- **SISCOMEX:** General foreign trade system that controls import and export cargo movements electronically.
- **MERCANTE:** Organizes the handling of information on transactions pertaining to ocean cargo transport. It promotes the integration among many Siscomex systems.
- **SISCARGA:** Conducts customs control, connecting Brazilian Merchant Marine and the internal revenue office.
- **MANTRA:** In charge of controlling the air cargo.

These four electronic systems are interconnected to each other permitting data crossing. Thus, the customers are able to manage the entire process and trace more rapidly. It also helps prevent risks and in case of abnormalities it makes easier to find. In addition, because technology and computer-based systems are largely used in Brazilian both international and national market today, the entire logistics process can be monitored more efficiently, providing higher levels of transparency and reliance, comparable to those of developed countries.

Despite the technological advances made during the last decades, this activity still has a high level of bureaucracy due to the large part of the process is dependent on the handling and exchange of documents among all parties involved.

2.2.6 Security

In the recent years, the level of robberies and theft has increased significantly and as a result, the cost to insure the transported loads of valuable freight is very high. Thus, companies try to avoid transportation of valuable loads or they diversify them among the different modes attempting to reduce the risks. However, by doing so, companies decrease the cost of insurance and consequently the risks, but they also reduce the cost per unit of transportation cost.

Transportation insurance is the most traditional type of insurance in the Brazilian market. Property insurance can cover domestic goods (mandatory for certain values and risks) or international goods. The most common types of protection are against theft and accidents. While in the past most international insurances were taken abroad, today, exporters usually take out insurances in Brazil to cover exported goods. The reason is that foreign companies started establishing them in Brazil and introduced a change in the market, incurring in multinational insurers to open more branches in Brazil (AMCHAN 2010). This scenario has created a competitive environment for insurance companies by bringing stability and competitive insurance prices for end consumers.

Improve the security to minimize stolen freight while at the same time maintaining the costs has become the key point for the companies. Thus, international shipping and aviation, in particular, are requiring higher standards of security in freight but they have not caused considerable increases in time and costs. On the other hand, the increase in security of port operations have directly impacted transit times, resulting in larger inventories and costs such as escorting and risk management (Wilson, 2005).

2.2.7 Legislation

The Brazilian logistics panorama shows that most sectors, despite making some recent progresses, still have room for improvement. Hence, legislation is an important player that can help improving logistics efficiency through enhancing the environment for

greater private sector participation and through unifying institutional structures to promote policies in favor of non-road modes. In general, today, the lack of an efficient legislation resulted in a lack of price competition between modes, low coverage and limited players incurring in higher prices for goods and services compare to other OECD countries.

Providing a proper legislation for current and future operations is in the agenda of the government. Today, the Brazilian government defines two types of PPP:

- The Sponsored Concession which is the concession of public services or public works legislated by Law/8987 of 2005 and involves a tariff charged to users in addition to a monetary contribution of the public administration to the private partner.
- Administrative Concession which is a contract for provision of services in which the Public Administration is a direct or indirect user, although it may embody the provision of works or goods.

Since 2009, the number of PPPs have maintained stable mainly due to the temporary credit crisis. However, in august 2012, Dilma Rousseff, the President of the Republic of Brazil, announced the establishment and reinforcement of PPPs for the different infrastructure development that are taking place in the country. The PPP contract must also involve some obligations between the different players and the states may establish their own PPP laws. On the other hand, legislation is not yet able to deal with the import and export of many products and support system that should facilitate the process, it still has gaps and the system continues clearance cast. Moreover, the customs agencies have not followed the evolution and to understand the import procedures, manuals should be consulted. Thus, it becomes necessary to develop an efficient legislation that could succeed in overcoming that situation.

2.2.8 Third Party Services Provider

The 3PL industry in Brazil has been experiencing accelerated growth for the last decade. This growth can be observed on multiple levels such as the variety of services offered average of revenues, sectors served and sector turnover volume. Today, according to ILOS (2008), the 3PL market is shared by some of the largest, most well-known international players (such as Ceva, DHL, and Ryder) as well as major national players (such as Vale and ALL Logística), and medium size national operators (such as Cesa, Rapidão, Cometa and Wilson Sons). Cesa and Rapidão Cometa first began providing road freight transportation services, while ALL Logística provided rail services and Wilson Sons main activity is based in ocean support services. The small-package delivery market is ruled by Empresa Brasileira de Correios, a Brazilian state owned company of mail delivery.

In Brazil, the transportation is the logistics activity with highest amount of outsourcing due to the ease of service accessibility and low costs. The second most outsourced activity is customs dispatch and the third is risk management. Between the 2004 and 2011 happened the major increase in outsourcing and in 2008 the trend is of a surge in the demand for service efficiency. However, the infrastructure deficiencies, the complex tax system and the absence of a specialized labor force act to slow down the implementation of more sophisticated logistics solutions (ILOS, 2008).

2.2.9 Brazilian logistics compare to other countries

Using the recent and readily available data, four logistics measures are currently used to compare Brazil with other countries:

- The World Bank Logistics Performance Index.
- The World Bank Doing Business.
- The World Economic Forum's Enabling Trade Index.
- The World Bank estimate of logistics costs as a proportion of GDP.

The Logistics Performance Index (LPI) is designed and administered by the World Bank in cooperation with the Turku School of Economics of Finland. The scale of study is from 1 to 5 and every year provides an in-depth cross country assessment of the logistics gap among countries by drawing information from professional operators and users involved in the logistics sector. Thus in 2012, on the overall LPI (see Figure 4), Brazil ranks number 45 out of 155 countries, lagging behind countries with similar dimensions such as: Mexico, India, China, Australia, United States and Canada (World Bank, 2012). For category, customs performance and international shipments are perceived more as a problem by international traders than infrastructure or the competency of logistics operators. On the domestic level, compare with the Upper Middle income group, Brazil has mixed results, performing well in terms of efficiency of processes (lead time and costs of imports), but low in terms of fees, charges, quality of infrastructure and container costs.

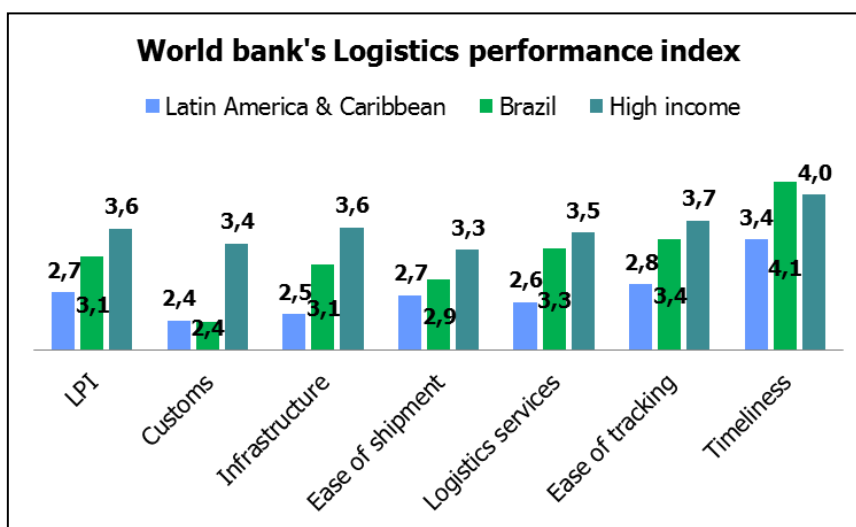


Figure 4: World Banks's Logistics Performance Index and man features.

Source: World Bank 2012.

The World Bank Doing Business database allows the comparison of 181 economies, including logistics indicators. Brazil's overall rank in the cost of doing business is considered high, 125, and under the measure for trading across borders it ranks 92, way ahead of Argentina (World Bank, 2010). In addition, also according to the World Bank it takes more than twice as long for Brazil to export as it does the United States, and almost four times as long as it takes the United States to import goods. However, the

time to export and import is better in Brazil than in China, though the costs are considerably higher in Brazil. Overall, Brazil's efficiency appears to be good, but with room for improvement on the cost structure.

The World Economic Forum's ETI measures the extent to which institutions, policies and services facilitate the free flow of goods over the borders and to the final destinations. It measures market access, border administration, transport and communications infrastructure, and business environment. In this Index, Brazil ranks 121, mainly due to the impediments and room for improvement in addressing the level of protectionism quality and availability of transport infrastructure, particularly weak on availability and quality of roads and port infrastructure.

The World Bank (2010) logistics costs as a percentage of GDP calculates that Brazilian logistics costs are approximately 15.4% of GDP (see figure 5), which is almost twice of the United States (8%). This index includes administration, warehousing, inventories and transportation. In general, these figures place Brazil among the best performers in Latin America, yet, is significantly lagging OECD and other emerging countries.

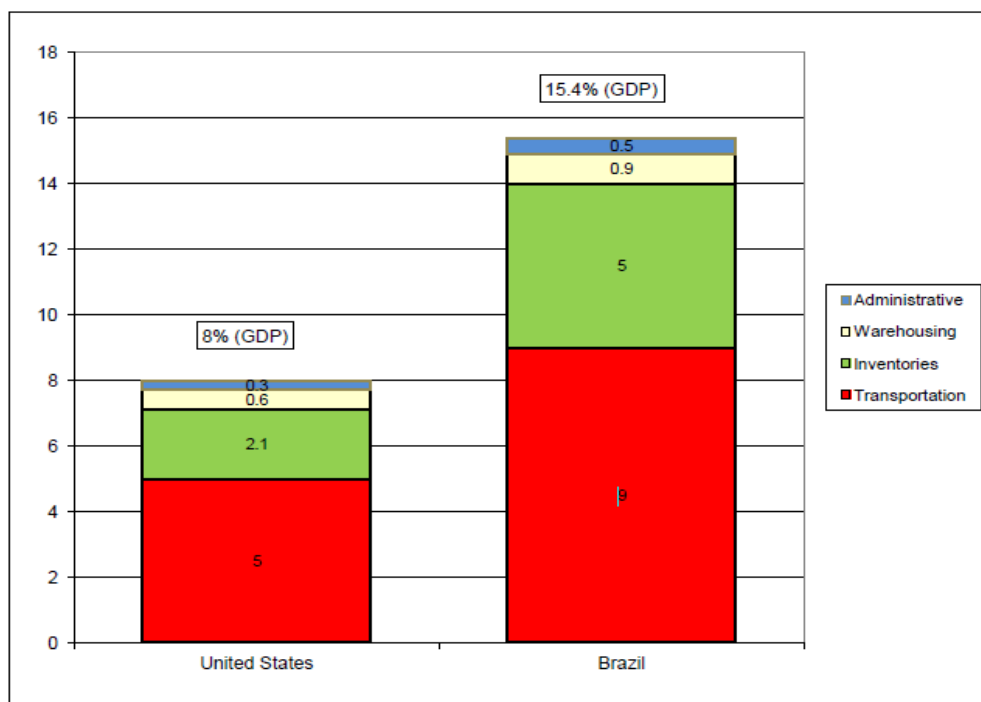


Figure 5: Logistics cost as a percentage of GDP

Source: World Bank 2010

The overall results indicate that in some logistical aspects, Brazil is well established and way ahead of its competitors, while in others Brazil experiences impediments to its performance. Hence, compare to other Latin American countries it may be considered as a better performer, however, compare to the country's main competitors, such as China, India and OECD countries, the logistics system is generally underperforming. In addition, inadequate logistics infrastructure and supply chain procedures may also become a serious bottleneck in preventing timely delivery of an increasing amount of agricultural and general cargo products to the main export gateways, affecting the competitiveness of the country and particularly of the products with high added value.

2.3 Transportation

Movements of people, goods and information have always been fundamental components of human societies but it was during the second half of the twentieth century when it significantly accelerated due to the trade liberalization, the materialization of economic blocs, the comparative advantages of global labor and best use of resources. Nevertheless, these conditions are interdependent with the capacity to manage, support and expand movements of passengers and freight as well as their underlying information flows. Today, transport systems support a variety of activities from commuting, supplying energy needs, to distributing parts between factories. Therefore, developing transport systems has been representing a continuous challenge to satisfy mobility needs, to participate in the global economy and to support economic development.

Transportation is the most important element of the logistics in most businesses, and it plays a fundamental role in providing customer service. As Fleury et al; (2000) states, transportation is, on average, about 60% of logistics costs. Similar conclusion is stated by Ballou (2001) describing transportation logistics activity as the most important process because it absorbs, on average, one to two thirds of logistic costs. Adding, no modern company can operate without moving their goods. As Rodrigue et al (2006) explained, the purpose of transportation is to overcome space, which is shaped by a

variety of human and physical constraints such as distance, time, administrative divisions and topography. The goal is thus to transform the geographical attributes of freight, people or information, from point of origin to a destination, conferring them an added value in the process.

Alvarenga and Novaes (2000) stated that in order to organize an efficient system of transportation is necessary to rely on a systemic view that involves planning, and to develop so is necessary to know the flows in various network connections, the current service level, the level of desired service and the types of equipment available and their characteristics. Yet, other authors argued that usually in less developed nations, the production and consumption occurs at the same place, thus resulting in low participation in the transport processes, and then limiting the market to local production. On the other hand, when the transport services are better, the cost of distant markets becomes competitive (Pozo, 2004).

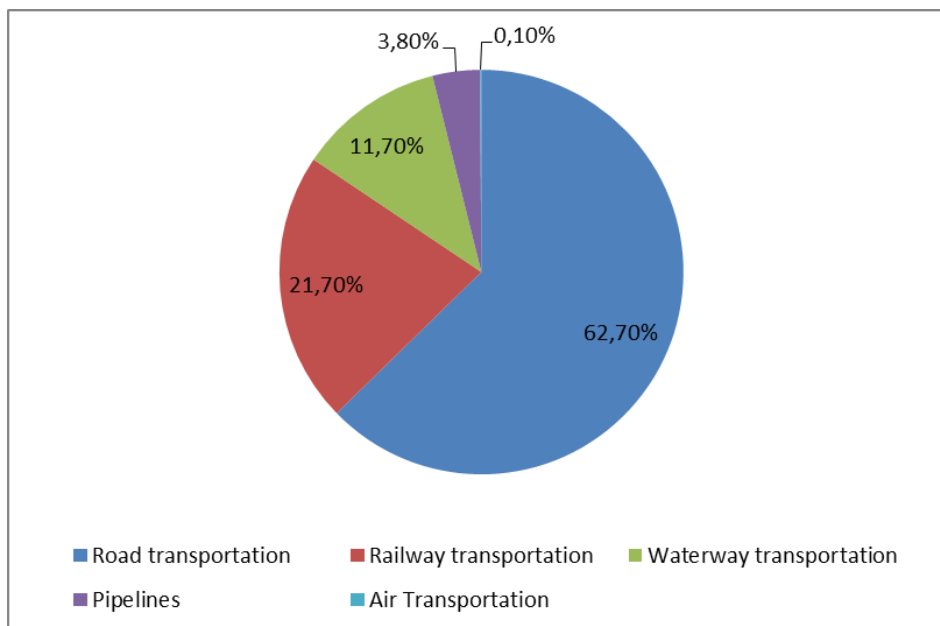
In order to provide an efficient logistics system, a good transportation infrastructure is necessary to reduce operation costs and promote service quality. The improvement of transportation systems needs the effort from both public and private sectors because a well-operated logistics system could increase both the competitiveness of the government and enterprises (Tseng Y, et al. 2005).

2.3.1 Brazilian transport matrix

According to the Receita Federal do Brasil (RFB, 2012), the current transportation system is incompatible with the country size. The road transportation plays a leading role in Brazil with roughly sixty percent of total transport volume (RFB, 2012), and the several well-built highways available are in the economically powerful south-west and south but not in the middle-west, north and north-east regions, where opportunities are limited in terms of various means of transport. There exist other means of transport in the country but the major challenge is the long-term reduction of the high dependency of road transportation, only possible after applying an investment model that favors

partnerships between the public and private sectors in different infrastructure development (ports, airports, roads, railways, intermodal distribution centers, sanitation etc.) through the Accelerated Growth Program and the resumption of the institutional reforms that could strengthen the competitiveness of the Brazilian economy and reduce transport-related costs.

Additionally, Brazil's transportation sector is poor by international standards, but with large potential for improvement. According to ILOS (Institute of Logistics and Supply Chain, 2010) the characteristics of the Brazilian transport matrix further emphasize the relevance of the road transport sector. Unlike other countries with similar characteristics, 62 per cent of freight in Brazil is transported by road, 21 per cent by rail and 11 per cent by waterways (see graph 2). The state of the truck fleet further worsens the situation due to the 1.3 million trucks traversing the country, from which 45 per cent are over 20 years old and about 20 per cent are over 30 years old.



Graph 2: Transportation modes of Brazil.

Source: ILOS (2010)

The largest investments throughout history were made in railroads, roads and highways, while the other transportation modes had fewer and lower investments. The solution would consist of a greater investment in the expansion of Brazilian transport matrix,

whose focus would be directed to other modes and intermodals. On the other hand, Brazil's urban passenger transportation measured in the number of passengers per kilometer travelled, is concentrated in the use of automobiles (43 per cent) and buses (50 per cent). Rail transportation represents only 7 per cent of the total. The current deteriorated transport system is responsible for tremendous economic losses and the very high accident figures resulting in negative effects on national competitiveness. Therefore, there are immediate steps necessary to overcome the situation by investing in air transportation, roads, railways and waterways.

2.3.1.1 Deployment Costs of Transport

According to Rodrigues (2005) transportation costs are important elements to calculate the total costs of an organization. In most industries, the transport activity represents one of the most important elements in the composition of the logistics costs. In developed nations, the freight usually absorbs about 60% of logistics expenditures and between 9-10% of the GDP. Therefore, hiring transport services should seek for efficiency and quality, based on partner relationships. Other authors similarly explained that transportation is considered a very important element in the economy, and [...] the most important logistics cost for enterprises. The activity of transportation management usually involves various tasks from deciding the method of transport and routes to the capacity utilization of the vehicles (Pozo, 2004). It can be classified as freight transportation and passenger transportation.

These costs can be lower if the government would invest in infrastructure. According to CENTRAN (The Center of Excellence in Transportation Engineering, 2008) the factor that hinders the development of the infrastructure of transportation modes is the lack of cost management of projects. To improve this situation, CENTRAN developed SINCTRAN (The National Transportation Costs System) which aims to reduce the difficulty of managing projects, by working together with the DNIT (National Department of Transport Infrastructure).

2.3.1.2 Load Transportation in Brazil

According to Alvarenga and Novaes (2000), the road transportation of loads is the most expressive mode of transportation in Brazil as it reaches practically the whole national territory. Nevertheless, according to Feltrin (2000), the atmosphere of this millennium turning is favorable to the truck competition, being stimulated by two sides: the increase of operational costs and the appearance of modal competitors. Thus, in this sense, some facts are inhibiting the hegemony of trucks such as:

- Freight influencing the final price of the product, stimulating alternatives of modal.
- The increase of oil diesel production and sales.
- Increase of robberies and theft in the transportation.
- The precarious state of conservation of most Brazilian highways.

As a result, the sector of load transportation in Brazil is experiencing a rejuvenated moment that places it as one of the most sensitive parts of logistics, entering the list of strategic subjects. Before, the cost of transportation of loads was an easy input to be reviewed to the price of the product or service, today, it can be the differential between the profit and loss of a company.

2.4 Transportation modes

Due to the trend of globalization and the use of new resources efficiency in recent decades (ERP, ECR and EDI), the importance of transportation modes in logistics management competitiveness has been growing in various areas. Today, transportation is the key element as it joints the separated activities and as it is required during the whole production procedures, from manufacturing to delivery to the final consumers and returns. Only a good coordination between each component would bring benefits to a maximum.

Thus, transportation modes are an essential component of transport systems since they are the means by which mobility is supported. There are three basic types depending on

over what surface they travel – water (shipping), land (road, rail and pipelines) and air. Each mode is characterized by a set of technical, operational and commercial characteristics. Thus, deciding on the appropriate transportation mode is very important when minimizing the costs. In this paper the description of the transportation modes developed by Rodrigue, Comtois and Slack (2006) is followed where road transportation, rail transportation, pipelines, maritime transportation, inland transportation, air transportation and intermodal transportation are explained.

2.4.1 Road transportation

This has become the dominant land transport system today. Automobiles, trucks and buses require a road bed and such infrastructures are expensive to build. Yet, there exists a wide divergence of costs, from gravel road to a multi-lane urban expressway. This is because vehicles have the means to climb moderate slopes and physical obstacles are less important than for some other land modes. Most roads are provided as a public good by governments, while the vast majority of vehicles are owned privately.

Hence, in every country, road transport modes have limited abilities to achieve scale economies. This is due to the size constraints imposed by governments and also by the technical and economic limits of the power sources. Road transport, however, possesses significant advantages compare to other modes: The capital cost of vehicles is relatively small, making comparatively easy for new users to gain entry, which helps the trucking industry to be highly competitive. Moreover, the relative high speed of vehicles and the flexibility of route choice together with the unique opportunity of providing door-to-door service, making cars, trucks and buses the modes of choice for a great number of trip purposes (Ballou, 2008). On the other hand, the success attained in cars, trucks and buses has raised a number of serious problems. Road congestion and major environmental externalities linked to transportation has become a major feature of most urban areas all around the world.

Brazilian road transportation came up with the construction of the Rio de Janeiro-São Paulo highway, which dates from 1926 (Rodrigues, 2005). However, roads were precarious until the 1950s, when Brasilia became the capital and the construction of roads throughout the whole national territory begun. Additionally, the physical distribution is mostly done during the day, clogging the main arteries of the city, increasing pollution levels, producing mediocre performance and accelerating wear fleets (Rodrigues, 2005). In addition, the vehicles used for road transportation are old compare to other countries and have great fuel consumption, incurring in high transportation costs. As Valente (2005, p45) explains, the reasoning is that truck fleet became one of the greatest phenomena as a means of transport, and Brazil is not an exception.

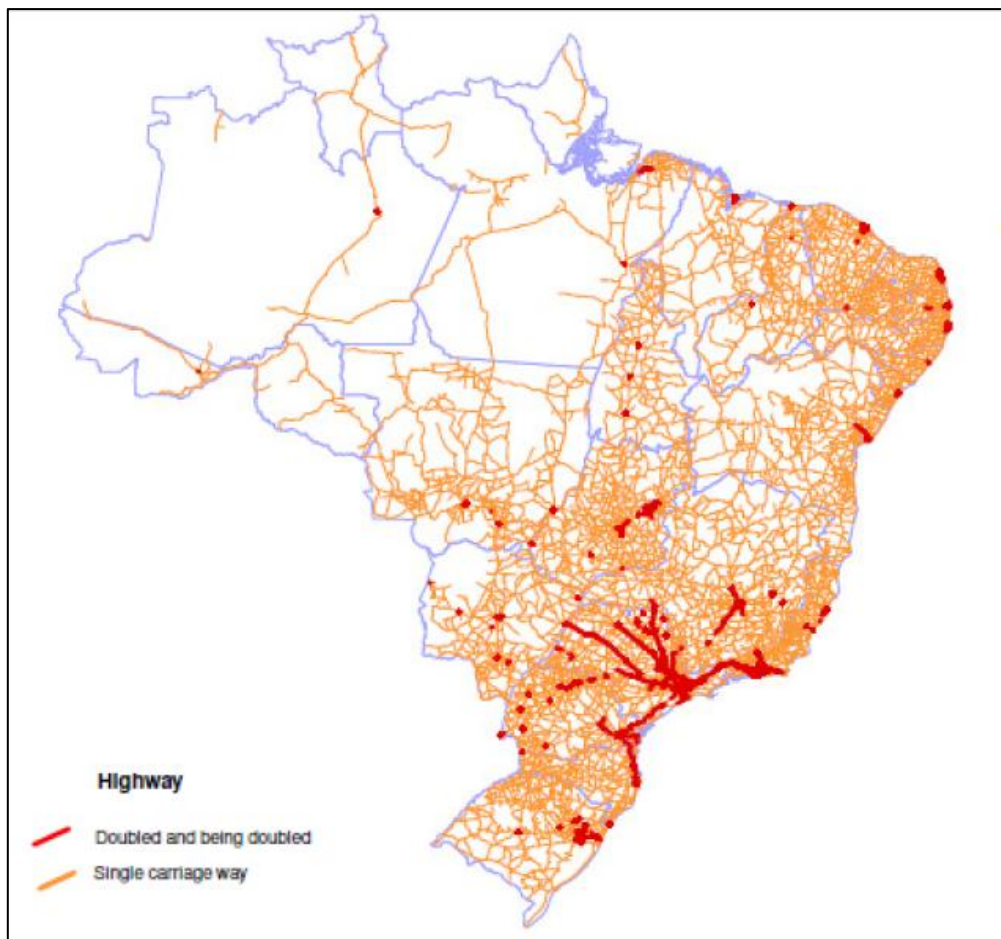


Figure 6: Highways in Brazil

Source: World Bank 2010

Usually, countries with continental dimensions, such as Russia, China, Canada and USA tend to use more the railroad transportation and less road transportation. On the other hand, countries with smaller dimensions usually indicate a preference for road transportation. Brazil, despite its continental dimensions, is positioned alongside with smaller dimensions countries characteristics where the road transportation has primordial position. Moreover, until the 1970s, the Brazilian government directed most of the investments to develop road transportation, connecting almost every city in the country. However, in 1988, the National Road Fund (responsible for the investments) went bankrupt, greatly reducing the allocation of resources to the modal, as well as maintenance of the roads that were already built.

In 2010, Dilma Rousseff announced new investments of more than R\$ 24.7 billion as a part of the PAC 2 (Growth Acceleration Plan) on infrastructures and road transportation. These investments are under the responsibility of the DNIT (National Department of Transport Infrastructure), which verifies whether the resources are being applied accordance with the government planning (DNIT, 2010). These investments are capital and crucial for the economic growth of the country as the tonnage of transported goods is expected to rise with an accompanying increase in the movement of laborer. Hence, prompting truck companies, private owners, and business leaders claim for more spending on the nation's transport system.

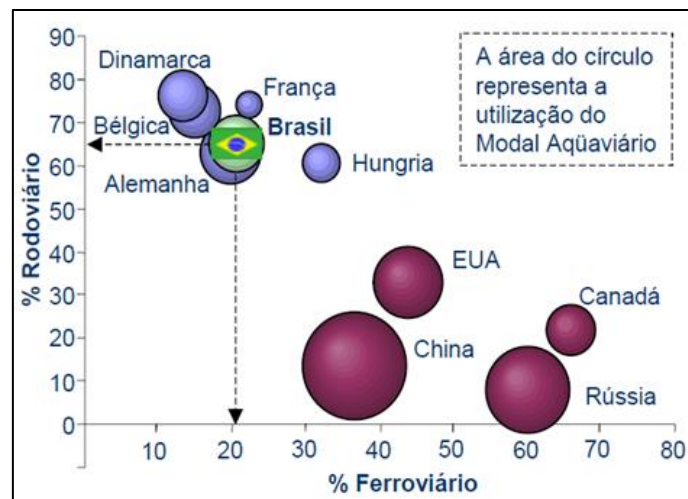
However, while Brazil is trying to attract private investors by presenting investment opportunities, the difficulties associated with Brazil's business environment limited international investors as they are forced to rely on local partners due to a high level of bureaucracy and complex regulations (SECOM, 2012).

2.4.2 Railroad transportation

Historically, the investments in railroad transportation have been made by governments and in less quantity by the private sector, mostly due to the high initial capital costs required. This high initial investment represent an important entry barrier that tends to

limit the number of operators and to delay innovation process, as the rolling stock has a service of at least twenty years (Rodrigue et al., 2006).

Railroad transportation has some disadvantages compare to road transportation. First of all, it is affected by topography because locomotives have limited capacities to mount gradients, incurring in expensive engineering solutions. Second, both freight and passenger transport systems are usually different and the integration between them is difficult (Rodrigue et al., 2006). Nevertheless, an attempt to standardize the rail services within regions and across the countries is being made.



Graph 3: Modal Participation in the World - Tons x Kilometer

Source: ILOS 2008

The ability of trains to haul large quantity of goods -allowing scale economies- and significant numbers of people over long distances is the mode's biggest advantage. Once the freights have been assembled or the passengers have boarded, trains can offer a high speed and high capacity service with lower consumption of energy (per unit load and per km compare to road transportation). However, passenger service is effective in places where the population density is high and freight traffic is dominated by bulk cargo shipments, agricultural and industrial raw materials in particular. Although usually identified as a mode that enjoyed its glory days during the nineteenth century, today, is enjoying resurgence because of technological advances in the end of twentieth century.

According to the ANTT (National Land Transport Agency, 2009), Brazilian railway system has about 30,000km and is concentrated in the South, Southeast and Northeast, with small connections in the Midwest and North of the country. It is used mainly to transport goods with low added value and for large distances (Nunes, 2009). According to ILOS (2010), Brazilian railroad infrastructure is able to transport much of the domestic production efficiently and counting for 21.70% of the total transportation matrix. However, comparing it with other countries with similar dimension (China 37%, U.S. 44%, and Russia 60%) Brazilian railroad transportation representativeness shows to be smaller. Similar reasoning is given by Rodrigues (2005), explaining that railroad transportation is able to carry large volumes of goods in an efficient manner, with less accidents and less incidence in the occurrence of thefts and robberies.

2.4.3 Pipelines

In Brazil, the pipelines only represent 3.8% of the transportation matrix. This is mainly due to the lack of investment in the sector. According to CETESB (The Environmental Company of the State of São Paulo, 2010) pipelines are specially designed and constructed according to international safety standards for transporting oil and oil products, alcohol, gas and chemical products in long distances. In this sense, Rodrige et al. (2006) describe pipelines as an extremely important and extensive mode of land transport, although very rarely appreciated by the general public mainly because they are buried underground or under the sea. Two main products dominate the pipeline traffic: oil and gas, although in Brazil minerals are also transported.

Pipelines usually are designed with the purpose of carrying one commodity from one location to another. They are built largely with private capital and because the system has to be in place before any revenues are generated, represent a significant capital commitment. Pipelines routes tend to link isolated areas of production with major centers of refining and manufacturing in the case of oil, or major populated areas, as in the case of natural gas. This mode of transportation is effective and cheap carrying large

quantity of products where no other feasible means of transport is available as it does not use fuel or special vehicle. The routing of the pipelines is indifferent to the terrain, although environmental concerns are frequent worldwide and geo-political factors play a very important role when crossing international boundaries. In addition, once this mode is built it becomes static, inflexible, and difficult to expand (Rodrigue et al., 2006).

Although operation costs are very low, the initial investments required are high and they vary according to the diameter of the pipe, increasing proportionally with the distance and with the viscosity of the fluid. Hence, a beforehand study is necessary in order to develop an accurate supply demand fluctuation to optimize the resources.

2.4.4 Maritime transportation

One of the most important modes for industry and logistics in Brazil, the maritime transportation has not its potential properly used. In Cecatto (2009) words, this mode of transportation has the capability to generate new jobs by increasing the load movement and strengthening the logistics domestic in the country. In this sense, according to Rodrigues (2005), the maritime transportation is divided in two parts: long course and cabotage. Long course are the international maritime transportations, which covers regular services (liners) and irregular routes (tramps). Cabotage is the maritime transportation along the Brazilian coast. Also according to Rodrigues (2005) there are five types of ships:

- Cargo ships: are vessels designed to carry non-bulk cargoes.
- Tanker ships: They constitute the 48% of the total fleet capacity worldwide. They have a higher load capacity and are classified by product and size.
- Container ships: Possess high cruising speed and they allow modal transfer inside the terminal.
- Roll-on/roll-off ships: ships designed to allow cars, trucks and trains to be loaded directly on board.

- Bulk carriers: ships designed to carry specific commodities, differentiated into liquid bulk and dry bulk vessels.

As in the other modes, this modal has some advantages and disadvantages as Rodrigues (2005) states:

- Advantages: High energetic efficiency and high levels of economy of scale.
- Disadvantages: Requires the existence of ports and services are slow and with large number of handlings.

The maritime transportation requires high capital initial investments due to the size of the shipments, representing a significant capital outlay. In some regards, therefore, the shipping industry is quite open and historically has provided opportunities for entrepreneurs to accumulate large fortunes. Thus, today, many of the largest fleets are in private hands. Physical barriers represent also a particular problem when shipping. For instance, in some places the water depth is not enough for ships to enter, or the rapids simply preclude navigation, or land separates the seas. Therefore, the maritime transportation still needs much investment to be used to its fullest.

2.4.4.1 Cabotage transportation

The cabotage or coastal navigation system was and still is mainly reserved for Brazilian flag vessels, with the possibility of using foreign flag vessels only in certain situations and merely after the opening of the Brazilian shipping market to ship-owners, shipping companies and vessels from all countries. Today, this industry faces major challenges to growth. The limited production capacity of domestic shipyards is posing a major hurdle to such plans and despite the national shipping industry recovery phase, it is mainly focused on the construction of offshore units for the oil industry (e.g. maritime support vessels, platforms and floating production, storage and offloading vessels). Thus, Brazilian shipyards appear to lack the capacity to meet the demand for new builds for cabotage.

The current situation presents many important challenges to the whole maritime transport industry as these problems need to be settled urgently in order for cabotage to grow alongside with the rest of the industry. Thereby, the government, shipping companies and shipyards are establishing conversations to promote the adoption of measures to make it easier to import vessels while at the same time supporting flexibility and reducing the tax burden. A further aspect that concerns the three parts is the requirement for Brazilian crew as there are not enough seafarers to meet the demand in view of the growth and expansion of offshore and cabotage activities nor plans to expand the training system.

2.4.5 Inland waterway

According to ANTAQ (The National Agency of Waterway Transportation) Brazil has 19 inland waterways. Rodrigues (2005, p75) explains that the inland waterway was discovered with some decades of delay as an alternative load transportation mode in the country, but today it has the status of a national integration. In large territorial countries like Brazil the use of inland waterways is a great alternative for the disposal of the Brazilian production, which has been widely used for some years now due to its lower costs.

Goebel (1996, p34) explained the main advantages and disadvantages of inland waterway transportation as:

- Advantages: A high transport capacity, cheaper freight compare to road and rail transportation, much lower variable costs, unlimited availability and facilitation of the use of multimodality.
- Disadvantages: Low speed, requirement of installations and equipment, transport capacity variable depending on the level of the waters, fixed routes, high investments requirements.

The inland waterway is a great alternative transportation mode. Also as Rodrigues (2005, p75) states, besides the advantage of the capacity, 10 tons of load only require 12

men in its crew, while the road transportation to move the same amount, 556 men are necessary in order to operate a fleet of 278 trucks with 36 tons capacity each.

2.4.6 Air transportation

The initial development of air transportation took place in the 1920s and 1930s, and not always for commercial reasons (Graham, 1995). At the beginning it was considered as a means of providing a national air mail service (U.S.) and of establishing long-haul air services with the colonies (UK and France). During the 1950s and 1970s the development of air transportation continues and many Asian, African, Caribbean and South American (including Brazil) nations created their own airline companies. It was in the 1970s, when the perspective changed and air transport shifted to be another transport service (Rodrigue et al., 2006). According to Rodrigues (2005) there exist three aerial services: regional, international and intercontinental. The most important transportation advantages are the following ones: speed, efficiency, competitiveness and reliability, while the major disadvantages are: the lower load capacity and higher value of the freight.

The airline industry is high capital intensive due to the required initial investments and operability costs (mostly fuel consumption). Today, with limited room to lower labor requirements, airlines are trying to reduce labor costs by cutting salaries, benefits and by carrying freight in the belly-hold of passenger airlines. In the late 1990s new low-cost airlines enter the market worldwide and in January of 2001 *Gol Linhas Aéreas* started its operations in Brazil (Oliveira, 2005).

Technology also has had an important role in the development of the air transportation. It has worked to overcome some of the constraints and also to significantly extend the range of the aircrafts, thus, while 40 years ago aircrafts were just beginning to be capable of crossing the Atlantic without stopping at intermediate places, are now capable of making trips of up to 18 hours duration.

Prior to deregulation movements (1960s and 1970s), many airline services were taking place on a point-to-point basis. With deregulation and opening of the industry competition, a system of hub-and-spoke networks emerged, as airlines rationalize the efficiency of their services (Rodrigue et al., 2006). In addition, there has been a significant development of alliances in the international airline industry. These alliances are voluntary agreements to enhance the competitive positions of the partners. As a consequence, members benefit from greater scale economies, a global coverage, a lowering of transactions costs and a sharing of risks, while remaining commercially independent (Agusdinata and de Klein, 2002). Nevertheless, air transport internationally is still dominated by bi-lateral agreements between nations (Graham, 1995).

In Brazil, this transportation mode represents only the 0.10% of the transportation matrix. However, it has become extremely important for both passenger and freight traffic. Passenger traffic is mostly made up of business travelers and the general public, many of whom are holiday-makers, incurring in the growth of national and international tourism.

2.4.7 Modal competition

Modes can compete or complement each other depending on their key operations, commercial advantages and properties. However, the imposed fixed costs (terminal cost structure of each mode), speed, quantities to be shipped and the value of the goods appear to be the most important factors when choosing the mode (Rodrigue et al., 2006). Road, rail, air and maritime transport have different cost functions depending on the distances. Road, for instance, has a lower cost function for short distances, but its cost function climbs faster than rail and maritime. Indeed, maritime transportation might offer lower variable costs for long distances, but for short distances and small quantities of goods, road transportation tends to be more competitive. On the other hand, air transportation offers the speed and accessibility but is at the same time the most expensive solution.

In the last decades the trade in manufactured goods and parts has increased, and these trends in demand affect the modes differently. Modes that offer fast and reliable services gain over others that offer lower costs but are also slower. For passenger services, railroad has difficulty in meeting the competition of road transportation in short distances and air transportation in long distances. For freight, railroad and maritime transportation have suffered from competition from road and air transportation for high value shipments. On the other hand, maritime transportation, pipelines and rail still perform well for bulkier shipments, although in Brazil these modes are less developed compare to other countries with similar dimensions.

Geographical variations are also important in modal competition as transport infrastructures and networks vary enormously depending on the availability. Some regions possess many different modes that in combination provide a range of transport services that ensure an efficient commercial environment.

3. METHODOLOGY

There are different methodologies for research, and methodology refer to the choices authors make about cases to study, method of data gathering, and from of data analysis (Silverman, 2007). The choice of qualitative research allows flexibility between gathering data and interpreting them within framed theories. As in this research, qualitative research usually works with small samples of people, nested in their context and studied in-depth, very different from quantitative researchers, who aim for larger numbers of cases and seek statistical significance (Miles & Huberman, 1994). Shank (2002) defines qualitative research as a form of systematic empirical inquiry into meaning. By systematic he means planned, ordered and public, following rules agreed upon by members of the qualitative research community. By empirical, he means that this type of inquiry is grounded in the world of experience. Similar studies add that qualitative research involves an interpretive and naturalistic approach by studying things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them (Denzin and Lincoln, 2000).

Other authors explain that qualitative research is not to generalize the results but to gain a greater understanding of a studied phenomenon by concentrating more on finding the opinions, experiences and feelings of the individuals and producing subjective data by concerning with questions about why, how, what and why (Zikmund, 2000).

In this thesis, the author uses a qualitative research based on scenario planning development. While conducting a qualitative research, this paper tries to ensure the validity and reliability of the research. The sources of data include in-depth interviews with different company representatives of the national logistical and transportation sector, as well as information gathered during the work developed by the author in one of the most important logistics company of Santos (Brazil). This information includes different workshops developed at company meetings and some informal interviews developed with the different logistics representative's board directors. This paper also includes both primary and secondary data throughout the data collection and analytical section.

3.1 Introduction to scenario planning methodology

Heiko (2008) defines scenario planning as an internally consistent, plausible, and challenging narrative description of possible situations in the future, based on a complex network of influence factors. Similarly, Schwartz (1996) defines scenarios as a tool for ordering an individual's perceptions of the alternative future environments in which the consequences of their present decisions will occur. In other words, scenarios are plausible narratives about the future, but they are not predictions, because it is not possible to determine future conditions with a reasonable degree of certainty.

The first scenario planning methodology used in business context was developed by the energy company Royal Dutch Shell during the oil crisis of 1973 (Van der Heijden, 2005). It was in 1960s and early 1970s that Ted Newsland and Pierre Wack, two Shell employees decided to try a novel approach, aiming for a consistent use of scenarios in the business environment and not only in military (Global Business Network, 2006).

As the history has shown, Shell was the only major oil company that managed to be prepared for the shock off the oil crisis in 1973. As Kleiner (1996) mentioned within ten days after the 1973 Arab-Israeli war started, the planners had a written scenario package that explained the implications what was happening. However, the benefits of the scenarios for such a fast responder were not seen clear at the beginning. Moreover, Kleiner (1996) describes that many managers walked away not able to get numbers to act on or selected number from one of the scenarios and proceed further. The scenario planners were asked the question that is often asked nowadays - "which scenario was the most probable?" Hence, the planners had to explain that the scenarios presented various futures and each of them had serious consequences if the company was not prepared regardless of probability. The crucial learning's of the scenario makers at Shell are still valid today (Wack, 1984). The task of scenario planner is not only to produce a view of the future business environment, but to target for mental models of the decision makers.

3.2 Analysis of scenario planning methodology

The fundamental premise of scenario planning is to make decisions based on perception and not on the real world. Perception can be informed by the real world, but it is also shaped by our experiences, interests, knowledge base, capacity for denial, and the communities that we belong to. So, when making decisions based on an informed set of perceptions, it reflects the mental map that we have about the world works (Schwartz, 2012).

Scenarios can help business units generate plans within macro scenarios, or look at how particular markets may be affected by global scenarios. However, they are not very useful if they sit on a shelf. In fact, scenario planning must be kept alive through regular strategic conversations among the leadership and ongoing scanning and monitoring of changes in the environment. Thus, by understanding the cause and effect relationships, planners are able to develop timely contingency moves. Good scenarios development have to incorporate rigorous analysis and data, but at the same time they also have to be driven by profound and insightful imagination because they are not about getting the future right, but to making better decisions today (Schwartz, 2012).

Van der Heijden (2005) gives an overview of the two -generative or adaptive- methods of scenario planning that can be summarized as follows: Generative process is an iterative process, starting with the first set of scenarios used as a way to understand the strategic situation better and proceed to next iteration of the scenario set, and repeating until the strategic situation is successfully reframed. In adaptive process, scenario building phase is linear and predetermined. In most cases the first or the second generation of the scenarios is used to evaluate the strategy of the organization. According to Fulton and Scarce (2004), scenarios that are created during each iteration of generative and adaptive processes can be done according to three widely used methods - deductive, inductive and incremental approaches.

The scenario methodology – alternative paths lead to future scenarios

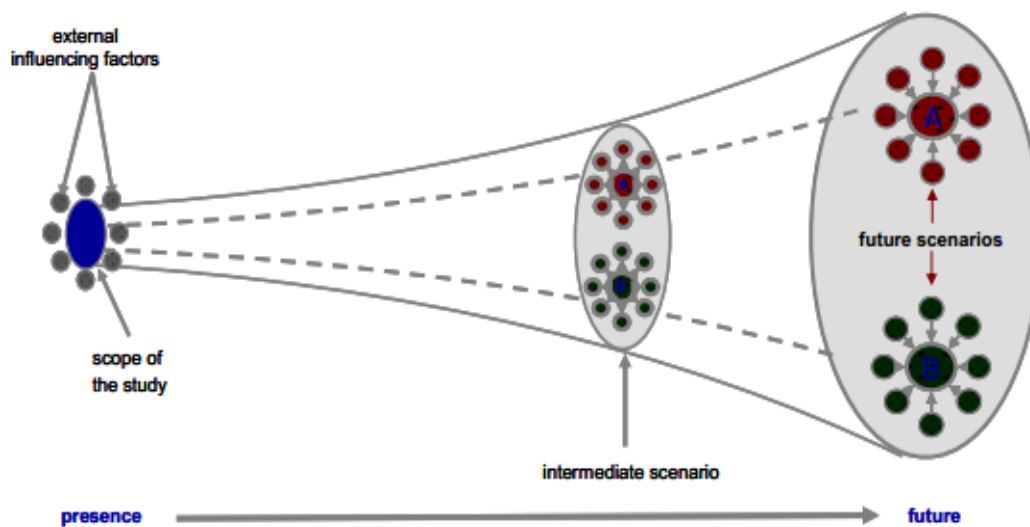


Figure 7: Scenario methodology - alternative paths lead to alternative future scenarios

Source: Geschka & Partner, 2005.

The deductive method creates an overall framework first and then fits the pieces of data and possible future events into the framework the way they fit naturally. The inductive method starts with brainstorming of the possible events in the future and the scenarios are constructed out of these events as story elements (Van der Heijden, 2005, p236). The incremental method (Fulton and Scarce, 2004) starts articulating the official future and then brainstorming for at least two different scenarios that diverge from the official future. Nevertheless, in any of the three methods, we first need to recognize which scenarios are unfolding in front of us. To do so, the early indicators -types of events, developments, or breakthroughs that are likely to occur as a particular scenario plays out - have to be taken into account.

3.3 Collection of data

The data collection can rely on many different sources of evidence and they can be classified in two types: primary and secondary data. Primary data is the information gathered through direct observation, personal interviews or conducting conversations.

The secondary data means the study of the document by using biographies, web-sites, documentary records, and other historical relevant tools for the studied issue.

3.3.1 Primary data

The primary data was conducted through both personal interviews and observations. During the data collection the author worked as a consultant analyst and he spent most of the time developing the strategic planning for one of the major transportation company located in Santos (Brazil).

3.3.1.1 Personal interviews

The logistics and infrastructure sector in Brazil has been widely discussed in recent years. However, in order to complement and expand the existing data and literature sources for a further development of different scenario planning, personal interviews were modeled on the basis of a qualitative research. The author believes that personal interviews would be preferable in this research, as this way is possible to interact personally with the different board directors of the companies as well as different personalities from the Brazilian transportation sector. The results were used to generate and formulate statements about the future outlook of logistics and transportation in Brazil.

Personal interviews can be done in different ways. Two are principal: structured and unstructured. The structured interviews were prepared in advanced but they were flexible regarding the questions raised in relation to the research problems and the interviewed specialty. The questionnaires contained questions about the background, the work of each respondent and his thoughts on the current and future of the logistics and transportation sector. The purpose of the interview was to obtain the highest information possible from the interviewed and to do so, some questions were avoided and some others were added during the interviews.

The first interviewed was Claudia Bezerra, the coordinator for import and export operations in *Giant Cargo*. With 10 years of experience her main focus is on air transportation. She works in a day-to-day basis with Infraero, the port of Santos, port of Manaus and with Viracopos airport administration. The second interviewed was Paulo Cesar, the board director of *Brasil Transporte Exterior LTDA* since 2001. A small company focused on road transportation with more than twenty years of history and mainly focused in the State of São Paulo. The third structured interviewed was one of the main responsible of ANTT (National Land Transport Agency). As the logistics and transport sector is crucial for the country and is highly dependent on the public sector, the author find out necessary to interview someone from the most important transportation agency in order to get deeper knowledge on the field.

In case of unstructured interviews, there is no schedule and they usually occur in a relaxed environment with different experienced and in-depth knowledge persons. These unstructured interviews were mainly developed while the author worked as a consultant analyst for the transportation company located in Santos. Thus, the author had the opportunity to ask questions frequently and get deep knowledge with the Brazilian logistics sector. Moreover, due to its privilege situation, the author was also able to get company background information, organization details as well as first-hand information from the logistics at the national level.

These interviews were crucial for the development of scenarios as well as the work developed by the author as a consultant analyst. Through this exercise, information and experts thoughts as well as new trends and future development were collected and analyzed. Additionally, the author was also able to identify the different patterns and issues that were important for the documentation of the driving forces, which afterwards defined the future scenarios of logistics and transportation in this work.

3.2.1.2 Observations

The observations developed in this research were qualitative and unstructured. The author took part at the different board strategic meetings and was also present at the workshop with the coordinators from all the departments of the company. By listening

to people with depth knowledge on the area but avoiding taking part of the things observed the author was also able to gather very valuable information for this work.

3.2.2 Secondary data

The secondary data consist of textbooks, journals, research papers, articles and company files and reports. They are collected from the library, target companies and through Internet. This data comprised the chapter 2 of theoretical framework. To provide an up-to-date picture most of literature used was published during the second half of the twentieth century. Scenario planning literature was also reviewed to explain the value of this tool and to analyze accurately the impact of logistics in the Brazilian future. It provides the background for preparing and conducting a scenario planning exercise for this research.

4. THE BRAZILIAN LOGISTICS AND TRANSPORTATION FUTURE

Regarding the activity of scenario development, a central question was taken as a basis:

What is the future of Brazilian logistics and transportation sector in 2032?

Thus, after analyzing the interviews and the related literature, few driving forces were identified: the level of clarity of government, the existing transportation matrix, the technology development (communications and IT) and sustainable development (environment protection, economic growth, and social development). However, in this paper the author focusses in the level of clarity of the Government as being the most important player in the development of infrastructures and the current transportation matrix and its importance for the future strategies.

In the level of clarity of the Government we have the flexibility of the country to the private sector involvement through different tools such as: *private participation*, *Public Private Partnerships* (PPPs) and the *private sector role*. In this side, the state and local governments enhance the increase of privatization practice of infrastructure construction and maintenance in order to improve the PAC implementation process and solve the Bras infection, an expression bemoaning the sprawling bureaucratic and rarely efficient public companies traditionally including “Bras” in their name. In this case, the most common form of privatization is concessioning. In addition, the government also flexible the access to credit for national companies by lowering the interest rates and presents a more flexible legislation that fosters alternative technologies and resources.

On the other side, as showed up at the interview realizations and also as The Economist journal described on its edition of 18th august 2012, despite the initial *flexibility* to privatizations and the enhancement of different practices, the state and local governments may appear to be instinctively hostile to anything akin to privatization in the future due to the different historical trends and political uncertainties. Thus, making

clear that such a backlog would strain any government and especially in Brazil, where current spending has long crowded out investments, it appears to be a remarkable hurdle. As a result, ineffective public sector often cannot get projects off the drawing board, the state firms mismanages infrastructures by often failing to carry out budgeted improvements and many PAC projects run years behind schedule. In addition, it frequently happens that cumbersome and illogical planning and environmental laws often halt infrastructure development for months - or even forever.

In relation to transport matrix, the high cost incidence of the Brazilian transportation system is correlated with the burdens of the road sector, which comprises about sixty percent of the country's total freight volume transportation in 2012. By this means, the road intensive practice will make logistics performance of Brazil remains outdated and undeveloped as well as the efficiency and competitiveness of the enterprises. In this case, the environmental concerns regarding the pollution will also make the country confront many issues.

On the other hand, the transformation of the whole transportation matrix from road intensive to a more multimodal intensive will reverse historical transportation problems while, at the same time, bolstering Brazilian economy. Thus, competition among modes will tend to reduce the *custo Brasil* by improving the logistics service, reliability and safety. Hence, further integration of the effective participation of all the transportation secretaries and states is kind to occur if the different players come together and work together.

The figure 8 shows the identified driving forces:

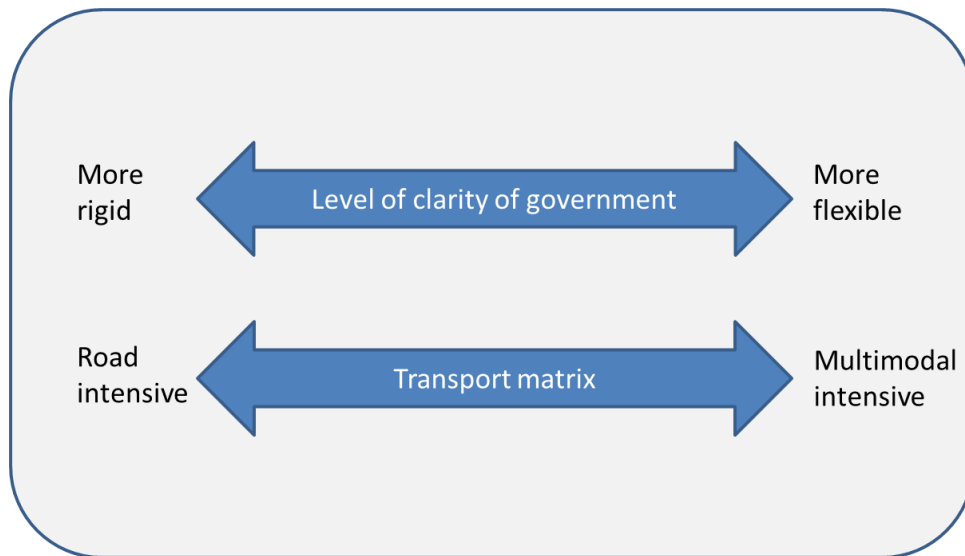


Figure 8: Driving forces for the logistics and transportation future in Brazil. Own elaboration.

Thus, if we use these two driving forces as the basis for the axes of a matrix, we outline four plausible scenarios relating the future trends of logistics and the transportation sector in Brazil.

In this section, first each future narrative is describe and afterwards the scenario. The narrative shows plausible situations, facts that can occur in each future scenario. Thus, each story will help raise new issues and illustrate how the relationship between the driving forces, as well as other industry variables may occur. Moreover, for each scenario, measurable indicators are listed. These indicators are the signs that show up whether logistics and transportation sector are following that particular scenario.

4.1 The four future scenarios and narratives of logistics and transportation sector in Brazil

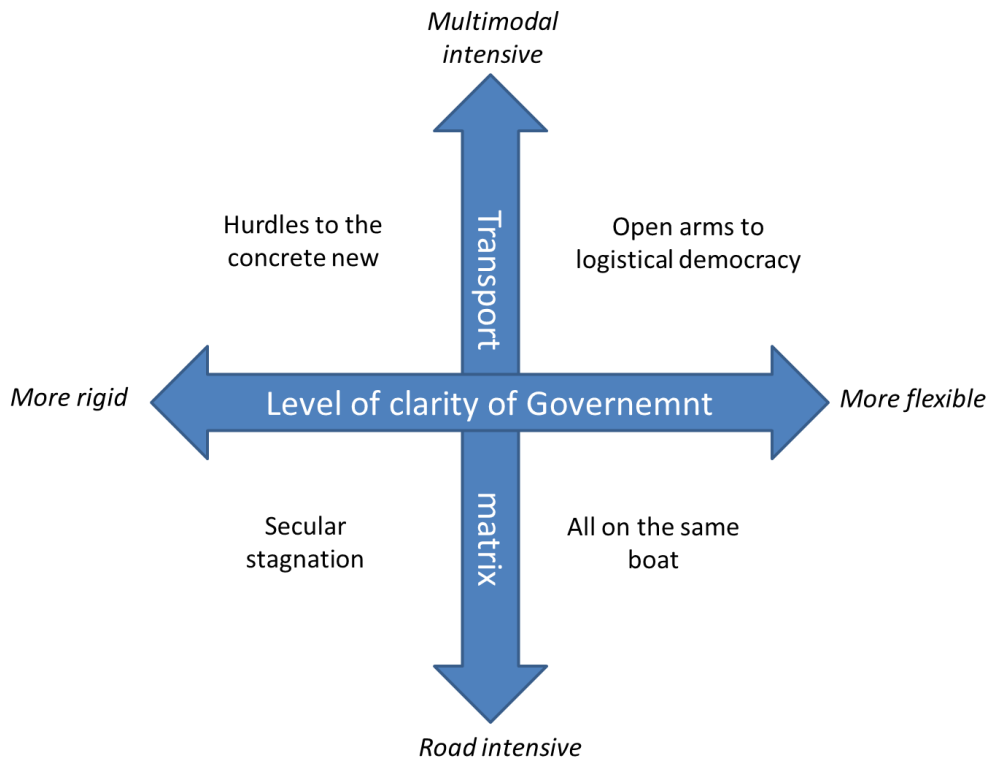


Figure 9: Prospective scenarios for logistics and transportation sector in Brazil. Own elaboration.

Open arms to logistical democracy narrative

Today, 28th January 2032 is the twenty-fifth anniversary of the Accelerated Growth Program and the government in order to celebrate the great success has elaborated a detailed research describing the most important improvements done during these years.

What has changed in the last twenty years?

Brazil has become the fourth largest economy in the world right after China, U.S. and India and the economic average growth of GDP has remained above 5 per cent each year. The logistics performance index indicates that the country has catch up the OECD country performance levels due to the successive investments in transport infrastructure along with rehabilitation and expansion of existing and development of new infrastructures.

Since 2012, when the former President of the Republic of Brazil decided that private companies will be an indispensable part of the different national logistics and infrastructure programs, large sums of private money started flowing into infrastructures to be refinanced by tolls and other usage concepts -mostly concessions. Thus, Brazil entered the new globally interconnected flows and trade conditions. This open mindset proved to be a boon to the institutions as the country became an important player into the global trade. Setting up huge infrastructure projects and complex planning's required close collaboration between the central government and private companies. In fact, many Brazilian inner-city logistics operations appeared to be based on a mandate given by public authorities to a particular provider. However, the shifting equilibrium between the private and public transportation sectors remains an important issue and the control over inappropriate and unwise private investments is greater than ever. Similarly, some public regulations begun to suffer from deficiencies emerged from the ambiguity of the objectives and proliferations of specialized public agencies.

These private investors, usually transnational corporations, started to performance as global political actors by taking charge of what previously was part of the Brazilian national responsibility; through multinational corporations and value chain networks organization of collaborating manufacturing firms worldwide. Moreover, they take over a key role by also running the complex logistics planning and operation processes which requires sophisticated capabilities that only can be provided by these big players. In the face of the influential policy networks, Brazil tries to safeguard the functioning of its social system by forcing transnational corporations to invest also in less developed regions.

By 2020, the Brazilian bureaucratic inefficiency is almost overwhelmed, tax burdens decreased and a significant increase in the country's finance occurred due to the decline of the BNDES (National Development Bank) participation in long term operations, which used to hamper the presence of the private sector at that time. As a result, the country efforts are now focused to other economic, social and regional plans.

Regarding the transport matrix, the PNLT program became a great success. Today, 29 percent of the freight transportation is made by road, 35 percent by railroad, 25 percent by waterways (inland, maritime and cabotage), 10 percent by pipelines and 1 per cent by using other transportations, resulting in a total logistics costs decrease of 6 percent. New waterways, pipelines (mostly for ethanol), ports, roads and railways are constructed. The country also created fiscal incentives for construction of more port terminals, intermodal transfer terminals, additional warehousing and improved port/customs interface with the incentivize of the proliferation of MTOs. Thus, efficient intermodal transport networks are created and the transport capacity becomes more effective by providing a well-balanced choice between speed and energy-efficient transportation. Dispatch or consolidation centers are instrumental to reach this high capacity by pooling incoming transport from several sources and the cooperation of competitors becomes the most common modus operandi in the logistics sector.

Today, the majority of economic activity and transport occurs in and between the Brazilian and global megacities. They are connected with each other through dedicated terminals and direct freight lanes located in the city peripheries, in order to overcoming problems of density like congestion or emissions. Also, container flows are highly automated to optimize the supply of necessary resources as well as some advances in rail, ship and truck design increase fuel efficiency.

Open arms to logistical democracy scenario

In the open arms to logistical democracy, the total overhaul of Brazilian logistics and transportation matrix is remodeled and the shifting equilibrium between the private and public transportation sectors through PPPs, private sector role and private sector participation, establishes a new constructive framework where national and international companies -both public and private- come together, resulting in a wholly transformation of the country logistics. Furthermore, in this scenario the government also enhances the access to credit for the local logistics and transportation companies by lowering the

interest rates and presenting a more flexible legislation that fosters alternative technologies and resources while at the same time facilitating innovation investments.

The privatization through concessions would actually solve the *Bras infection*, and an overall efficiency improvement will occur, while at the same time increasing the government finances. The exorbitant costs of the Brazilian transportation system - correlated with the burdens of the road sector until now- is overcome, and the diversification through multimodality becomes a reality, resulting in an overall reduction of the *custo Brasil* and the achievement of global competitiveness. Through the development of multimodality, enterprises will be able to use an integrated approach of the transport industry in operation, management and control of traffic, so that shorter delivery from origin to destination is made possible. In addition, the transport chain where all the constituents work closely in accord with market needs and objectives will also be developed.

As the private sector becomes increasingly engaged in the logistics and transportation sectors, it ushers in an opportunity to improve Brazil's bureaucratic inefficiency and the existent legislation hurdles. Provided that the grand design does not stand pure privatizations but concessions, the government will have smartly positioned itself and will have gained popular political support. This will be as a result of the government's understanding of the transportation sector's essential role in boosting of the Brazilian economy with a boom in construction and unprecedented privatizations processes. Moreover, an increase in the country finance also occurs due to the decline of the BNDES (National Development Bank) participation in long-term operations and the entrance of FDI. In addition, these characteristics will make internal competition to increase and the price of goods will also decrease as the offer does.

Yet, it is also possible that these procedures of privatizations will also encounter a strong opposition in the Brazilian complex political coalition, where some various senior leaders fear and abandonment of public prerogatives for sources of capital and

which emphasize the necessity to strengthen the entire nation instead of focusing only on economic growth.

Hurdles to the concrete new narrative

Disintegrated logistics: Brazil, May 2029

The federal government has been aware of the inadequacies of the logistics system in Brazil for quite some time. However, looking back at the last 20 years little has been done to rectify this situation. The economic growth of the GDP is way below the other emerging countries (3% per year). Therefore, Brazil seems to be good at planning but once more implementation is a pitfall, primarily due to government policies, red tapes, lack of technology and know-how as well as multimodalism disintegration. The federal government developed a long-term national transport and logistics program (PNLT), giving greater focus to rail and waterways, yet tangible results have been few to this moment. The Accelerated Growth Program (PAC), another federal government program, had remarkable funds for infrastructure and logistics and results until now turn out to be minimal too.

The private sector, which has had little participation until now, has remained critical of BNDES, which has long been the almost unique source of long term financing in Brazil. Two are the main reasons:

- High level of interest rates
- Low government incentives to attract private investments

In addition, the successive *immobilism* in political coalitions where various senior leaders fear an abandonment of public prerogatives further emphasizes this situation.

Regarding the transport matrix, due to historical underinvestment and besides the federal government efforts, railroads and waterways are not yet in position to be the trunk lines due to the existent inefficiency and lack of competitiveness compare to other similar countries. By this means, the shortage of efficient transfer terminals for

transferring freight between modes, the excessive paperwork caused by the government regulations, the no recognition of MTOs from the Banco Central do Brazil and the existing taxes hinder the development of an efficient multimodalism. Finally, the country dependency in road transportation has decreased to 40 percent, the logistics costs compare related to GDP has also decreased to 11 percent and the transportation matrix is now more balanced. However, the logistics performance index of last year, May 2028, shows up that Brazil has only climb five positions since 2009 and is still far beyond the most developed countries.

Hurdles to the concrete new scenario

In this scenario, level of clarity of the Government lead to an inefficient policy development, incurring in limitations, lack of competitiveness and low overall performance of logistics. Yet, freight transportation increases very rapidly owing to economic growth and the expansion on international trade. Nevertheless, the freight transport sector is regarded as nonintegrated, inefficient and with high cost due to many factors, including outdated regulatory framework, business practices, capacity problems and multimodality underdevelopment.

In regulatory framework, Brazil seems to be good at planning but the implementation and required investments are a pitfall due to politics, bureaucracy, red tape and the growing topic of environmental issues. Thus, federal government cannot get projects off the drawing board, the public firms mismanages infrastructures by often failing to carry out budgeted improvements, cumbersome and illogical planning are developed and the PAC program runs years behind schedule. Also, in most cases the process of making decisions become more rigid and public regulations began to suffer from deficiencies that emerge from the ambiguity of the objectives and proliferations of specialized public agencies.

On the other hand, the increased use of multimodality becomes virtually inescapable due to the growing demands of the country. However, the integration of the different

modes is a mere theory and the inefficient multimodalism will emerge as a matter of necessity and as a result of near gridlock. Therefore, without an emerge of creative leadership and private sector involvement -mainly through PPPs, private sector role and private sector participation- the logistics performance will not be increased and the so-called *custo Brazil* will continue tackling the domestic production.

Accordingly, multimodal service will be provided by Multimodal Transport Operators (MTOs) -which are responsible for all elements of the multimodal shipment- but the Banco Central do Brazil will not recognized MTOs, making it impossible for them to carry out transactions in foreign currency, hence impeding multimodal transport across borders.

All on the same boat narrative

Same old, same old

Today, six years after the end of Olympic Games, the country freight transportation characteristics are similarly comparing to ten years ago. The road transportation represents 58 percent of the total freight and the railroad transportation 23 percent. By this means, the total costs of logistics remains at the same level of 2012, representing 15 percent of the GDP. In addition, supply failures in all kinds of goods become usual and the country's idea of developing a cost optimized global supply chain is no longer viable. Thus, the country still enjoys dynamic economic development, but now it copes with much lower growth rates (1,5-2% per year) and an overall stagnation.

Infrastructure investments are done in order to build redundant backbones. These investments, mostly directed to roads, occur through major maintenance programs such as:

- Maintenance funds guaranteed every year
- Accelerated road concession
- PPP, Private Sector Participation and Private Sector Role involvement
- Guarantee CIDE transfers to states

The resilient Brazilian logistics of 2022 relies on a logistics sector that ensures the delivery of products in spite of unforeseen events. Now, supply security is a top priority and due to the road transportation dependency, shorter transport distances with lower volumes and multiple suppliers are common. Despite the number of local or regional companies increased, the big national and international providers continue to play a major role as the capital capacity of large players is needed to provide a fragile supply chain with enough backup infrastructure, technology and machinery.

Finally, the country continues supporting the exploitation of national raw materials and exporting them. Hence, by not producing added-value products the country is not able to compete with major countries worldwide.

All on the same boat scenario

In this scenario, there is an improvement of roads condition through a major preservation programs with the establishment of guaranteed planning and funds every year. The level of clarity of the Government appear to be fundamental through the promotion of accelerated road concession programs, PPPs, private sector role involvement, private sector participation and guaranteed CIDEs (Contribution for Intervention in the Economic Domain) transfers to states. At the same time, this scenario improves police surveillance to decrease theft and tracking procedures.

Concessioning becomes the most common privatization form, which typically entails a competition among private bidders to perform government activities. With concessioning, the government remains the financier and has management and policy control over the type and quality of services to be provided. Nevertheless, a new recent variation of privatization is established, known as *managed competition*. Under this variable, the contracting process permits the agencies (e.g. highway departments) of the government to prepare a work proposal and submit a bid to compete with private bidders (e.g. highway construction contractors). This way, by introducing talent from

private industry a better professional management exposure is established and the connectivity of the country is improved, as the country road transportation provides a great connectivity.

Yet, the road intensive practice will make logistics performance remains outdated, limited and underdeveloped, as well as the efficiency, competitiveness and overall costs for goods transportation. As a result, environmental concerns arise regarding the pollution, safety and traffic congestion, and the need for accelerated maintenance becomes a remarkable issue across the country. Thereby, foreign companies prefer to establish their headquarters in more efficient and with lower logistics costs such as: Mexico, Chile or Colombia.

Secular stagnation narrative

The great leap failure

Today is the 20th anniversary of the Logistics Planning Company (EPL) and the current status quo which consists of continuing with the same transportation matrix characteristics as twenty years ago, has made logistics costs increase, totaling 16 percent of the GDP. The main reasons are:

- The very poor quality of roads
- Difficult access to ports
- Overall inefficiency
- Lack of competitiveness
- Limited number of pipelines
- Few intermodal transfer terminals

In addition, the excessive protectionism of Brazilian market makes most supply chains regionalized. The country continues exchanging raw materials but trade takes place mainly within regional trading blocs resulting in an average increase of the GDP of 0,5% in the last twenty years. Furthermore, trade suffers from a lack of infrastructure development and maintenance, as the BNDES is the only existing instrument of

financing, resulting in a general productivity decline. Also, technological development is lagging way down compare to other advanced countries and under these circumstances, there is no effort from the federal government to reduce greenhouse gas emissions.

In this way, traffic suffers from congestion and malfunctions due to the few private infrastructure companies operating in the sector. Thus, people on average pay more for food, clothing and electronic devices, as economies of scale derived from the division of labor and from international specialization have suffered. Moreover, national transport and logistics regulations focus mostly on ensuring the safety and security of transported goods and the overall average transport distances decrease.

Finally, the shorter and less complex regional supply chains generally reduce the demand for elaborate and sophisticated logistics solutions. The country appears to *devalue* the logistics industry, resulting in fewer customized solutions and in services that become increasingly commoditized.

Secular stagnation scenario

In this last scenario, the *status quo* which consists of maintaining the same transportation matrix with further relevance in road transportation and without properly private sector involvement, will lead to a remarkable poor quality of roads, difficult road/rail access to ports, inefficient ports, low participation of rail and waterway modes, limited number of pipelines, few port terminals and intermodal transfer terminals, as well as complicated and time-consuming customs/revenue procedures. As a result, the overall logistics costs remain greater compare to OECD countries and, at the same time, the economic growth is established below the emerging countries.

Escaping the *status quo* will hinge on addressing several pending issues including reducing the cost of logistics and the modernization of the inefficient government policies, but remaining immobile in a market environment where every country has to compete to the best of its ability turns out to be irresponsible. The country appears to be within the so-called *middle-income trap*, which describes a situation where it cannot escape despite posting marginal improvements. Thus, Brazil becomes a country capable of producing great quality products but with little overall competitiveness.

In addition, the country finds out to be hostage in ups and downs of political cycle where the projects cannot get off the drawing board, the state firms mismanages infrastructures by often failing to carry out budgeted improvement and the PAC, PNLT and Logistics Investment Program (LIP) run years behind schedule, resulting in a perpetuation of the *custo Brasil*. As a result, the country further emphasizes its dependency on commodity exportation, while most of the emerging markets are able to produce value-added goods for both domestic and external markets.

On the other hand, the implication for climate change, tend to be greater due to the inefficient development of public policies to reduce the Brazilian transportation matrix dependency on road transportation. Thus, the country confronts many environmental

issues as the road transportation continues to be the second largest contributor to greenhouse gas (GHG) emissions.

5. CONCLUSIONS

5.1 Conclusions

The logistics and transportation panorama in the country indicates that despite making some recent progress, there is still room for improvement to reach the levels of the OECD countries, BRICS and other emerging countries. Yet, the path forward is not quick or easy and many challenges have to be overcome if the country wants to become a new global player on the world stage.

This study aimed to analyze the Brazilian logistics and transportation sector in a not very conventional way, not only taking into account the past and present, but looking into the future. To do so, the author used the methodology of prospective scenarios. Hence, after an intense literature review, some interviews with different experts from different areas and an in-deep work, two drivers were identified and considered as crucial to define the future of transportation and logistics sector: The level of clarity of the Government and the transportation matrix.

In the level of clarity of the Government, in the more flexible side, the private sector appears to be participating actively by professionalizing the logistics and transportation sector and also by increasing reliability, efficiency and competitiveness while at the same time reducing the *custo Brasil*. As a result, the state and local governments are no longer the unique responsible for investing nor developing the construction and maintenance of infrastructures. In addition, the government also flexibilizes the access to credit for national companies by lowering the interest rates and presents a more flexible legislation that fosters alternative technologies and resources. On the other hand, with more rigid policies, the government appears to be akin of any privatization and due to its *immobilism*, projects often cannot get off the drawing board nor able to carry out budgeted improvements, resulting in a stagnation of the country development.

Regarding the transportation matrix, in one side, the system is heavily biased towards roads, for which trucks become more expensive than other modes for long haul bulk transport, and whose costs are exacerbated by the lack of proper load enforcement causing an accelerated deterioration of the road conditions and impeding the country to grow in a more efficient and effective way. On the other side, by transforming its current transportation matrix to a more multimodal intensive, the country is able to reverse its historical low transportation efficiency while, at the same time, bolstering the national economy.

Given these two driving forces, the study developed four plausible scenarios for the future of logistics and transport sectors in Brazil.

In the *open arms to logistical democracy* scenario, the total overhaul of Brazilian logistics and transportation matrix is modified and the shifting equilibrium between the private and public logistics sector establishes a new more constructive framework, where both national and transnational companies invest in Brazilian infrastructures, resulting in a wholly transformation of the country logistics characteristics. Furthermore, the *Bras infection*, prevalent characterization of the public companies is solved, ensuing in an overall efficiency improvement by diversifying the freight transportation among other modes, reducing the so-called *custo Brasil*. Besides, the government also enhances the access to credit for the local logistics and transportation companies by lowering the interest rates and presenting a more flexible legislation that fosters also alternative technologies and resources while at the same time facilitating innovation investments.

In the scenario of *hurdles to the concrete new*, a more rigid government role leads to an inefficient policy development, where the freight transport sector is regarded as nonintegrated, inefficient and with lack of competitiveness due to outdated regulatory framework and multimodality underdevelopment. Regarding the regulatory framework, Brazil seems to be good at planning but the implementation and required investments are a pitfall due to politics -BNDEs dependency-, bureaucracy, red tape and

environmental issues. In multimodality underdevelopment, the integration of the different modes is a mere theory and as a result the logistics performance and the so-called *custo Brasil* continued tackling the economic growth.

Regarding the *all on the same boat* scenario, there is an upgrading of roads condition as the government promotes different road concession programs and guaranteed Contributions for Intervention in the Economic Domain (CIDEs) transfers to states. This way, by introducing talent from private industry a better professional management exposure is established and the connectivity of the country is improved. Yet, the road intensive practice makes logistics performance remains outdated, limited and underdeveloped as the country is unable to compete against other more efficient and with lower logistics costs countries, as the availability of modes is wider.

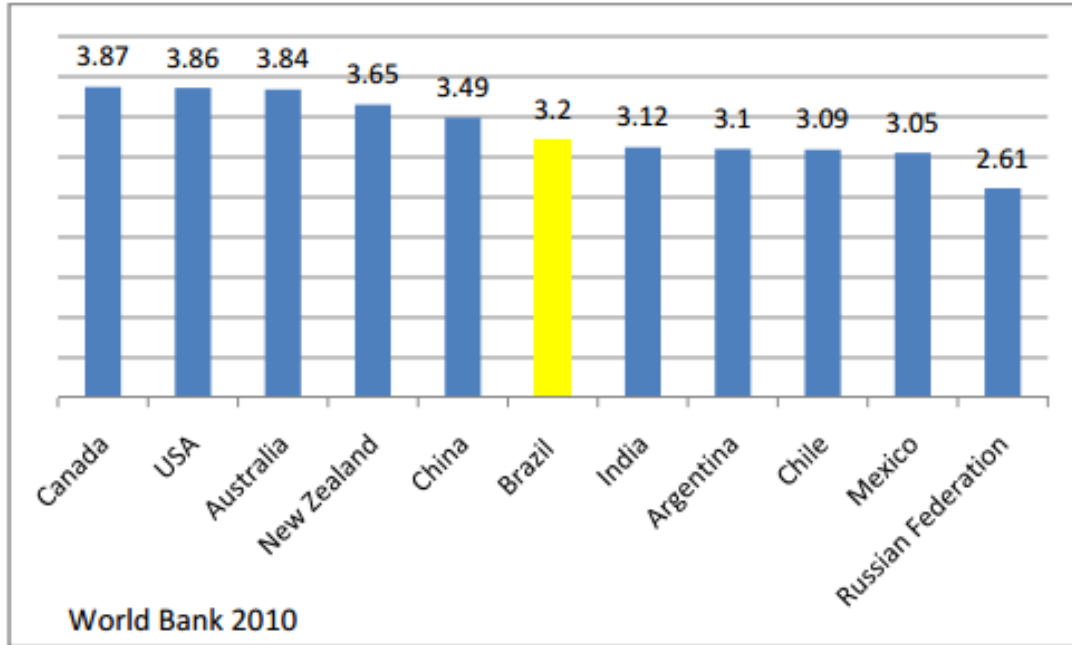
In the *secular stagnation* scenario the country appears to be within a *status quo* which consists of maintaining the current transportation matrix with further relevance in road transportation and without putting in place the different existing public projects in the establishes schedule. Thus, the *custo Brasil* becomes in perpetuity and the country further emphasizes its dependency on commodity exportation while the economic growth is established below the emerging countries, and price of goods are established well above the other countries.

Finally, by choosing this subject, the author has tried to bring new insights and knowledge for the reader with a topic -logistics- which usually happens to be *forgotten* despite being one of the most important sectors of the economy. For instance, what would happen if a truck slowdown happens in Brazil? Or, if during the Olympic Games the affluence of visitors is too high that airports collapsed? Therefore, by using prospective scenarios this paper has tried to elaborate possible undertakings depending on which path the country chooses to follow. If Brazil continues investing same percent of GDP in logistics sector, projects do not get off the board, the regulamentary framework does not get improved and there is not enough involvement from the private sector, the country may slowly loose its competitiveness and instead of producing

value-added products it may become even more dependent of commodities. As a conclusion, the Olympic Games of 2016 should be the biggest turning point for the country as it was *Barcelona 1992* for Spain.

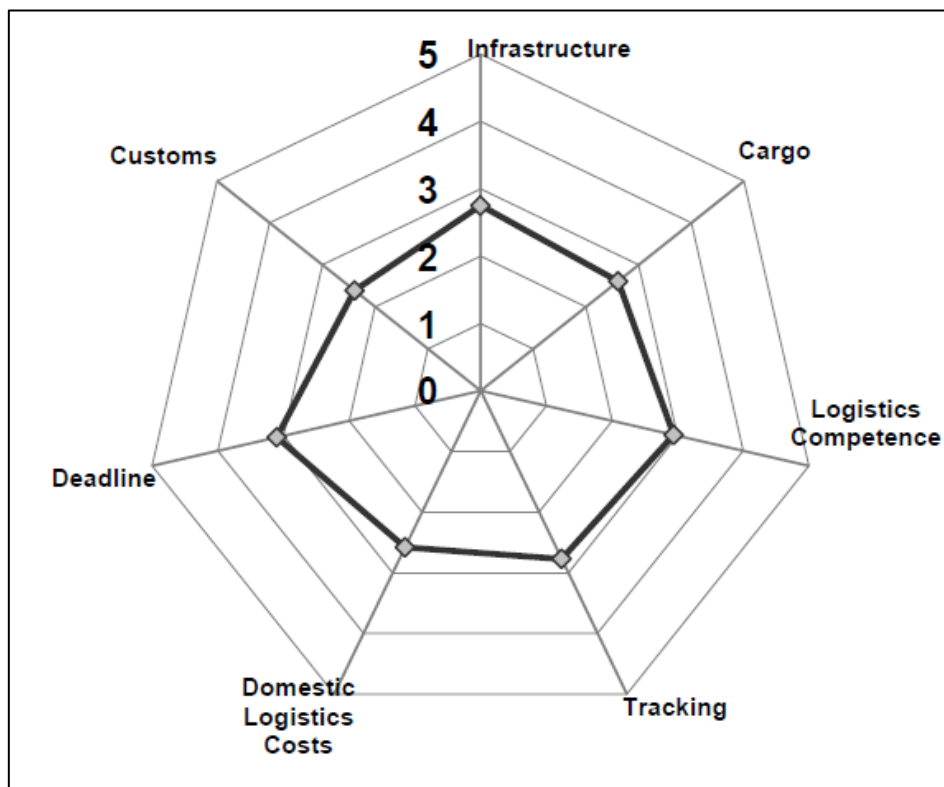
Annex 1: Logistics information

Logistics Performance Index 2010



Source: World Bank 2010

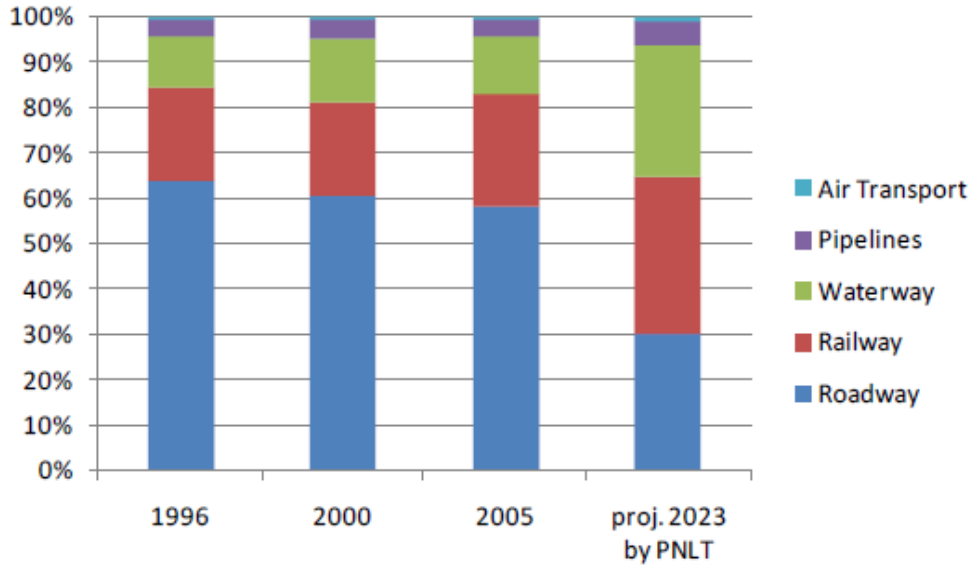
Brazil's LPI within upper middle income country group



Source: World Bank 2010

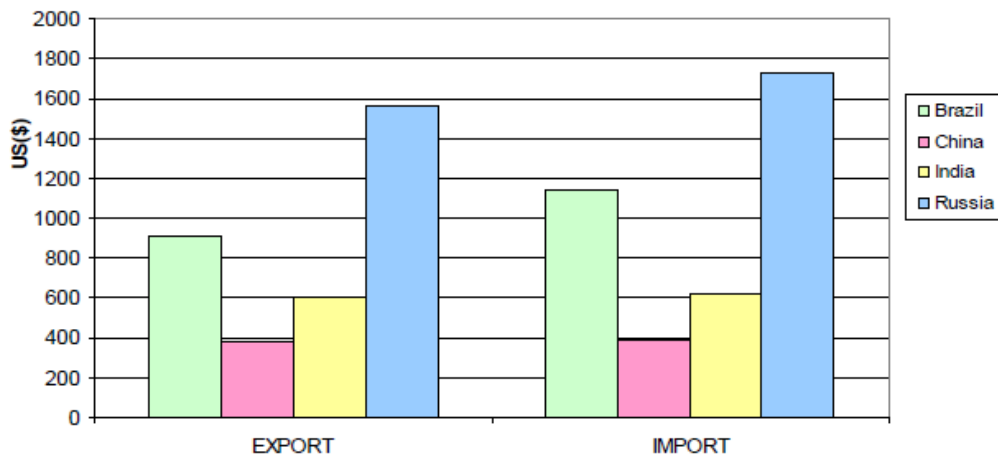
Annex 2: Transportation information

Actual and projected mode shares by TKU



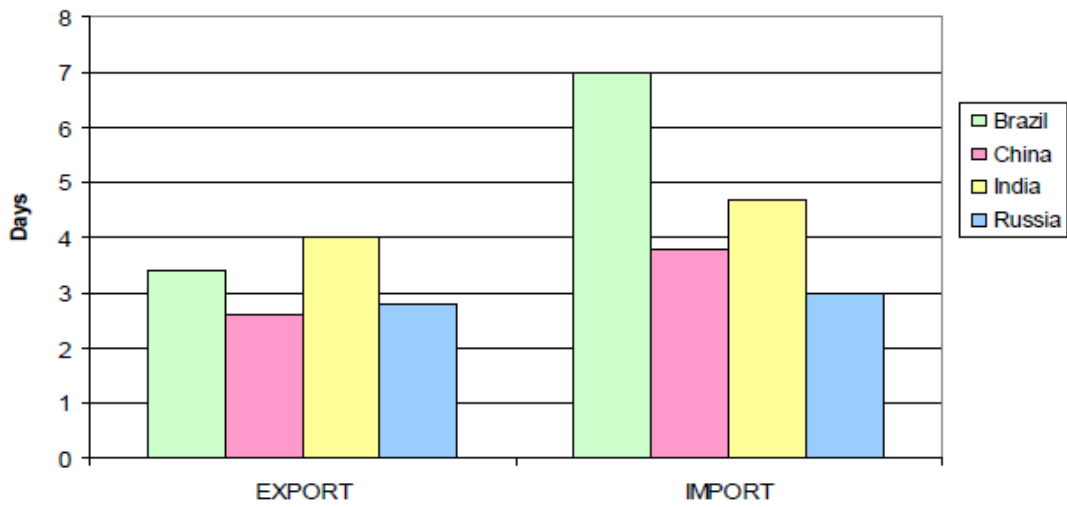
Source: PNLT 2007

Typical charge for a 40-foot container or a semi-trailer (Total cost to transport and port services)



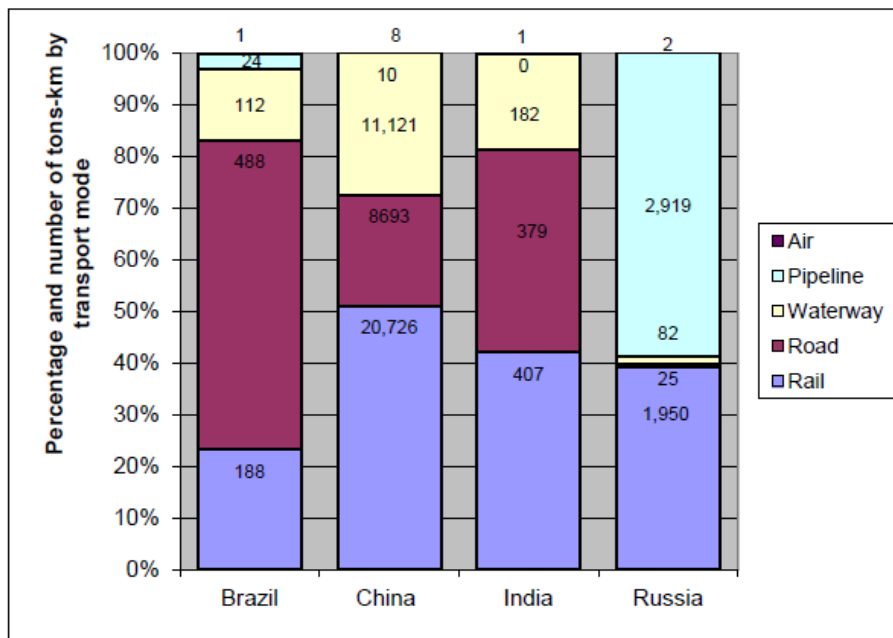
Source: World Bank 2010.

Lead-time, median case (from port of discharge to consignee):



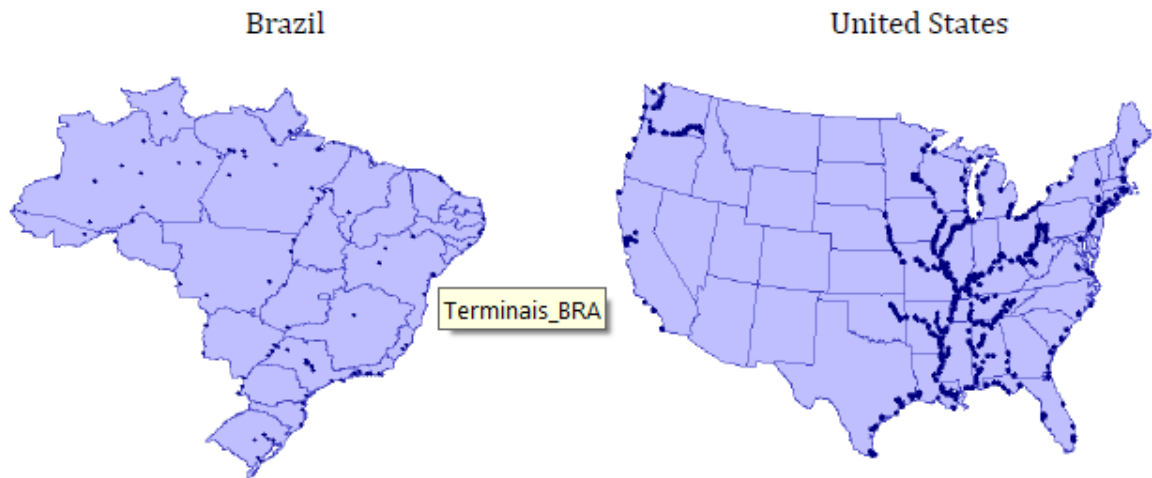
Source: World Bank 2010.

Percentage and number of tons-km by transport mode in Brazil, China, India and Russia. A comparison.



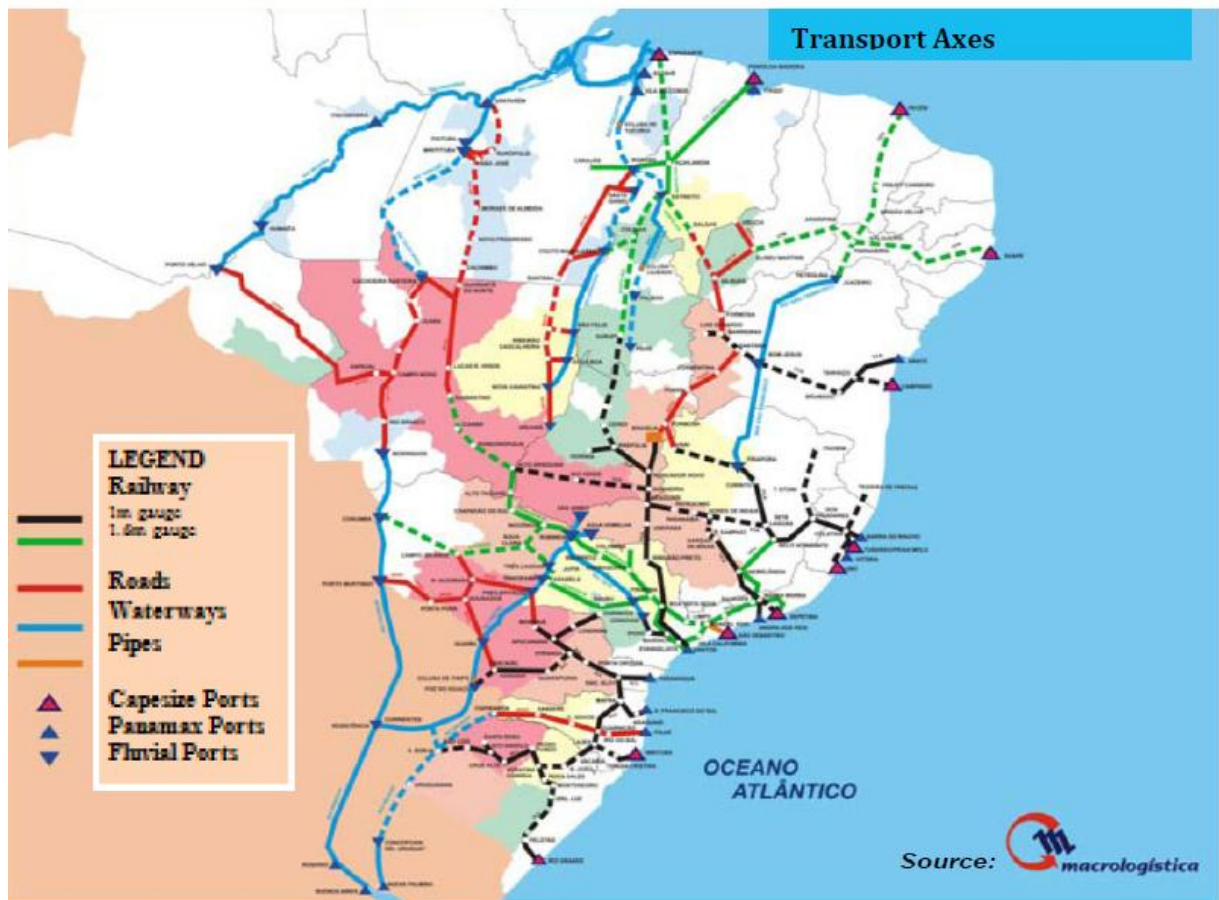
Source: World Bank 2007.

Waterway intermodal terminals comparison



Source: World Bank 2010

Main Transport Axes in Brazil



Source: World Bank 2010

Appendix 1: Interviews

Roteiro de entrevista: Agencia ANTT

Nome: XX

Cargo: Superintendente Agencia ANTT

Anos no setor: 20

Data: 12/11/2012

1 – Em sua opinião, qual o papel que a logística e transporte desempenham na economia brasileira?

2 - Em sua opinião, quais os setores que mais se destacam no sector logístico e de transporte terrestre? Qual é o papel da agencia?

3 - Como sua agencia poderia se converter em ponte entre o governo e as empresas privadas?

4 - Em sua opinião, que mudanças o Brasil promoveu nas últimas décadas para reduzir o chamado “custo Brasil”? De que forma sua agencia esta ajudando o desenvolvimento da logística e transporte?

5 - Qual é o papel dos diferentes programas públicos (PAC, PNLT, EPL, etc.) no futuro da logística e transporte Brasileiro? E os investimentos privados, que papel podem ter?

6 - Qual é sua avaliação sobre o estado das infraestruturas no Brasil? E que papel pode ter os movimentos para conservação ambiental no desenvolvimento das infraestruturas?

7 – Como a agencia têm trabalhado para ajudar as pequenas empresas de logística e transporte?

8 - Como afeta ao transporte de cargas a legislação brasileira?

9 - Em sua opinião, que papel poderia ter o multimodalismo no futuro das empresas Brasileiras?

10 – Em sua opinião, qual é o futuro da logística e transporte no Brasil?

Roteiro de entrevista: *Brasil Transporte Exterior LTDA*

Nome: Paulo Cesar

Cargo: CEO

Anos no setor: 11

Data: 18/11/2012

1 – Em sua opinião, qual o papel que a logística e transporte desempenham na economia brasileira?

2 - Em sua opinião, quais os setores que mais se destacam no sector logístico e de transporte terrestre? E de transporte rodoviário?

3 - Em sua opinião, quais são os *players* (governo, instituições, empresas etc.) que mais se destacam na evolução da logística e transporte brasileira? Qual é o papel de cada um?

4 - Em sua opinião, que mudanças o Brasil promoveu nas últimas décadas para reduzir o chamado “custo Brasil”? De que forma o governo e os diferentes entes públicos dificultam e de que forma facilitam o desenvolvimento da logística e transporte?

5 - Qual é o papel dos diferentes programas públicos (PAC, PNLT, EPL, etc.) no futuro da logística e transporte Brasileiro? E os investimentos privados, que papel pode ter?

6 - Qual é sua avaliação sobre o estado das infraestruturas no Brasil? E que papel pode ter os movimentos para conservação ambiental no desenvolvimento das infraestruturas?

7 – Como as instituições têm trabalhado para ajudar as pequenas empresas de logística e transporte?

8 - Como afeta ao transporte de cargas a legislação brasileira?

9 - Em sua opinião, que papel poderia ter o multimodalismo no futuro das empresas Brasileiras?

10 – Em sua opinião, qual é o futuro da logística e transporte no Brasil?

Roteiro de entrevista: *Giant Cargo Logística*

Nome: Claudia Bezerra

Cargo: Coordenadora para exportações e importações

Anos no setor: 10

Data: 6/11/2012

1 – Em sua opinião, qual o papel que a logística e transporte desempenham na economia brasileira?

2 - Em sua opinião, quais os setores que mais se destacam no sector logístico e de transporte terrestre? E de exportação e importação?

3 - Em sua opinião, quais são os *players* (governo, instituições, empresas etc.) que mais se destacam na evolução da logística e transporte brasileira? Qual é o papel de cada um?

4 - Em sua opinião, que mudanças o Brasil promoveu nas últimas décadas para reduzir o chamado “custo Brasil”? De que forma o governo e os diferentes entes públicos dificultam e de que forma facilitam o desenvolvimento da logística e transporte?

5 - Qual é o papel dos diferentes programas públicos (PAC, PNLT, EPL, etc.) no futuro da logística e transporte Brasileiro? E os investimentos privados, que papel podem ter?

6 - Qual é sua avaliação sobre o estado das infraestruturas no Brasil? E que papel pode ter os movimentos para conservação ambiental no desenvolvimento das infraestruturas?

7 – Como as instituições têm trabalhado para ajudar as pequenas empresas de logística e transporte?

8 - Como afeta ao transporte de cargas a legislação brasileira?

9 - Em sua opinião, que papel poderia ter o multimodalismo no futuro das empresas Brasileiras?

10 – Em sua opinião, qual é o futuro da logística e transporte no Brasil?

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