

UDK: 656.1:338.47(81)

An Overview of Road Cargo Transport in Brazil

Maria da Penha S. Araújo

Master Candidate, Instituto Militar de Engenharia, Praça General Tíbúrcio 80, Praia Vermelha, Brasil,
mparaujo@bol.com.br

Vânia Barcellos G. Campos

Professor, PhD, Instituto Militar de Engenharia, Praça General Tíbúrcio 80, Praia Vermelha, Brasil,
vania@ime.eb.br

Renata Albergaria M. Bandeira

Professor, PhD, Instituto Militar de Engenharia, Praça General Tíbúrcio 80, Praia Vermelha, Brasil,
re.albergaria@gmail.com

Received (17 October 2012); Revised (21 December 2012); Accepted (07 March 2013)

Abstract

This study aims to evaluate the operation of the main actors in the Brazilian market of road freight transportation: owner operators and carrier companies. It initially presents an overview of cargo transportation in Brazil, highlighting its characteristics and freight market. Subsequently, in order to characterize the performance of owner operators and carrier companies, a survey is conducted with carriers that act in Sao Paulo – Rio de Janeiro. The result of this research enabled us to identify conditions of the fleet and freight costs, besides allowing a comparison between the operation of owner operators and carrier companies.

Key words: cargo transport, freight rates, road carriers, road transport.

1. INTRODUCTION

Road transport has been the preference for overland transport of goods in Brazil. Over 60% of the cargo in Brazil is transported by road and, considering only containerized cargo, this share reaches up to 90%[1].

This preference for road transport has logistical reasons, such as the possibility of splitting the cargo to be distributed in smaller lots, more suited to the practice of just in time (JIT). However, there are also factors that improperly favours road transport in the country, such as [2]: (i) the practice of vehicle overloading which results in the destruction of highway infrastructure and in high maintenance costs; (ii) lack of regulation for driver's working hours, which enables the journey to be made more rapidly and consequently reducing costs, while simultaneously sacrificing the driver and contributing to the increasing number of road accidents in Brazil (about 30% of traffic accidents in the country have trucks involved); (iii) tax evasion, due to inefficiency in controlling the bill of lading or even the invoice of goods transported by owner operators, and (iv) practice of low margins in freight charging, which makes fleet renewal more difficult (the average fleet age for owner operators in Brazil is 19 year old) and leads to disastrous consequences related to fuel consumption, pollution and accidents.

Lower freight rates in the Brazilian market are the result of an excessive supply of transport services offered by owner operators, which mostly are hired by major

carrier companies. In general, carrier companies are hired by manufactures for transporting raw materials to industrial sites or final goods to consumer markets. In order to reduce costs and optimize routes, carrier companies end up outsourcing part of this service to owner operators, who tend to charge prices below what would be recommended under economic and financial perspectives.

These low freight rates generate low revenues for owner operators, which can lead to problems such as vehicle overloading, excessive working hours and difficulties in fleet renewing and vehicle maintenance. Therefore, this malpractice contributes to increase the average fleet age, accident rates and tax evasion [3]. Consequently, it brings many impacts to society, such as increasing accident rates and deaths, excessive emission of pollutants, traffic jams and excessive consumption of fuel [4]. This cycle of problems is known as the Vicious Circle of Road Cargo Transport in Brazil [3].

However, even in this problematic context, transport activity has increased its participation in the Brazilian Gross Domestic Product (GDP), rising from 3.7% to 4.3% between 1985 and 2000 [5]. From 1970 to 2000, the transport sector grew nearly 400% while the GDP increased 250%. Such growth has been strongly influenced by the geographical dispersion of Brazilian economy in recent decades towards the Midwest, North and Northeast areas of the country. Thus, the current

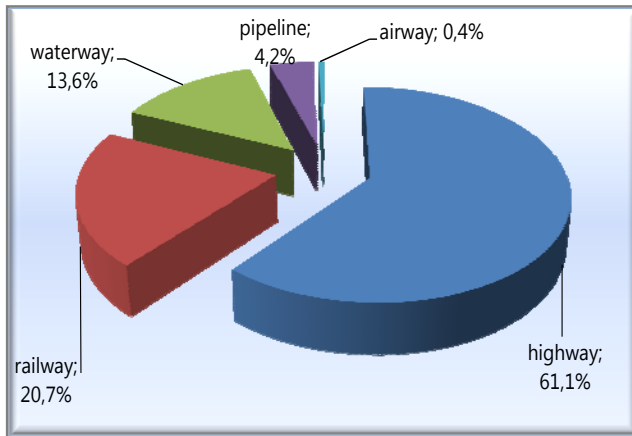


Figure 2: Brazilian Transport Matrix [4]

Brazilian economic growth introduces the transport market as an excellent investment opportunity. Therefore, knowing the current situation in this market becomes crucial to private investors.

In this context, the paper presents an overview of the current situation of road cargo transport in Brazil. The study is based on primary and secondary data, obtained from a bibliographical and a survey research. Initially, the paper summarizes the main characteristics of the Brazilian cargo transport, including its main actors, characteristics of the national truck fleet and conditions of the roads. Then, it analyzes the road freight market in Brazil. Finally, the results of the survey research are presented and analyzed, indicating the main differences between owner operators and carrier companies that operate in the Southeast region of Brazil, regarding the following variables: average fleet age, frequency of truck renewal, transported cargo, acquisition of insurance and the need for outsourcing transport services.

2. ROAD CARGO TRANSPORT IN BRAZIL

Among all the problems related to cargo transportation in the country, the most alarming is the distortion of the Brazilian transport matrix. While large territorial

countries, such as the United States, Canada, China and Russia, use predominantly railroad and waterway transport over road transport, exactly the opposite occurs in Brazil, where there is a predominance of the road mode, as shown in Figure 1. Trucks account for approximately 61 percent of the general cargo transportation in Brazil, which represents 1.2 billion tons of cargo transported, a figure 5.1% larger than in 2009 (Figure 2).

Considering aspects related to road safety and restrictions on the volume and weight of cargo transported, the road mode may be considered less efficient for cargo transport than the rail model. In fact, the rail mode is more economically efficient than road transport for long travelled distances and for the shipment of bulk commodities. However, the road mode offers a reasonably fast and reliable delivery for less than truck load (LTL) shipments, besides presenting advantages for transporting smaller cargo loads [6]. Road transport presents greater advantages for urban goods distribution, especially considering door-to-door delivery. In consequence, the road mode should be the preference for transporting small volumes of industrial goods, with medium to high aggregate value in short distance routes. However, due to lower freight rates practiced in Brazil, the road mode ends up being a major player in the transport of commodities such as soybeans, oil and cement.

2.1 The Market of Road Cargo Transport in Brazil

Road transportation is responsible for six of every ten pounds of cargo distributed in Brazil. It is a market that involves the participation of 671,000 owner operators, 127,000 carrier companies and 623 cooperatives, generating over 3.5 million jobs [2]. Table 1 presents the concentration of these actors in different regions of Brazil.

It can be observed, from Table 1, a high concentration (51%) of owner operators in the Southeast region of the country.

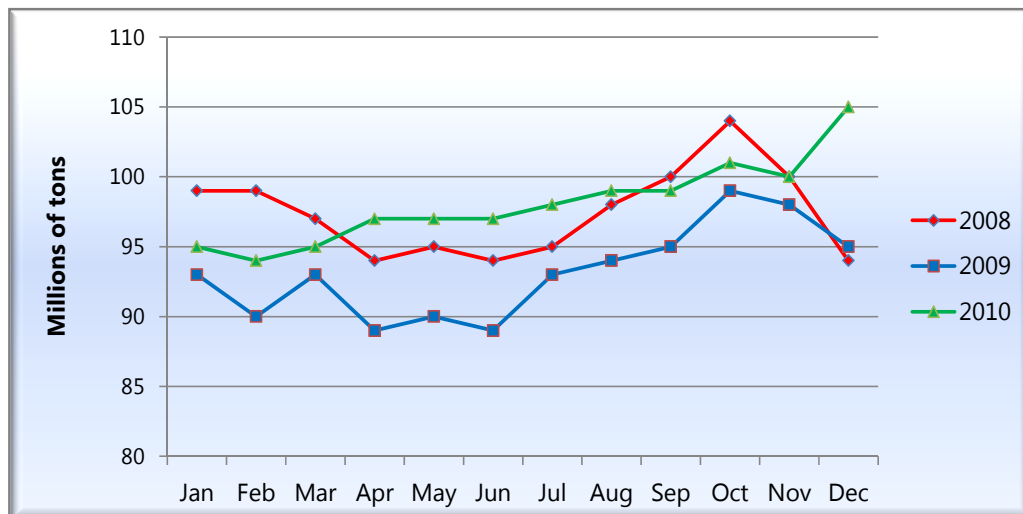


Figure 1. Transported Cargo [4]

Table 1: Concentration of Carriers per region

Amount of Carrier	Midwest	NE	N	SE	S	Total
Owner operators	52,439	89,557	18,974	342,582	168,229	671,781
	7.8%	13.3%	2.8%	51%	25.0%	
Carrier Companies	7,193	13,448	5,088	60,196	41,670	127,595
	5.6%	10.5%	4.0%	47.2%	32.7%	
Carrier Cooperatives	28	76	32	221	266	623
	4.5%	12.2%	5.1%	35.5%	42.7%	100%

Source: Adapted from Cibulska *et al.* (2010) [8]

Owner operators are responsible for most of the trucks in circulation and for transporting over 60% of general cargo in Brazil [2]. These professionals generally work without a contract and they tend to be hired by carrier companies in peak demand or for long-distance services. In such cases, the ownership of the truck is no longer a responsibility of the carrier company, so the investment and the costs of maintenance are passed on to owner operators [7]. This practice is a global trend, since, in many countries, drivers have passed from the position of employees to the position of outsourced staff, in which they must have their own truck or lease it [1].

Instead of working independently as owner operators, some drivers have organized themselves in cooperatives for the provision of freight service. In a typical cooperative in Brazil, a group of truck drivers, who owns their vehicles, provides cargo transport services in a collective way. The members alternate themselves in providing services and the earned income is divided among these members. The cooperative signs contracts and fulfils legal formalities. There are 623 cooperatives that provide cargo transportation in the country, with a fleet of 11,000 vehicles with an average age of 14.4 years [2]. Being a member of a cooperative has the advantage of reducing risks and costs, besides increasing value-added services, in comparison to owner operators. Besides, cooperatives, as a legal entity, tend to have better conditions than individual owner operators to negotiate freight rates, discounts for insurances or for vehicle maintenance.

2.2 Characteristics of National Truck Fleet

The fleet for road cargo transport is currently composed of 1,329,390 vehicles, of which 46% are operated by owner operators, 53% by carrier companies and 1% by cooperatives [2].

Vehicles of owner operators are, on average, 18.9 years old and the average age of cooperative vehicles is 14.4 years, while vehicles of carrier companies are, on average, 8.5 years old. The fleet of carrier companies is significantly newer, more modern, diversified and greater in capacity: 42% of their vehicles are heavy trucks (maximum gross weight of 23 tons) and 29% are semi-trailers and 21% are 6 ton trucks.

The car bodies can be opened (37%), closed (24%), tanks (9%) or others [2].

Almost half (47%) of Brazilian carrier companies operate with only one vehicle and another 37% have between two and five trucks [2]. On the other hand, the fleet of owner operators is composed mainly by heavy trucks with open bodies (63%). Owner operators generally have a single truck.

Cooperatives have an advantage over owner operators for financing the purchase of new vehicles, so their fleet is more modern and diverse than that of owner operators. The fleet of cooperatives is composed of eight thousand vehicles. The fleet of cooperatives is distributed homogeneously among three types of vehicles – heavy trucks, semi-trailers and 6 ton trucks – which allow them to offer a more diversified transportation service [2].

2.3 Condition of Roads

Despite an increasing number of roads in Brazil, transportation density indicators are very conservative compared to other countries. In 2000, the country had on average 30.51 miles of paved roads per 1,000 square miles versus an average of 658.38 miles of paved roads per 1,000 square miles in the United States [9].

Currently, Brazilian highway network has 1.580.890 Km of roads, from which only 212,618 km (13%) is paved [4]. A research developed by CNT in 2011 analyzed 89,552 km of these paved roads and concluded that 69% of them presented problems such as deficiencies in road pavement, signalling or geometry, compromising thus road security and reducing the possibility of integration with other modes [2]. CNT has also analyzed in 2010 90,945 km of the paved roads in Brazil and classified their pavement condition (Figure 3) [10]. 58% of them were classified as very poor, poor or regular, such as presented in Figure 4. Therefore, there is a high level of deterioration of the few paved roads in the country, jeopardizing the entire logistics system.

Figure 4 presents a classification of the Brazilian roads regarding signalling: 41.8% of Brazilian highways have appropriate signalling; signalling in 38% of the roads are considered regular; and in 30.2% of the roads signalling conditions are considered poor or very poor [10].

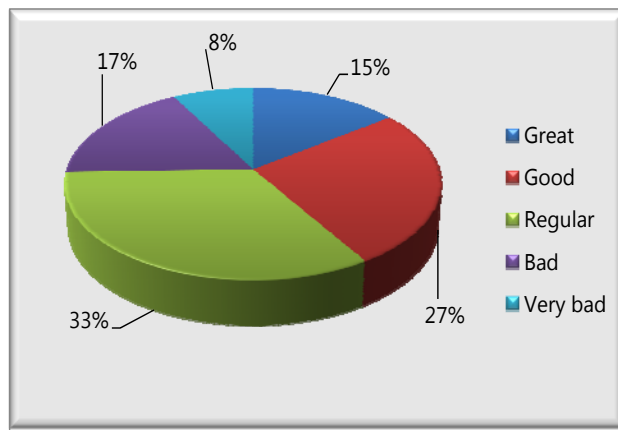


Figure 3. Classification of roads according to pavement conditions. Source: CNT, 2010 [10]

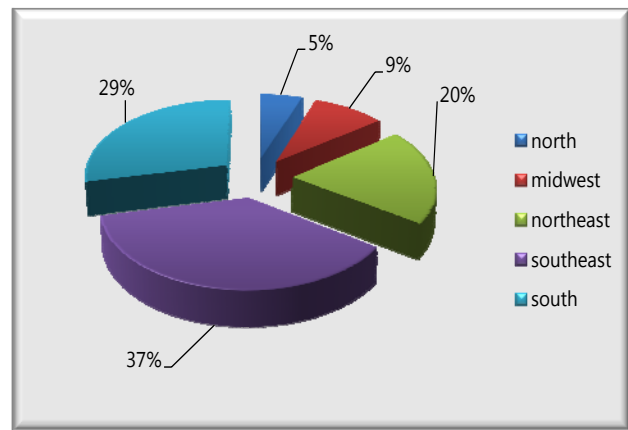


Figure 5. Concentration of Road Accidents per Brazilian Region. Source: CNT, 2010 [10]

This inefficiency in signalling results in higher susceptibility to cargo thefts since the driver is often forced to reduce the speed, hence becoming more vulnerable to burglary. In 2009, there was an estimated loss of 900 million dollars with burglary on Brazilian roads, a figure 12% higher than in 2008 [11]. High accident rates are recorded annually in Brazilian highways, and this figure is still increasing [10]. In 2009, 159,400 accidents on federal roads were registered, a figure 13% higher than in 2008. Such accidents cause major losses, such as late deliveries, customer dissatisfaction, costs to health care, as well as the loss of lives. Figure 5 shows the concentration of road accidents by Brazilian regions. A high concentration (65.4%) of accidents in the South and Southeast regions can be observed. Over 60% of the national fleet of vehicles is also concentrated in these regions, which may be one of the reasons for this high figure of accidents [10].

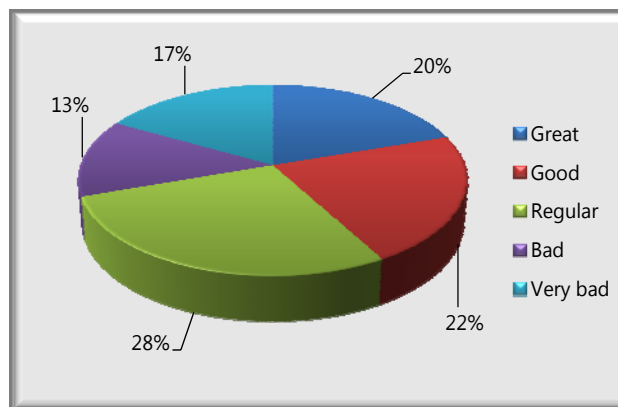


Figure 4. Signalling condition in Brazilian roads. Source: CNT, 2010 [10]

3. FREIGHT MARKET FOR ROAD CARGO TRANSPORT IN BRAZIL

There has been a historical predominance of the road mode in Brazil due to the larger number of highways built and extended [9]. However, a scenario of loose surveillance and operational requirements led to a reduction in quality of services provided and reduced freight rates [12].

The truck freight market is not under government control; hence, freight prices are determined by supply and demand for the transport service.

There is, in Brazil, a general dissatisfaction by road carriers regarding freight rates [13]. This dissatisfaction can be partially explained by the lack of constancy in the evolution of operational costs in comparison to the freight rates practiced, causing a direct reduction on profit margin. To negotiate efficiently, carriers and shippers must be aware of current shipping cost variables, but it is not always true in the Brazilian market.

Freight rates basically depend on the travel distance, type of cargo shipped, as well as the quality of roads and of the fleet [13]. Price formation for cargo transport services is quite complex, because, besides its operational costs, it also depends on local and situational factors [14]. Freight rates are directly proportional to variations in decisive factors for the demand for transportation, such as economic performance and certain business strategies. It is also indirectly influenced by decisive factors for operational costs of transport services, such as regulation, fuel prices, among others.

A study developed by Hijar in 2008 concluded that transportation services from Sao Paulo usually have higher freight rates than routes that have this city as a destination. For example, the freight rate of a shipment transported from Rio de Janeiro to Sao Paulo is, on average, 34% lower than the rate for the reverse route [12]. This phenomenon can be partially explained by the fact that São Paulo is the largest industrial city in Brazil and therefore there is a high demand for transport services to distribute its production to other regions.

Freight rates also depend on the fleet used for cargo transportation due to differences on capacity and volumes [12]. For instance, freight rates per kilometre travelled (US\$/Km) charged when the transport is done in heavy trucks tended to be 15% higher compared to the freights charged when the same shipment is transported by truck combinations. This is due to the fact that a heavy truck has a lower capacity than a truck combination, and hence there is a lower possibility of cargo consolidation. Even though the costs of acquiring

and maintaining a truck combination are high, they are compensated by the higher volume shipped in each trip [5].

4. RESEARCH METHOD

Besides presenting an overview of the current situation of road cargo transport in Brazil, this paper aims to identify the main variables that differentiate the major players who operate in the road cargo transport market in the Southeast region of the country: owner operators and carrier companies. The selection of this particular market to be the object of the research is justified because 40% of the total weight of goods shipped in the country is transported in the Southeast region of the country. Furthermore, 60% of Brazilian road carriers operate in this region, as well as 51% of all owner operators.

The investigation uses both primary and secondary data, obtained in the literature and by a survey research, which is a structured and standardized method that uses a questionnaire to obtain the information required for the study [15]. However, it is important to reinforce that the results obtained by the survey research represent the reality of road cargo transport in the Southeast region of Brazil and these results cannot be generalized to the whole country. Nonetheless, due to the significant participation of the south-eastern market in the total cargo transported in Brazil, this data is important for understanding the main transportation route in the national market. This route has its origin in São Paulo and destination in Rio de Janeiro. The expressive amount of cargo shipped from São Paulo to Rio de Janeiro can be explained by the high concentration of industries in the State of São Paulo that exports goods to the second largest consumer market in the country, Rio de Janeiro. Most of the exported goods from São Paulo to Rio de Janeiro have medium to high value-added, so road transport is prioritized and Via Dutra, the main road connection between these two markets, ends up having a large amount of cargo shipped towards Rio de Janeiro.

The sample assessed by the survey research consisted of 120 carrier companies and 96 owner operators that

act on the route São Paulo – Rio de Janeiro. The 120 carrier companies assessed are responsible for 30% of the total amount of cargo transported in the Southeast region of Brazil.

Data collection was divided into three stages. In the first stage, an electronic online questionnaire was sent to 100 carrier companies. Meanwhile, face-to-face interviews were conducted for a group of 20 carrier companies. This group of 20 companies is responsible for shipping 60% of the goods transported from São Paulo to Rio de Janeiro. Therefore, face-to-face interviews were conducted in order to obtain more detailed data about this group, as well as other information not yet identified, but that could contribute to a better understanding of the Brazilian market of road cargo transportation. Among the survey respondents, 92% are managers and directors of carrier companies, since they are primarily responsible for operations, including cost management.

In the third stage, face-to-face interviews were also conducted to owner operators, since, in most cases, this group does not have easy access to computer resources or to the internet. The sample size of 96 owner operators was obtained with a 95% level of confidence and an accepted error percentage of 10%, since the total number of owner operators in Brazil equals 671,000 and 51% of them operate in the Southeast region of the country. A research instrument of 14 questions was used for data collection and SPSS (Statistical Package for Social Sciences) software package was applied in the data analysis.

5. ASSESSMENT OF THE ROAD CARGO TRANSPORT

This section presents the results obtained by the survey research, which aims to analyze the market of road cargo transport. At first, the characteristics of the main actors in this market – owner operators and carrier companies – that operate in the Southeast region are presented. Then, a comparative analysis of their operations in the route São Paulo - Rio de Janeiro is also assessed.

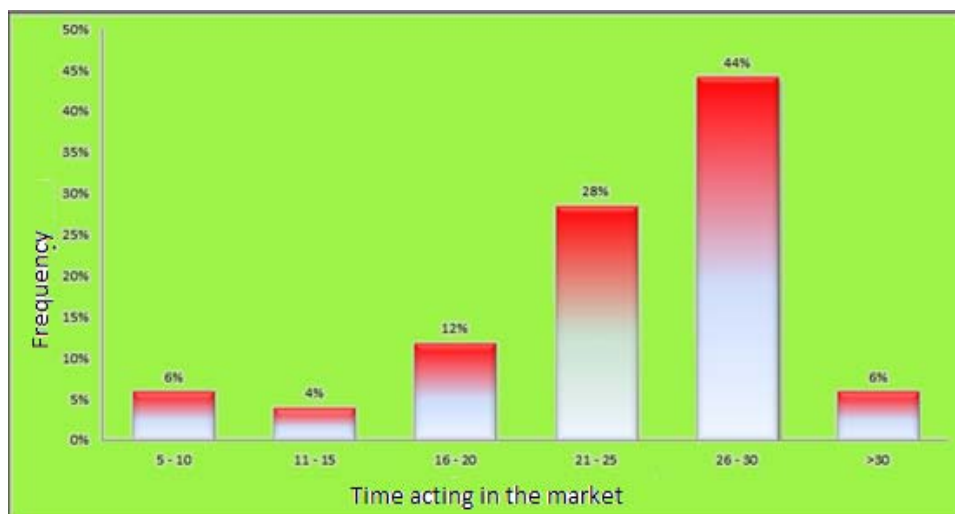


Figure 6. Experience of owner operators in the route São Paulo – Rio de Janeiro

5.1 Analysis of the market of owner operators

Respondents were owner operators that operate in the route São Paulo – Rio de Janeiro, who have, on average, 24 years of experience in the market, as shown in Figure 6.

The fleet of owner operators that operate in the route São Paulo - Rio de Janeiro is mainly composed of heavy trucks (67%), truck combinations (27%) and 6 ton truck (6%). 71% of this fleet do not have commercial vehicular insurance. The fleet of owner operators have, on average, 19 years old, and their frequency of exchange of vehicles is shown in Figure 7.

Regarding fleet maintenance, only 33% of owner operators regularly perform any type of vehicle maintenance, often performed by drivers. Vehicles are sent to the authorized technical assistance only to perform services that drivers cannot do themselves. However, due to the high average age of the fleet, vehicles must undergo through successive maintenances in order to keep them operating. The remaining respondents (67%) only perform repairs on vehicles when there is a defect that makes it impossible for the vehicle to operate. About 56% of the cargo transported from São Paulo to Rio de Janeiro by owner operators is general cargo, 26% are bulk cargo and 18% is frigorific cargo. The average freight rate charged by owner operators according to the type of cargo is presented in Figure 8. Regarding the composition of freight, 95% of owner operators operating in the route São Paulo - Rio de Janeiro consider transportation costs as an important variable in the composition of freight. They consider the expenses with fuel, tolls and food as the most important variables, representing nearly 50% of the freight charged.

Approximately 80% of respondents report that there is no negotiation regarding the value of the freight charged, because such values are already determined by carrier companies, according to the cargo loaded

and the type of truck or route, when outsourcing a service to an owner operator.

5.2 Analysis of the market of carrier companies

Based on the results of the survey research, it can be verified that carrier companies use mainly truck combinations (up to 33 tons) to operate in the route São Paulo - Rio de Janeiro (100% of responses assessed). Other types of vehicles may be used for specific occasions, such as for short-distance routes or for distribution in urban centers. The fleet of carrier companies is, on average, 5 years old, and it is constantly being renewed, sometimes even before every 5 years, because carrier companies are concerned about always maintaining its fleet in good conditions in order to offer high quality services.

The fleet of all assessed carrier companies has commercial vehicle insurance and this is a common variable considered by these companies in the composition of freight costs. Due to the large number of vehicles insured, these companies can negotiate discounts for vehicle insurance. Furthermore, the entire fleet of these carrier companies is subject to preventive maintenance, a fact that ensures greater fleet reliability, and prevents unexpected vehicle breakdowns during operation.

About 92% of the cargo transported by carrier companies from São Paulo to Rio de Janeiro is general cargo, which can be bagged or carried on pallets or containers. Only 8% of the assessed companies carry refrigerated cargo. The average freight charged by carrier companies for the transportation of general cargo is equivalent to R\$115.00. For the assessed companies, the most important fixed cost variables in the freight composition are related to salaries and insurance. On the other hand, the variable costs that most influence the value of the freights charged, according to their degree of importance, are: fuel, maintenance, tires and toll.

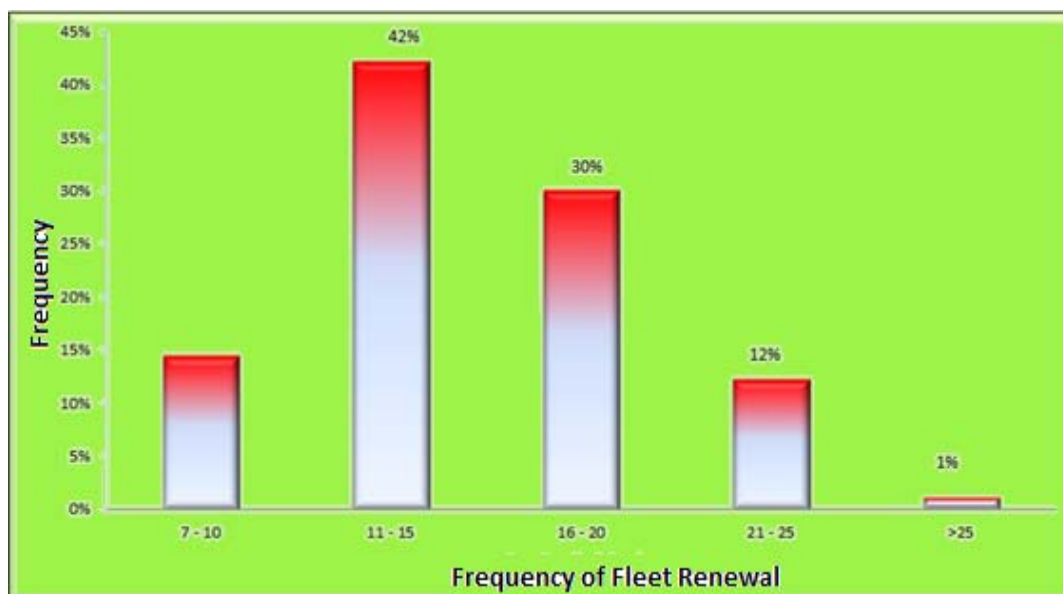


Figure 7. Frequency of exchange of vehicles by Owner operators in São Paulo – Rio de Janeiro

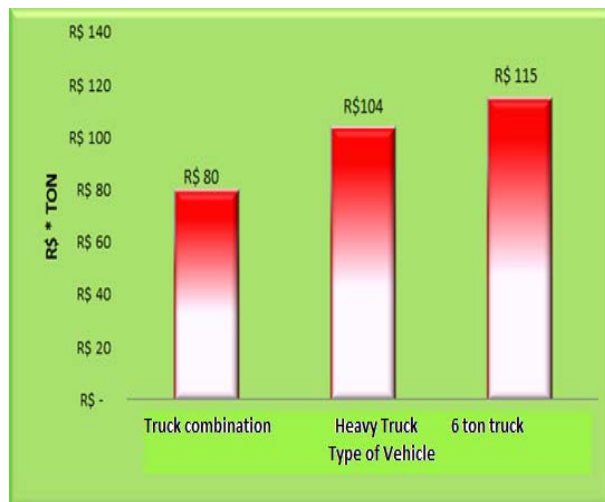


Figure 3. Average freight charged by owner operators according to vehicle type

The main reason that leads carrier companies to outsource part of their services for owner operators is demand seasonality, such as tends to happen during holiday seasons or after closing a large contract for distribution. This factor was mentioned by 63% of respondents as the main motivator for hiring an owner operator. Another factor, indicated by 12% of respondents as an important motivator for outsourcing, is long transport distances. Since most carrier companies prefer keeping their vehicles available for more profitable services, so they outsource this type of service, which tends to be more costly and time consuming, to owner operators. Moreover, about 18% of the assessed carrier companies affirm that they outsource transport services to owner operators when they consider that the profit will not be sufficient to perform the service with their own fleet. This shows the general dissatisfaction regarding freight rates.

5.3 Comparative assessments

For the comparative analysis between the operation of owner operators and carrier companies that operate in the Southeast region of Brazil, the main variables that differentiate these two actors were considered: average fleet age, frequency of truck renewal, transported cargo, acquisition of commercial vehicle insurance, the need for outsourcing transport services and type of vehicle adopted. These factors also influence the freight rates charged by both carrier companies and owner operators in the route São Paulo – Rio de Janeiro. Analyzing each of these variables, the following results were assessed.

- **Average Fleet Age:** The fleet of carrier companies acting on the route São Paulo-Rio de Janeiro is, on average, 5 years old, while the fleet of owner operators acting on the same route is, on average, 19 years old. 52% of the vehicles that belong to owner operators present an average fleet age between 15 and 24 years. Therefore, one can conclude that the average age for the fleet of owner operators that act on the route São Paulo - Rio de Janeiro is significantly higher than that of carrier

companies. This phenomenon is not exclusive in the market of São Paulo – Rio de Janeiro. As shown in section 2.2, in the Brazilian market, the fleet of carrier companies is significantly newer, more modern, diversified and greater in capacity than that of owner operators. However, this research shows that, on average, the fleet of carrier companies that acts on the route São Paulo – Rio de Janeiro is newer and more modern than that of other Brazilian carriers, with average fleet ages of 5 and 8.5 years old, respectively. This is due to the expressive amount of cargo shipped from São Paulo to Rio de Janeiro and to the economic importance of both these cities in Brazil. However, no difference was found for the average fleet age of owner operators that acts in this particular route in comparison to others in the Brazilian market. It can be explained by the fact that owner operators face many difficulties in financing the acquisition of new vehicles everywhere in Brazil and that the general dissatisfaction regarding freight rates is a national problem.

- **Frequency of Fleet Renewal:** As observed in the previous topic, the fleet of carrier companies is newer and more modern than that of the owner operators. Therefore, it is no surprise that they renew their fleet more frequently than owner operators. Carrier companies that act on the route São Paulo – Rio de Janeiro renew their fleet, on average, every five years, while the frequency of fleet renewal by owner operators that act on the same route is, on average, every 16 years.
- **Transported cargo:** Certain uniformity can be observed in the characteristics of the cargo transported from São Paulo to Rio de Janeiro by owner operators and by carrier companies, since both are subjected to the same demand pattern for cargo transport in the route. Thus, there is a predominance of general cargo (50% of the cases), which is packed for shipment, transportation and unloading.
- **Commercial Vehicle Insurance:** 70% of owner operators that act on the route São Paulo – Rio de Janeiro do not contract vehicular insurance and those who do (only 30%) are members of insured cooperatives, which offer discounts on hiring policies. This is not an exclusive phenomenon of the São Paulo – Rio de Janeiro route, but a characteristic of the entire Brazilian market due to the high insurance costs for commercial vehicles in the country. On the other hand, all the assessed carrier companies had insurance contracts that covered their vehicles as well as the transported cargo. These companies usually get high discount rates on insurance because of the large number of vehicles covered.
- **Outsourcing of Transportation services:** most carrier companies that act on the route São Paulo – Rio de Janeiro outsource part of their service to owner operators on peak seasons, mainly due to seasonal demand pattern.

- **Type of vehicles:** based on the results of the survey conducted, one can conclude that most of the owner operators (58%) used truck combinations (up to 33 tons) to transport cargo from São Paulo to Rio de Janeiro. The same type of vehicles is also majorly adopted by carrier companies. This type of vehicle is more indicated to operate on this route due to the fact that 50% to 60% of the load transported on this route are of general cargo and truck combinations with open semitrailers are suited for transporting different types of cargo. Other types of vehicles are used in the assessed route to a lesser extent or at specific times.
- **Values of charged freights:** the results of the survey research show that carrier companies hire owner operators for values that, on average, correspond to 60% to 70% of their original contracts. In these outsourcing contracts, carrier companies pass on to the owner operators the task of transporting. Although these values are apparently attractive to owner operators, it is important to stress that, in general, they do not consider part of the costs incurred on transportation service (such as fuel, tolls, tires and maintenance) and neither the difficulties involved on the operation, such as delays in loading and unloading, time spent waiting for the loading and unloading (causing loss of other freight), difficulties in getting return cargo (forcing them to return empty or to use longer routes), restrictions of traffic in large cities at certain times, or the traffic jam in large urban centres, such as São Paulo and Rio de Janeiro. As can be seen, all these factors have led to an increase in operating costs and loss of revenue from owner operators.

Finally, significant differences were observed in the data surveyed for both carrier companies and owner operators that operate in the route São Paulo – Rio de Janeiro. Such differences demonstrate discrepancies in the service of road cargo transport offered in this region, depending on who is performing the service.

7. REFERENCES

- [1] Wanke, P. (2010). *Logística e Transporte de Cargas no Brasil: Produtividade e eficiência no Século XXI*, Atlas, São Paulo-SP. (in Portuguese)
- [2] ANTT (2011). Agência Nacional de Transportes Terrestres, *RNTRC - Registro Nacional dos Transportadores Rodoviários de Cargas*, available at: <http://www.antt.gov.br> (accessed: 15 April 2012). (in Portuguese)
- [3] ANTT (2010). Agência Nacional de Transportes Terrestres, available at: <http://www.antt.gov.br>. (accessed: 10 October 2011). (in Portuguese).
- [4] CNT (2011), CONFEDERAÇÃO NACIONAL DOS TRANSPORTES. *Plano CNT de Transporte e Logística*. available at: <http://www.cnt.org.br/Paginas>. (accessed: 8 July 2012) (in Portuguese)
- [5] Fleury, P. (2003), *Nota Sobre o Setor de Transporte de Cargas no Brasil* – ILOS- Instituto de Logística e Supply Chain. available at: <http://www.ilos.com.br/web/index.php>. (accessed: 17 July 2012) (in Portuguese)
- [6] Ballou, R. H. (2001). *Gerenciamento da Cadeia de Suprimento, Planejamento, Organização e Logística empresarial*, Bookman, Porto Alegre, RS. (in Portuguese)
- [7] Chahad, J. and Cacciamali, M. (2005). *As transformações estruturais no setor de transporte rodoviário e a reorganização* no mercado de trabalho do motorista de caminhão no Brasil, available at: <http://www.fea.usp.br/feaecon/biblioteca>. (Accessed in 12 November 2011) (in Portuguese)
- [8] Cibulska, P. (2010), “Panorama da frota dos transportadores rodoviários remunerados de cargas no Brasil” in PANAM (Ed), XVI PANAM proceedings of the international conference in Lisboa, Portugal. (in Portuguese)
- [9] Caixeta Filho, J. (2003), “Transportation and logistics in Brazilian agriculture” in. *Proceeding of the Agricultural Outlook Forum 2003*. available at: <http://purl.umn.edu/33141>. (accessed: 10 October 2012). (in Portuguese).
- [10] CNT (2010), Confederação Nacional Dos Transportes. *Pesquisa CNT de Rodovias 2010: relatório gerencial*. available at: <http://www.cnt.org.br/Paginas>. (accessed: 18 September 2012) (in Portuguese)
- [11] NTC&LOGÍSTICA (2010). Associação Nacional do Transporte de Cargas. *Roubo de Cargas*. available at: <http://www.cnt.org.br/Paginas/index.aspx>. (Accessed in 18 march 2012). (in Portuguese)
- [12] Hijjar, M. F. (2008), *Preços de Frete Rodoviário no Brasil*. – ILOS- Instituto de Logística e Supply Chain, available at: www.ilos.com.br, (accessed: 11 August 2011). (in Portuguese)
- [13] Caixeta Filho, J. and Martins, R. (2011), *Gestão Logística do Transporte de Cargas*, Atlas, São Paulo, SP. (in Portuguese)
- [14] Martins, R. (2008). *Estudo da Formação do Frete Rodoviário e Potencial de Conflitos em Negociações em Cadeias do*

Analyzing the assessed variables, one can conclude that carrier companies have a more reliable fleet and offer a more reliable service than those of owner operators, who usually act on an outsourced basis under the rules of carrier companies. This relationship does not always translate into lucrative contracts for these owner operators.

6. CONCLUSION

This paper presents an overview of the current situation of the road cargo transport in Brazil. It also points out the main differences between owner operators and carrier companies operating in the Southeast region of the country, regarding the following variables: average fleet age, frequency of truck renewal, transported cargo, acquisition of insurance and the need for outsourcing transport services. The results show that, for all evaluated items, the fleet of owner operators performed well below than the fleet of carrier companies. For that reason, owner operators offer a less reliable service and hence do not have conditions to compete with carrier companies for contracts. Therefore, they end up working for these carrier companies, who outsource transport services which they choose not to perform with their own fleet.

Generally these outsourced services have more complicated and costly routes or cargo, which ends up rapidly depreciating vehicles of owner operators as well as increasing the risks involved. As a result, carrier companies often impose their own rules and conditions of the owner operators. Finally, one can conclude that the service of road cargo transport in the Southeast region of Brazil may present discrepancies depending on who is performing it. These problems, associated with an unbalanced transport matrix, lead to disastrous consequences for society, such as an increasing number of road accidents, deterioration of road infrastructure and higher cost for cargo distribution.

Agronegócio Brasileiro. available at: <http://revista.dae.ufla.br> (accessed in 8 November 2011). (in Portuguese)

- [15] Gil, A. (2002), *Como elaborar projeto de pesquisa*, Atlas, São Paulo, SP. (in Portuguese)

Pregled drumskog teretnog saobraćaja u Brazilu

Maria da Penha S. Araújo, Vânia Barcellos G. Campos, Renata Albergaria M. Bandeira

Primljeno (17. Oktobar 2012.); Recenzirano (21 Decembar 2012); Prihvaćeno (07. Mart 2013.)

Rezime

Ova studija ima za cilj da proceni rad glavnih aktera brazilskog tržišta vezanih za drumski teretni saobraćaj: vlasnika operatera i izvršnih kompanija. U osnovi predstavljen je pregled teretnog saobraćaja u Brazilu, ističući njegove karakteristike i tržište teretom. Nakon toga, kako bi se okarakterisale performanse vlasnika operatera i izvršnih kompanija, napravljeno je istraživanje s izvršiocima na relaciji Sao Paulo – Rio de Ženero. Rezultat ovog istraživanja omogućio nam je da identifikujemo uslove vezane za cene teretnog saobraćaja, kao i komparaciju rada vlasnika operatera i izvršnih kompanija.

Ključne reči: *transportni saobraćaj, cene tereta, drumski izvršioci, drumski transport.*