Desired and Perceived Levels of Service in Transport Contracts

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Abstract

This article aims to fill in some gaps in the literature regarding logistics and transport management. An analysis was made of the decision-making factors considered to be important by small-sized shippers when contracting transport services and of their levels of satisfaction with those services. For this purpose a structured questionnaire and the Multivariate Declared Preference Technique was used to analyze a sample of 305 small and medium-sized Brazilian industrial shippers. The results indicate that Service Confidence is the most important construct for shippers. This is followed, in order of importance, by Delivery Times, Frequency of Service, and Freight Information. The importance given to the constructs helps in understanding the rationale for agents using their own transport and arranging their own contracts for transport of their goods. The levels of service perceived by these shippers were also studied.

Keywords: Transportation management; Logistics management; Freight; Stated Preference.

1 INTRODUCTION

Transport management is traditionally treated mainly as a process (Ng, Ferrin and Pearson, 1997; Neuschel and Russell, 1998) and its flow is measured according to its operational performance and costs (Meixell and Norbis, 2008; Mason *et al*., 2003; McCann, 2001). In this article, transport is analyzed from the service management viewpoint in order to understand how shippers develop their expectations about services and how these services are evaluated.

The study was based on the business environment found in small and medium-sized Brazilian industrial companies.

This topic has a significant impact on an organization's daily routine. Transport management involves decision-making about the movement of materials and finished products between different locations in a specific business network. The search for efficiency in logistic processes has caused other features of the service, such as meeting delivery times, transparency about costs and the development of appropriate integrated services with suppliers and customers to become an integral part of the decision-making process about transportation.

Transport is important for companies because it generates locational value and, since it can account for between one and two thirds of total logistic costs, it makes a significant contribution to cost formation. Therefore, a significant proportion of business competitiveness depends on transport strategies being correctly developed and implemented, although they will have a greater or lesser impact depending on the type of business. Moreover, as emphasized in Skinner's (1969) seminal article, any particular operations strategy must also be aligned with the corresponding corporate strategy. This means deciding between the many alternative levels of service (pre-arranged loading and delivery times and frequencies), ownership of the transport fleet (self or third-party) and the method of consolidating freight (lots and location).

In Brazil, small and medium-sized companies (SMEs) are very important, since they constitute 99.2% of registered companies, are responsible for 57.2% of formal employment and for 20% of the Gross National Product (GNP) (SEBRAE, 2008).

Thus, taking the impact of transport services on business competitiveness as its context, this study sought to analyze which factors are important for small-scale shippers when making decisions about hiring transport services and for their satisfaction levels regarding the transport services they contract. Although the study of transport activities and their importance for company logistics is at an advanced stage in regard to third-party contracts and contracting operators, there are still important gaps concerning specific details in the case of small and medium-sized companies (Holter *et al.*, 2008).

Following an introduction, this article is divided into four sections. The first takes up the question of logistic management and transport as part of business strategies, and deals with specific aspects of small and medium-sized companies. The second section presents details of the methodology and, in the section after that the results are discussed. Lastly the conclusions and final considerations are presented.

2 LOGISTIC AND TRANSPORT MANAGMENT AS A FACTOR OF COMPETITIVE ADVANTAGE

According to Neuschel and Russell (1998), as a result of the competitiveness of the business environment, the demand for transport services has been undergoing important changes. As far as service providers are concerned, these changes are have been felt in the form of increased competition, the need to integrate with service providers from other areas, market deregulation and severe pressure on prices, costs and for improvements in service.

In general, transport services provide shippers with a basic foundation for distribution of their products, since they have a direct effect on customer satisfaction. When an organization supplies products in a highly competitive environment, logistics, especially delivery, may have a negative impact on the on customers' evaluation of aggregate products and services.

For example, it can mean loss of loyalty or failure to reorder, depending on delivery performance regarding cost, damage levels, delivery times and the general dependability of the service (Ballou, 2006).

Decisions about transport have important direct interfaces with company finance, production and marketing, especially customer satisfaction. According to Mason *et al*. (2003), empirical studies show that, in financial terms, transport costs account for 2 to 4% of sales revenue and from 30 to 60% of a company's total logistic costs. Holter *et al.* (2008), also highlight the fact that, apart from direct costs, transport decisions also have an effect on other areas such as stock carrying, the level of service and production planning.

Decisions about transport interact with production regarding both the availability of raw materials and finished products. It is the efficiency of the former which guarantees availability of the latter, and, consequently, that production plans will be put into practice. In addition to this, meeting agreed delivery dates also depends on the transport services contracted and provided.

Holter *et al.* (2008) draw our attention to the difference between transport purchasing and transport management. The process of acquiring transport services is involved in the traditional trade-off between cost and quality which results from the buying process in itself. However, transport management includes monitoring the service and thus goes beyond the limits of the company to inevitably include the management of relations with the operator.

Bowersox, Closs and Cooper (2002) suggest that transport management should be carried out by evaluating services according to parameters that allow measure of performance. For

example:

- Speed: Transit time

- Availability: Ability to service any point of origin and destination

- Reliability: Potential variation in total time taken to provide the service

- Capacity: Ability to handle any amount of any type of cargo.

- Frequency: Ability to provide service at any time.

According to Holter *et al*. (2008), in order to coordinate transport services with logistic and marketing strategies, service users, known as shippers, base the management of transport processes on such factors as cost, transit time, traceability of freight, delivery management and their total cost for managing the activity.

Transport management in small-scale business environments has some special features. First of all, it should be highlighted that there is a strong family element in the management of small businesses and a high degree of centralization. The owner of the company is directly involved in company operations, including transport. Gasse (1982), holds that this close contact with all the operations and the fact that company policy is heavily concentrated in the owner's hands, has an effect on management, mainly because entrepreneurs require independence and autonomy.

Gasse (1982) emphasizes that this situation causes difficulties in delegating, consulting and sharing activities with other parties, and also means that attention is concentrated more on efficacy than efficiency, along with an exaggerated preference for short-term advantage to the detriment of long-term planning. In other words, specialized transport management is not to be expected.

According to Ng, Ferrin and Pearson (1997), transport usually constitutes the most costly aspect of logistics for medium-sized companies. Moreover, it is a process which is repeated many times on an everyday basis for both the purchase of materials and distribution of products.

In addition to this, according to Holter *et al.* (2008), there are special features to be considered in the case of small-sized companies. First of all, shippers deal with small amounts of freight which, over and above the implications this has for the direct question of bargaining power in negotiations over price and level of service, means higher unit operating costs for the operator (MacCann, 2001). The scale of operations also makes for difficulties in developing more harmonious and balanced relations with transport operators, which would allow small companies to internalize external competences and transform them into competitive strengths in their businesses (Grant, 2005).

On the other hand, according to Pappu, Mundy and Paswan (2001), the financial situation in small-sized companies makes it difficult to invest in the technological tools that would make it possible for them to carry out transport management, according to the definition put forward by Holter *et al.* (2008).

3 METHODOLOGICAL DEFINITIONS

This study is an empirical exploratory study that sought to define the needs and expectations of shippers regarding the services provided by road transport companies to small and medium-sized shippers in current Brazilian conditions. .

This study was carried out according to criteria put forward by Collis and Hussey (2009) and is an exploratory-descriptive study of objectives, using quantitative/qualitative procedures and inductive reasoning. The survey method was also adopted, with non-probability sampling according to accessibility.

Malhotra (2001) points out that exploratory research is appropriate when phenomena are not well understood or are not understood at all. In such cases, the empirical nature of the research is based on field surveys and the use of complementary sources.

According to Creswell (2007), quali-quantitative research combines field techniques such as observation and interviews with traditional studies using quantitative data. This author holds that this makes it possible to triangulate the sources of quantitative and qualitative data with the results. Quali-quantitative studies involve empirical and theoretical analysis of one particular case in order to formulate hypotheses that can be generalized.

The qualitative aspect of the research consisted in trying to understand how logistic management takes place in the organizations that were analyzed. Qualitative research therefore has the aim of understanding phenomena by means of holistic analysis, employing different types of data obtained from the context in which the phenomenon occurs (Yin, 1994).

Inductive logic is used as the method of reasoning about the topic, with the aim of not only producing ideas but of also guiding reflection about them (Malhotra, 2001).

3.1 The Sample

Non-probability sampling according to accessibility and representativity was used to obtain

the sample. This method was chosen because of the difficulty in obtaining access to the companies studied. Collis and Hussey (2009) confirm that it is sometimes difficult to obtain a sample, especially when dealing with sensitive or confidential matters

The sample consisted of 307 establishments that did not use transport fleet of their own. There was a 95% confidence level and a 5% error (Hair Jr. *et al*., 2005).

The unit of analysis consisted of the processing industry companies from the State of Minas Gerais with up to 100 employees, listed in the Federal Ministry of Labor Register of Businesses with Employees. The units of observation were the owners and managers involved in transport planning and management.

3.2. Research Strategy, Data Collection and Type of Information

The strategy consisted of using interviews of the type also known surveys, which are intended to obtain information about a specific subject by analyzing the situation and collecting data. The interviews were carried out during in loco visits and made use of a structured questionnaire with declared preference cards.

Data collection took place in February and April, 2009. The interviews dealt with the individual features of transport services and, based on these characteristics, the constructs that were required in order to carry out the analysis, and, lastly, the level of satisfaction with these services.

In order to produce the necessary research instruments, it was necessary to decide which of the factors required for an analysis of transport services were the most important. Guidance on

this question was obtained from Novaes (2001), Schluter and Sena (1999) and Valente, Passaglia and Novaes (2008). In addition to this survey of the theoretical literature, the experiences taken from previous studies with similar aim, such as ANTT (2005), and IBRD/ANTT (2006), were also used.

The evaluation of transport considered the following aspects:- the decision-making process for contracting transport services; the constructs that determine this decision-making; and the evaluation made of the services that were available in comparison to those that were actually used.

The factors that influenced both the choice and evaluation of services were identified according to the following constructs taken from ANTT (2005) and duly corroborated in the relevant literature, e.g., Bowersox, Closs and Cooper (2002):

- Time - the time spent between contracting and conclusion of the service (pick-up and delivery of the freight).

- Safety – both the means of transport and of the freight itself.

- Reliability – variations in relation to the terms of the contract.

- Price – freight rate.

- Customer relations – service quality and provision of information.

- Care - attention given to the customer's special needs – loading and unloading requirements or questions relating to compliance with suppliers' or customers' needs .

These constructs were subdivided into individual features in order to evaluate the service provided. This evaluation was compared with the relative importance of the constructs in order to make a rough estimate of the shippers' level of satisfaction regarding the services.

Satisfaction was also measured by means of results matrix to show the gap between what the shipper held to be important and what was actually provided, based on an even more varied list of features.

The ranking of shippers' preferences was ascertained by the survey carried out according to the Declared Preference technique, which is dealt with in the following section.

3.3 The Declared Preference Technique

Multivariate statistical techniques can be used identify shippers' preferences. Three of these techniques are - Conjoint Analysis, Revealed Preference and Declared Preference and the last of these was chosen as the one best suited to the aims of this study, due to the fact that it deals with hypothetical situations or situations where preferences or choices cannot be directly observed.

Market analyses that are based on the Declared Preference technique use certain concepts of human behavior to explain the preferences expressed by agents, both individuals and organizations, when they try to maximize satisfaction. According to Byrns (1996), this behavior is also vital for making business decisions that are intended to maximize resource utilization in an organization.

According to Ortúzar (1998), Declared Preference consists of a set of methodologies that are based on the judgments expressed by individuals about hypothetical situations that are presented to them. It uses techniques for devising experiments to create alternative hypotheses that can be put to respondents. So, by analyzing situations that do not necessarily exist, it can identify the features of the service under study that are considered to be important by those

who use it.

The Declared Preference Technique was originally used in the Management Sciences in the 1970s for problems in the marketing area. According to Louviere *et al*. (2000), this technique is also widely used in both industrial and commercial business sectors and is usually employed for:-

a) testing the acceptance level of new products or services or for modifying them.

b) separating out data obtained using the Revealed Preference technique.

c) assessing subjective factors that influence decision-making

By means of the Declared Preference Technique it is possible to identify the relative importance of each feature. The use of this information as strategic input makes it possible to organize the service in the way that most closely corresponds to the wishes of the agents involved. So some logistic studies use Declared Preference to ascertain which features of service quality are considered to be the most important (UFSC-ANTT, 2003; Danielis, Marcucci and Rotaris, 2005; Beuthe, Bouffioux and De Maeyer, 2003), while Bolis and Maggi (1998) use it to estimate the extent to which shippers would be prepared to pay for differences in the quality of transport services.

3.3.1 Survey of Shippers' Preferences

According to Jones (1991), when using the Declared Preference Technique he following sequence of steps must be followed:-selecting the sample; defining the form and level of complexity of the technique; establishing the criterion for measuring choice, defining the interview method and method of data analysis.

3.3.1.3 Interviews

When the survey is actually in progress, the interviewee should be made properly aware of the correct procedure for using the set of cards presented to them. There are three ways of measuring the interviewee's preferences:- "choice", where the interviewee chooses the best alternative.; "rating", where the interview awards marks to the alternatives, and "ranking", where interviewees place the alternatives in order of importance according to their preferences.

In this study, the ranking method was chosen, since it provides the least tiring method of classification for the interviewee. In this method, the cards are presented separately and at random and the interview ranks the alternatives according to usefulness.

It is recommended that the interviews be carried out in loco due to the fact the process is somewhat time-consuming. However, it is also possible to combine this method with others, such as postal, telephone (Louviere *et al.,* 2000) or Internet interviews. This research was conducted in loco.

3.2.2 Data Analysis

The Logit Multinomial Model was used to analyze the data produced by the Declared Preference technique. Given that the random term of the utility function (1) is in accordance with a Gumbel-type distribution, we have the Logit Multinomial Model (Bem-Aakiva and Lerman, 1985), which can be expressed as:

$$P_n(i) = \frac{e^{\beta_k X_{ink}}}{\sum\limits_{j \in C} e^{\beta_k X_{jnk}}} \tag{2}$$

where $P_n(i)$ is the probability of the alternative *i* being chosen by individual *n* within a set of possibilities *C*.

Statistical techniques, using the algorithm created by Souza (1999), were employed to to analyze the responses.

4 RESULTS AND DISCUSSION

4.1 Desired Level of Service

The choice of features used for the Declared Preference technique was made by carrying out a survey of the same original sample to determine the features that were important in decision-making about transport. In this experiment, shippers stated that the "Safety" and "Reliability" of transport services were the most important constructs. It is important to note that the lowest scores were found in the case of "Customer Relations" and "Attention given to the Customer's Special Needs" (Table 1).

Table 1 - Evaluation of Transport Services according to the Constructs

Constructs	Score
Time	4.45
Safety (means of transport and freight)	4.60
Reliability	4.59
Price	4.34
Customer relations	4.23
Attention given to the Customer's Special Needs	4.28

Source: Research Results

In other words, "Safety" is the main feature of transport services. The reason for this being of such importance can be explained by the fact that shippers have a high level of dependence on

transport services in order for goods to reach customers. They therefore do not want transport to be the source of conflicts with the customer. The importance of the features connected to relations with the transporter ("Customer Relations" and "Attention to Special Needs"), and which are more specifically related to a collaborative and strategic partnership, were minimized. "Price" was given an intermediate level of importance.

According to an international study by Meixel and Norbis (2008), the criteria most sought after when hiring transport services are "Reliability", "Transit time" and "Logistic Costs", followed by "Damage", "Availability of Vehicles/Flexibility", "Treatment", "Freight rate and Service Quality".   This is the reason that we feel confident about the elements included in our construct "Confidence".

The features used to make up the constructs for the Declared Preference cards are shown in Table 2. These constructs deal specifically with aspects of the level of service and a specific construct "Safety" was not created, since it was included within Reliability. On the other hand, based on other studies made of the situation in Brazil (ANTT, 2005; IRDB/ANTT, 2006), the construct "Service Frequency" was included.

The results from the statistical model for all the regions grouped together are shown in Table 3. The t test considers the significance of the β parameters and indicates that the results obtained will be significant if they are higher than the value given in Table t student. The LMPC program (Souza, 1999), uses the t test with a significance of 95% for these parameters. If we consider that the number of interviews is greater than 120 and the values obtained from the t test are all, in module, higher than 1.96, then the null hypothesis for the constructs is rejected and it is accepted that they can all make a significant contribution to utility (Ortúzar,

2000).

Table 2 – The Constructs used with their Respective Levels and Numerical Codes

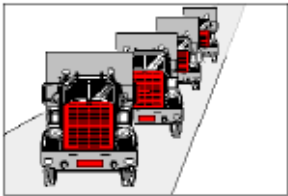| Construct	Levels	Numerical Code
Service Frequency	**Satisfactory:** the company is visited for pick-up or delivery with a satisfactory frequency (several times per week)	1
	Low: the company is not visited for pick-up or delivery with a satisfactory frequency (a maximum of once a week)	0
Delivery Time	**Express:** deliveries are made immediately	1
	Without precision: no trustworthy estimate is given about delivery times.	0
Reliability	**High:** the service is reliable so that the shipper has no doubts about the punctuality and integrity of the freight.	1
	Low: the service is not reliable and the shipper has doubts about the punctuality and integrity of the freight.	0
Freight Information	**Monitored:** the shipper is able to obtain precise information about the freight regarding its location at any given time	1
	Not-Monitored: the shipper is not able to obtain precise information about the freight regarding its location at any given time	0

Figure 1 – An Illustration of the Constructs used in the Field Research

Table 3 – Statistical Results for the Constructs

Construct	Coeffcient	Error	t Teste	CI (t=2.5%)
Freqüência	0.7824	0.0922	8.4884	[0.598 ; 0.967]
Prazo	1.4844	0.1046	14.1913	[1.275 ; 1.694]
Reliability	1.6526	0,1057	15.6331	[1.441 ; 1.864]
Information	0.5716	0.0945	6.0466	[0.383 ; 0.761]

Number of Interviews = 307   Number of Cases = 921
F(Betas_0) = -975.6625   F(Betas_1) = -634.6064
LR (-2[F(0)-F(B)]) = 682.1123
Rho = 0.3496   Rho (Ajt) = 0.3455

Source: Research Results

It should be noted that the results obtained for Confidence Interval confirm acceptance of all the parameters. The Likelihood Ratio Test, which checks the LR value and compares it to the value in the table for χ^2, also simultaneously rejects the null hypothesis for all the parameters (Brandli and Heinaeck, 2005). This is also true for the statistical test for ρ^2, whose theoretical value is limited to between 0 and 1. However, according to Ortúzar and Willemsem (1990), they are considered to be appropriate and consistent for use with the Declared Preference Test when the values are between 0.2 and 0.4, confirm the consistency of the models and the results obtained.

In the light of these results, it is noted that the ranking of the constructs is as follows:- "Reliability", "Delivery Dates" and "Frequency and Information about the Cargo". In addition to this, the positive indications were consistent with expectations, which means that the preferred level of service needs to provide deliveries that are more frequent and reliable, with set delivery times and full access to information about cargo when it is in transit. Moreover, shippers showed that the "Reliability" and "Set Delivery Times" are relatively much more important than "Frequency" and "Availability of Information"

4.2 Evaluation of the Level of Service Received

Table 4 shoes a results matrix that was created to provide a general view of the importance given to certain features and the evaluation made of them. This showed the gap between what

the shipper holds to be important (Importance) and what is actually provided (Evaluation). It can be seen that the features related to the "Reliability" construct are considered to be the most important for the companies analyzed, closely followed by those related to "Safety".

Table 4 – Results Matrix (RES): Importance (IMP) versus Evaluation (EVA)

Constructs	Features	IMP	AVA	RES	IMP	AVA	RES
Safety	Prevention of Theft	5.56	4.84	-0.72	5.55	4.80	-0.75
	Prevention of Damage	5.58	4.64	-0.94			
	State of Repair of Trucks	5.41	4.95	-0.46			
	Prevention of Accidents	5.48	4.84	-0.64			
	Compensation for Losses	5.73	4.72	-1.01			
Reliability	Fulflment of Contract	5.61	5.12	-0.49	5.67	5.05	-0.62
	Regularity of Services	5.58	510	-0.48			
	Capacity & Availability of Trucks	5.50	4.89	-0.61			
	Punctual Delivery	5.81	4.94	-0.87			
	Safety of the Cargo	5.84	5.22	-0.62			
Price	Freight Cost	5.56	4.36	-1.20	5.40	4.32	-1.07
	Discount Policy	5.33	3.85	-1.47			
	Payment Times	5.29	4.47	-0.82			
	Rivalry among Competitors	5.42	4.62	-0.80			
Customer Relation	Ease of Communication with Transporter	5.68	5.08	-0.60	5.52	4.63	-0.89
	Speed of Service	5.70	4.97	-0.74			
	Autonomy of Person responsible for the Service	5.54	4.63	-0.91			
	Efficient Resolution of Problems	5.67	4.53	-1.14			
	Freight Tracing;Monitoring System	5.20	3.97	-1.23			
	Technical Cooperation with Customers	5.33	4.60	-0.73			

Source: Research Results

The size of the gap (RES) between the importance given to each feature of the service and the evaluation made of the service actually received in each case indicates the aspects of the transport service that need to be improved. If we note the relative values awarded to each of the features, it is possible to see that there is a wide gap in the case of the constructs for "Price" and "Customer Relations", In the case of "Price" the sharpest difference relates to transporters' discount policies, followed by freight costs. Although given relatively low importance, shippers are dissatisfied with the price of the services.

As far as "Customer Relations" are concerned, the companies studied indicated that the

greatest failing lies in the area of resolving problems, along with lack of efficiency in monitoring cargo. Leaving aside the details for the moment, it is worth pointing out that the evaluations made by the interviewees did not coincide with their statements about the importance of the same features and this means that transporters need to take action to reduce this gap.

However, the values presented can also be used to make a general assessment of the service offered, taking into account the importance of its component parts and the evaluations made of them. In this case the shippers' level of satisfaction regarding transport services is 86 %, which seems to be a rather important figure.

5 FINAL CONSIDERATIONS

This article aims to fill in some gaps in the literature regarding the logistics of transport management. An analysis was made of the decision-making factors considered to be important by small-sized shippers when contracting transport services and for their levels of satisfaction with those services.

The results indicate that shippers hold that the most important construct for the level of service is "Reliability", which includes efficiency, punctuality and safety. This is followed, in order of importance, by Delivery Times, Frequency of Service, and Freight Information.

In addition, shippers showed that the constructs of "Reliability" and "Set Delivery Times" are relatively much more important than "Frequency" and "Availability of Information"

The ranking and relative importance seem to indicate that the logistic constructs are important

for the companies. "Level of Service" appears to be an important item for evaluating relations between buyers and sellers so it is possible to conclude that logistic aspects are capable of strengthening or weakening relations and this means that logistics can provide companies with an effective means of creating competitive advantages.

On the other hand, shippers indicated their high level of satisfaction with the services currently provided by transporters and logistic operators. Thus, shippers showed that they expect the performance of transport services to strengthen relations with their customers and to be provided with services that satisfy these expectations.

However, the importance given to the "Reliability" and "Delivery Times" constructs can also help us to understand the reason that many companies either have their own transport fleet or sign contracts for the transport of their goods. In special situations where products have special features, e.g., are perishable, have high aggregate value, are very large-scale or when they service supply chains where logistic indicators are very important in the evaluation made by the suppliers, shippers may decide that the services provided by the transport operators contain such a high level of risk that it is preferable to have control over these services by maintaining their own fleet or by negotiating strict contracts. However, since the shippers' level of satisfaction is relatively high, these practices are not prevalent.

Although the gap in knowledge regarding logistic strategies in the area of small and medium-sized companies was the reason for this research, it is recognized that one of its limitations is the difficulty in applying its conclusions to larger-size businesses. For this reason, it is recommended that similar studies of this type should be carried out in larger companies so that an appropriate contrast to this study may be obtained and so that the topic is studied at a

deeper level in Brazilian academic institutions.

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