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**Collaborative Practices in the Management of the Brazilian Automotive Chain: Does the Origin of Automakers Matter?**

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**Abstract**

This study analyzed management models used in the Brazilian automotive industry supply chains, using the collaborative relationship practices existing between the tiers as its basis in order to identify alignments in these practices. Alignment was analyzed by using the concept of the magnitude of the gap between a customer's needs and the emphasis put on such needs by first tier suppliers when dealing with those from the second tier. Alignment was measured by using ten performance criteria. In order to make a comparative analysis of these practices, the suppliers of European and US automakers were identified. The main conclusion of this study was that, irrespective of the nature of the culture implanted as a result of the automaker's place of origin, in the case of suppliers beyond the first tier, performance criteria of a collaborative nature are not widely found in the automotive chain.

**Keywords:** Relationship Management, Strategic Alignment, Collaboration, Automotive Chain.

## **1. INTRODUCTION**

The paradigm for the development of networks or chains of supply companies in response to a more competitive global market highlighted the need to implement cooperative, collaborative and competitive concepts and practices in inter-company relations. Experience has shown that the organizations which obtain the best results are precisely those that are most successful in organizing, coordinating and managing relations with their partners in the network (Christopher, 2005). Thus, the organizations comprising these chains come to depend on satisfactory performance from all their partners.

The automotive industry can be considered a basic source of guidance for implementing practices which prioritize relations. In this industry, relations are improved by standardizing the concepts and technological tools used by automakers and their suppliers in the process of supplying the production process while taking into account the need to minimize stocks and the risk of stoppages in the production line.

In order to reach this level of relationship, the automakers encouraged a gradual process of reduction in the number of suppliers. Reducing the number of points of contact made it possible to establish collaborative relations with first tier suppliers, thus contributing to the development of both innovative capacity and new products (Di Serio, Sampaio, Pereira & Moreira, 2005). Once the improvements in the regularity and accuracy of performance required by the automakers had been obtained from suppliers (Barratt & Oliveira, 2001), it was thus possible to establish the proper basis for managing component and systems suppliers and to allow the automakers to maintain minimum stock levels,.

So, as Spekman, Kamauff and Myhr (1998) emphasize, the concepts of collaboration, cooperation and integration should be applied to the most important links within the network.

It is in this way that one does not lose sight of the aim of the chain, namely, to satisfy the needs of the end customer, an aim which implies other equally important connections, such as those which take place between buyers and suppliers all across the network.

Chopra and Meindl (2007) complement this approach by stressing the fact that the individual strategies of each link in the supply chain must be aligned with the competitive strategies adopted within the whole chain. That is to say, in addition to what is found regarding relations between automakers and first tier suppliers in the Brazilian automotive chain, the same alignment is also to be expected in the relationships between first tier companies and their suppliers.

This alignment relationship is especially important in the case of the automotive industry in Brazil, since, at least in the case of the four main automakers operating in the country – Fiat, VW, GM and Ford – it has become a development centre for new vehicles. According to Fischmann (2007), the four automakers with the greatest share of the Brazilian market have already reached the stage of developing complete derivative projects, which is considered to be the penultimate stage in the scale of engineering competence for new-product development.

Therefore, this study analyzed management models used in the supply chains of the Brazilian automotive industry, based on the collaborative relationship practices existing between different tiers – automakers and 1<sup>st</sup> and 2<sup>nd</sup> tier suppliers – with a view to identifying alignments in these practices. Consequently, evidence was sought for the adoption and implementation of these collaborative practices in the relation between automakers and their suppliers and for the adoption and implementation of the same practices in the relations these suppliers establish with their own suppliers. The search for this evidence was based on the

performance criteria given priority in relations between the automakers and the first tier and between this first tier and the second tier.

This study had the specific aim of analyzing the way in which these relations are affected by the automaker's place of origin. In other words, one question arised as to whether the implementation of collaborative practices and the prioritization of collaborative performance criteria are influenced by the automaker's place of origin?

This paper offers makes a contribution from both the academic and management point of view. One of these contributions is an analysis of the relations established in tiers that are the furthest removed from the most important companies, an area that has so far received little empirical study. Another important contribution to management studies lies in the identification of practices that support the expansion of a new model of collaborative arrangements implanted by automotive assembly companies in Brazil. In addition, this research aims to help in understanding the processes companies have adopted in order to manage their supply operations and the implications of these activities for the competitiveness of both for the companies involved and the supply chain as a whole.

This article is divided into five sections, the first of which is the above introduction. In the second section a revision of the literature on supply chain relationships is provided. In Section 3, the research methodology is explained in detail, along with the characteristics of the sample of companies used. The fourth section contains the analysis and discussion of the results and, in the final section the main conclusions of the paper are presented.

## **2. SUPPLY CHAIN RELATIONSHIPS**

According to Borgatti and Li (2009), Management Science uses the same processes as the majority of the Social Sciences. This means seeking the explanation for business success in individual and environmental factors, and, more recently, by using the relational approach.

Christopher (2005) and Lambert, Cooper and Pagh (1998) hold that the inclusion of the relational approach in Management Science analytical and strategic literature constitutes one of the most significant advances in management thought in recent years.

In this approach, organizations are not only studied according to their organizational form and activities but also by the way in which they interact with suppliers and customers, that is, in the supply chain where they operate. According to Morgan and Hunt (1994), the concept of establishing, developing and maintaining successful relations is the greatest recent change in market theories and practices.

According to Burt, Dobler and Starling (2003), although every company has business relations and many of them develop collaborative relations, only a few develop strategic alliances. In Ellram's (1992) opinion the level of complexity of the products involved in the act of buying and selling determine the type of coordination required between the companies involved. Buying commodities, for example, tends to lead to simple market relationships, whereas the purchase of specialized products with limited sources of supply tends to lead to more complex relationships.

Cooper e Ellram (1993) point out that the guiding elements of relationship strategies are to be found in the interaction situation. A closer relationship derives from the recognition that this is the most appropriate way of obtaining access to resources controlled by third parties so that they can be added to its own resources and skills. Moreover, interaction makes it possible to increase coordination of the activities carried out by the group of companies that constitute the relationship, thus eliminating similar activities and increasing the level of complementarity between their organizations.

The relational approach extends the concepts of cooperation, collaboration and competition. Companies compete in order to attract and retain their customers. Cooperation and

collaboration can coexist with competition because they are situated in different dimensions and attract different interests and, according to Porter (1998), do not mutually exclude each other. Cooperation and collaboration can be understood as concepts with the same practical implications (Hiltz, 1998; Johnson & Johnson, 2001), there being little benefit in trying to define the differences in meaning between the two terms.

According to this relational approach, collaboration and cooperation are two concepts which should not only be applied to relations between close business partners but as processes which develop throughout the network (Spekman et al., 1998). In other words, they emphasize the need to integrate functional silos and begin to understand that they are interdependent and dedicated to the aim of satisfying the needs of the end customer. The result of these links is a set of interconnected and interrelated firms that have the common aim of obtaining competitive advantage for the whole network (Dyer & Chu, 2000). According to Pires (2004), the level of cooperation increases to the extent that both the level of formalization of relations between companies and the level of integration of processes in the supply chain increase expand.

Cooperation refers to the way in which the members of a channel synchronize their activities in order to increase mutual benefits. It has to do with shared activities that seek to create long-term partnerships that bring common advantages for those who participate in the relationship. According to Anderson and Narus (1990), it consists of coordinated activities carried out by firms which have interdependent relations in order to obtain mutual benefits or individual benefits that are expected to bring future returns. That is to say, cooperation can be said to take place when all parties involved have the common aim of benefitting from the alliance they have established.

Collaboration is the process by which two or more partners intentionally adopt a high level of cooperation in order to maintain a business relationship over time (Monczka, Trent & Handfield, 2002). It takes place when two or more companies share the responsibility of exchanging information about planning, management, execution and measurement of performance. This involves joint decision-making and collective responsibility for the results (Barbara, 1991). Thus, it is understood that, just as cooperation seeks common ends, collaboration is related to the union between individuals who seek a common goal (Skjoett-Larsen, 1999).

Certain elements are necessary in order to establish a collaborative relationship. In the opinion of Stank, Keller and Daugherty (2001), successful collaboration requires a change in the standard of business practices, especially regarding exchange of information. Quinn (1999) holds that free exchange of information, for example, about operational plans and finance is necessary if the benefits of collaboration are to be obtained.

Morgan and Hunt (1994) suggest that, in the case of materials and strategic products, successful relationships are based on commitment and confidence. These two authors hold that these are the key variables for explaining differential rates of performance between supply chains, since they encourage the links to invest in responding to their partners' needs, to resist more interesting short-term opportunities in favor of long-term stability, and to run risks because they trust that the other links will not behave opportunistically.

According to Hardy, Phillips and Lawrence (2003), relations based on collaboration help to transfer knowledge between those involved and facilitate in developing new knowledge and synergy. Hausman (2001) holds that collaboration reinforces relationships and can only be obtained through trust, commitment, solidarity, reciprocity and flexibility. In order for this to happen, there - must be open communication, frequent interaction, attainment of objectives,

an extensive interface, internal norms governing relations, non-opportunistic behavior, cooperation, vertical or horizontal partnerships, personal relationships, minimum use of coercion and flexible contracts. On the other hand, the consequences of strong relationships are high levels of satisfaction, better performance, an increase in adaptability, a reduction in coercion, long-term survival, an increase in cooperation, a reduction of conflict, an increase in market share, contractual advantages and a reduction in uncertainty.

Relationships can be understood as a type of coordination between those involved, one that is obtained by means of adaptation – mutual adjustments in activities, products, management systems and production processes (Skjoett-Larsen, 1999) – which have to do with the fact that activities can be carried out in a personalized manner in diverse situations while other activities can be carried out in a single way, depending on the buyer with whom they are associated. These adaptations are the crucial ingredient for inter-organizational relationships.

Hakansson and Snehota (1995) use the example of a company with three customers in order to explain this concept. Some of the company's activities, for example, manufacturing, are carried in a standardized way without it being important who the customer is. However, other activities need to be personalized in order to fit in with the way in which the customers' activities are organized, for example, sales activities. Yet others should or could be adapted, either by the supplier or by the customer, for example, logistic activities may be mentioned here.

The changes made as a result of a relationship may be carried out by either of the companies involved but both of them will always be affected. They will appear in the course of time as a means of solving problems (Hakansson and Snehota, 1995), of improving performance, even when there is a cost (Gadde and Hakansson, 2001), and as a way of making better use of resources in the context of the supply chain (Skjoett-Larsen, 1999).



Various authors have tried to model how relations develop according to levels of strength. Dywer, Schurr and Oh (1987) propose four phases for this process: recognition that partners are able to satisfy specific demands; attraction; communication and negotiation; development of norms; exercise of power and development of mutual expectations; expansion, there is - an increase in interdependence and risk; and the development of mechanisms and systems for helping in conflict resolution.

Webster (1992) has proposed a typology for defining the types of relationship and alliance found in supply chains or networks. His model takes the form of a continuum which begins with the most traditional forms, based on commercial transactions and evolves to take in more sophisticated forms of relationship that culminate in vertical integration at the the opposite end from transactions.

As show in Figure 1, Monczka et al. (2002) propose a classification system with four distinct phases to show how relations develop over time. According to this classification, relationships progress from the situation where merely commercial attitudes predominate – Phase 1 and then, under the influence of antagonism, reach a stage where there are a certain number of initiatives for joint activities - Phase 2. These activities then deepen and bring about the need to come into closer contact, to cooperate, in order to support strategies that are differentiated according to cost and level of service – Phase 3, until they mature to the point where trust and commitment provide sufficient basis for exchange of information and joint planning. This is Phase 4, which in the opinion of these authors characterizes collaboration.

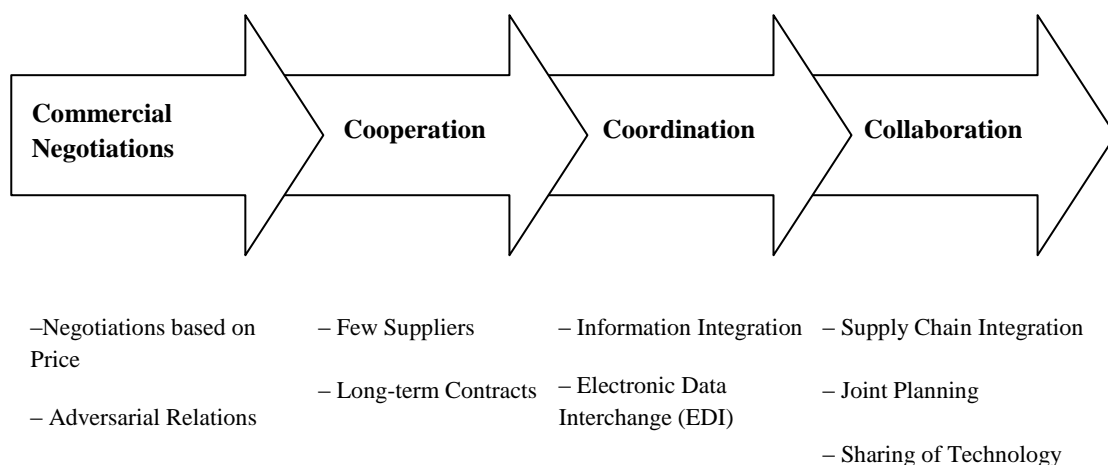
The concept of collaboration put forward by Spekman et al. (1998) suggests that effective management of the chain depends on the search for close, long-term relationships with a limited number of customers and suppliers, who depend on each other in order to do business, i. e., develop interactive relationships with partners who share information freely, work

together to resolve problems, develop products, on joint planning for the future and for whom success means interdependence.

Phase 1	<i>Antagonism</i>	<ul style="list-style-type: none"> <li>-Each party regards the other with a minimum of trust or respect;</li> <li>- Relations are frequently hostile;</li> <li>- Multiple-source Strategy, competitive offers, short-term contracts;</li> <li>- Suppliers unable to offer price reductions are immediately replaced.</li> </ul>
Phase 2	<i>Competitive or Adversarial</i>	<ul style="list-style-type: none"> <li>- Only suspicion instead of complete mistrust;</li> <li>- Multiple-source Strategy, frequent change of sources;</li> <li>- Beginnings of a close relationship at work.</li> </ul>
Phase 3	<i>Cooperation</i>	<ul style="list-style-type: none"> <li>- Closer relationship due to common aims;</li> <li>-Recognition of the advantages of a lean supplier base.</li> <li>- Strategies focused on reductions in the time of the overall cycle.</li> </ul>
Phase 4	<i>Collaboration</i>	<ul style="list-style-type: none"> <li>- Complete trust between partners;</li> <li>- Commitment to joint work and adoption of strategies that lead to world-class performance;</li> <li>- Trust and information-sharing become routine;</li> <li>- Suppliers become an extension of the purchasing company.</li> </ul>

**Figure 1:** Development of Relations  
Source: Adapted from Monczka et al. (2002)

Spekman et al. (1998) hold that the integration and management of the supply chain really only take place at the stage called “collaboration”, cf. Figure 2. This stage - requires high levels of trust, commitment and information-sharing between the partners in a supply chain. In addition to these requirements, partners must have a common vision of the future.



**Figure 2:** Essential stages in the process of development from commercial negotiations to collaboration.  
Source: SPEKMAN et al. (1998)

To summarize, one way of understanding the strategic nature of collaboration is by considering the Resource Based View (RBV). Dierickx and Cool (1989) note that collaboration is a critical resource that has to be constructed, i.e., it does not occur automatically.

It is necessary to develop the ability to overcome intra and inter-organizational barriers and this makes collaboration a rare and valuable resource which it is difficult to simulate (Hansen and Nohria, 2004). The financial returns produced by the relationship mean that it constitutes a competitive advantage (Dyer and Singh, 1998).

### **3. RESEARCH METHODOLOGY**

This study was carried out according to criteria put forward by Collis and Hussey (2009) and it makes an exploratory-descriptive study of objectives, using quantitative/qualitative procedures and inductive reasoning. The multiple case study method was also adopted.

According to Malhotra (2001) exploratory-descriptive research is recommended when the research seeks to describe the characteristics of any phenomenon, assess the behavior of a specific population or confirm the relationship between variables. According to Creswell (2003), quali-quantitative research combines techniques and methods from the field such as observation and interviews with traditional studies using quantitative data. 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). The methodological procedure, using multi-case studies, normally involves in-depth and detailed analysis of the object of research.

#### **3.1. Sample**

Non-probability sampling according to accessibility was used to obtain the sample. This sampling 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 target population of this research consisted of the first tier suppliers of automobile automakers. The membership list of SINDIPEÇAS – National Association of Automobile Components Manufacturers – was used to carry out the company survey. In total, 33 companies were visited. As a result of the strategy for optimizing the supplier base used by the Brazilian automotive industry, which has led to a pronounced reduction in the number of first tier suppliers, due to the practices involved in modularization of production (Correa, 2001; Venanzi & Gobbo Júnior, 2009), it is reasonable to assume that the companies included in the sample are important actors on the Brazilian automotive scene.

The units of observation were the purchasing managers or those responsible for this area, working for first tier suppliers and taking direct part in the management of the second tier supplier base and the relations established with it.

### **3.2. Research Strategies and Type of Information**

Data collection was carried out in loco (on site) by means of interviews using semi-structured questionnaires. The following categories of questions were used: a) identification of – company type; b) identification of the three main automakers serviced; c) identification of the three most important materials purchased d) assessment of the importance of the ten performance criteria in selecting and evaluating second tier suppliers; e) assessment of the same performance criteria from the standpoint of each of the three automakers supplied by the company under study.

### **3.3. Analytical Models used in the Research**

The concept used for analyzing the alignment of practices was taken from Vachon, Halley and Beaulieu (2009), and proposes that the degree of alignment corresponds to the strength of the

gaps between the customer's needs and the importance given to these needs by the first tier supplier in dealings with second tier suppliers. This concept was used in the automotive industry and has produced very satisfactory results (Martins, Souza Filho & Pereira, 2010).

The strategic alignment for each automaker-supplier pair is obtained by totaling the absolute values of the difference, in percent, between the importance of each criterion used by the first tier supplier in order to evaluate second tier suppliers and the importance of these same criteria for the automakers in their relations with first tier suppliers in the opinion of the latter. The lower the figure obtained, the more aligned the first tier supplier's strategy is with the strategy of the automaker. The formula for this calculation is:

$$A_y = \sum_{n=1}^{10} |1 - (CDF \div CDC)| \quad (1)$$

where:

$A_y$  = strategic alignment for the automaker – supplier pair  $y$ ;

$n$  = performance criterion;

CDF = importance of the performance criterion in relations with the second tier supplier

CDC = importance of the performance criterion from the point of view of the customer in its relations with the first tier supplier.

Strategic alignment was assessed on the basis of the total amount of individual alignment calculated for each automaker – supplier pair according to the formula presented in (1).

The method for analyzing strategic alignment used the marks awarded by respondents as input and consisted of two stages. In the first stage 10 performance criteria for the automotive sector were selected from Hines (1995), Dyer and Chu (2000) and Ogden (2006). The criteria were as follows: support for projects involving new products, punctuality, rapid cycle time, price, production capacity, quality, sharing of information about production plans, openness regarding costs, flexibility and financial structure. The respondents were asked to rank these criteria from 1 to 10 according to their importance in the processes of selecting and evaluating

second tier suppliers, where 10 was awarded to the most important criteria and 1 for the least important.

In the second stage, as a way of ensuring that the analysis of the practices adopted in relations with second tier suppliers only included those who were significant for the first tier supplier's business, respondents were requested to identify the three most important materials purchased. From this point onwards, responses only considered the suppliers of each one of these items. The criterion used for importance was the amount spent on the item per annum.

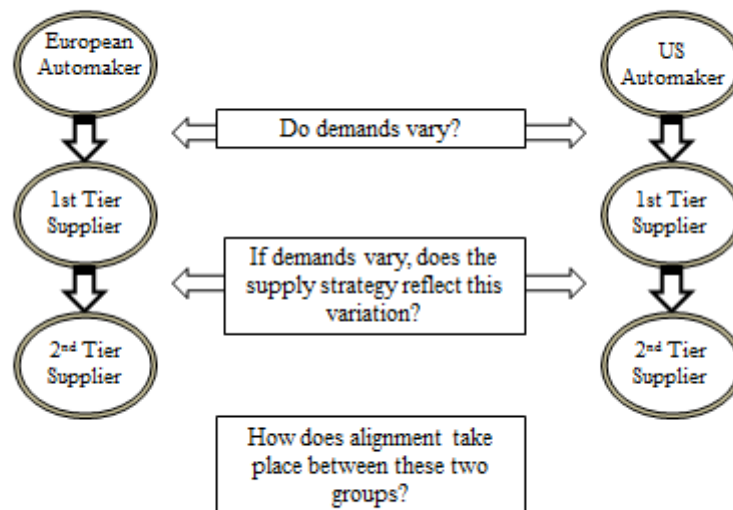
The same respondents were also asked to use the same procedure in deciding on the importance of the ten performance criteria but this time from according to the opinion of each of the three main automakers served by the company. This procedure was intended to obtain the suppliers' opinion of the performance requirements demanded by the automakers.

In order to analyze strategic alignment, a segmentation was made, in order to analyze strategic alignment according to the automakers' place of origin, namely, Fiat, Volkswagen, Renault, PSA Peugeot/Citroen, Mercedes-Benz and Iveco, from Europe, and General Motors and Ford, from the United States. The question that arises here is whether changes in the place of origin have an influence on the occurrence of strategic alignment between the levels of the supply chain and on the adoption and implementation of more collaborative practices between them. According to Dyer and Chu (2000), the business environment in the place of origin influences the level of trust and loyalty adopted by companies when managing their supply chains. Liker and Choi (2004) confirm this hypothesis and use it to explain the success of Asian automakers in the United States in contrast to the marketing problems faced by US automakers.

The choice of these two places of origin, Europe and the United States, is due to the fact that they are representative of Brazilian domestic production of automobiles, light commercial vehicles and trucks and buses, since these items account for approximately 92% of total

production (National Association of Automotive Vehicle Manufacturers [ANFAVEA], 2010). For this reason, Asian automakers were not included in this study, and, given that were also almost never mentioned as being among the three most important customers of Brazilian suppliers, they do not constitute a significant sample.

Figure 3 shows the model used to make a comparative analysis of the automakers place of origin.



**Figure 3:** Model used to analyze Strategic Alignment according to the Automaker's Place of Origin

#### 4. RESULTS

The results obtained are presented in segments according to the place of origin of the automakers. At the end there is a discussion of the implications of the results for the effectiveness and performance of supply chains as a result of type of alignment.

#### **4.1. Identification of Alignments by Place of Origin of Automakers**

To make this comparison the responses were segmented into two separate groups: first tier suppliers servicing European automakers and those servicing plants from the United States.

Table 1 shows a number of characteristics of the companies analyzed, segmented according to the place of origin of the main automakers which head supply chains.

Table 1

##### **Characteristics of the Company Studied**

<b>Characteristics of the Company</b>	<b>Suppliers of European Automakers</b>	<b>Suppliers of US Automakers</b>
Main Customer's Contribution to Annual Revenue	52%	25%
Percentage assigned to Payment Second Tier Suppliers	56%	51%

Source: Research Results

The European automakers had stronger links with their suppliers than the US automakers, since, when the former are the supplier's main customer, they account for an average of 52% of the latter's sales revenue. For their part, when the US automakers are the main customer, they account for an average of 25% of the supplier's revenue.

The two groups of first tier suppliers have practically the same level of third party contracts. This information suggests that first tier suppliers have a reasonable level of dependence in comparison to second tier suppliers and similar to the average level of 60% found in the case of the automakers (Monczka et al., 2002).

##### ***4.1.1 Analysis of the Alignments based on the Performance Criteria***

The readiness of a particular company to develop relations with suppliers with high levels of collaboration and integration of processes can be measured by the importance given to a set of criteria for selecting and evaluating suppliers (Dyer & Chu, 2000; Hines, 1995; Ogden, 2006).



Before presenting the data, it is necessary to test the validity of the conclusion that the average values of importance given to performance criteria by companies are different for the groups used in this comparison. For this purpose, the hypothesis was tested for each of the criteria, by taking the value of the group with the highest value and putting forward the null hypothesis that this value is equal or less than the average value of the other group.

For this test it was considered that the population had a normal probability distribution. The standard deviation of the marks awarded to the criteria was calculated and the *t* distribution was used to make inferences about the value of the averages of the population. According to Hair et al. (2005), when samples have less than 30 units, if the standard deviation is known and if the population has a normal probability distribution, it is possible to use a specific formula as a statistical test for the testing of hypotheses for small samples.

The level of significance was set at 0.05, that is, it was established that the maximum probability of accidental rejection of the null hypothesis was 5% (Hair, Anderson & Tatham, 2005) and it was therefore only possible to reject the null hypothesis for the performance criteria for “punctuality”, “speed” and “financial situation”. In these cases it is not possible to conclude that the averages are different for the two groups. In the case of these performance criteria it was decided to present the general average for the sample, without making any difference between the two groups.

Table 2 shows the calculation of strategic alignment following the procedure described in the formula (1) in Section 3.3. Especially from the sum of alignment, it can be inferred that the supply strategies of the first tier suppliers of European automakers are more aligned with the supply strategy adopted by the automakers than those which supply US automakers.

Table 2

**Importance of the performance criteria for first tier suppliers and for automakers and the calculation of alignment according to criterion and supply chain, segmented according to the place of origin of the automobile automaker**

Performance Criterion	Suppliers of European Automakers			Suppliers of US Automakers		
	Supplier	Automakers	Alignment	Supplier	Automakers	Alignment
<b>Quality</b>	8.5	7.6	0.11	7.0	7.6	0.09
<b>Performance</b>	7.7	7.9	0.03	7.7	7.9	0.03
<b>Speed</b>	7.0	6.9	0.02	7.0	6.3	0.11
<b>Price</b>	6.8	6.8	0.00	5.3	5.9	0.11
<b>Production Capacity</b>	5.9	6.0	0.03	4.6	6.0	0.32
<b>Financial Situation</b>	5,2	4.3	0.17	5.2	4.3	0.17
<b>Support for Development of New Products</b>	4,2	5.1	0.23	5.4	5.1	0.06
<b>Flexibility</b>	4.2	4.3	0.04	5.7	4.3	0.24
<b>Openness about Costs</b>	2.9	3.8	0.33	3.7	4.9	0.34
<b>Sharing of Production Plans</b>	2.6	2.6	0.00	3.7	2.6	0.29
<b>Sum of Alignment</b>			<b>0.9</b>			<b>1,8</b>

Source: Research Results

There are negative effects on performance when the links in a supply chains are not aligned by a supply strategy, since the absence of one single strategy hinders the achievement of common aims and targets throughout the network (Chopra & Meindl, 2007).

The first tier suppliers of European automakers behave in a similar way to these automakers when ranking these criteria in order of importance. However, in this case, the main differences, between the level of importance given by supplier and customer concern the criteria of “support for development of new products” and “openness about costs”, where the automakers rank them higher than the suppliers. In contrast, suppliers ranked “supplier’s financial situation” higher than European automakers.

For the supply chains belonging to US automakers “timeliness” is the most important criterion and is given a higher ranking than “quality” in this study.

The lowest level of alignment found in this group of companies in comparison to the group associated with the European automakers concerns the divergence between supplier and automakers regarding the importance of the following factors:

- a) “Production Capacity and Openness about Costs” – ranked higher by the automakers.
- b) “Financial Situation, Flexibility and Sharing of Production Plans – ranked higher by the suppliers.

#### ***4.1.2 Hypotheses for Differentiated Alignment***

If we bear in mind that this study did not find any case of a US automakers with an exclusive supplier, that is, all the first tier suppliers in the sample that service US automakers also service European automakers, two hypotheses may be examined in order to explain the difference in alignment between the two chains under comparison:

- I. The automakers from the two places of origin have similar practices, but the first tier suppliers do not.
- II. The US automakers’ supply practices are different from those used by European automakers to manage first tier suppliers.

Table 2 shows information that offers little support for Hypothesis I, since there are significant differences in the averages attributed to the automakers from the two groups regarding “speed”, “price” and “openness about costs”

Hypothesis II was analyzed by placing the criteria in separate groups. The criteria were grouped in separate categories and analyzed in order to elucidate the second hypothesis. The choice of categories was made according to their principal characteristics. The four categories were “quality”, “performance”, “collaboration” and “price”. Table 3 shows the criteria making up each of the categories.

Table 3

**The Categories of Performance Criteria**

<b>Category</b>	<b>Integrated Performance Criteria</b>
<b>Quality</b>	- Quality
	- Timeliness
	- Speed
<b>Performance</b>	- Production Capacity
	- Financial Situation
	- Support for Development of New Products
	- Openness about Costs
<b>Collaboration</b>	- Flexibility
	- Sharing of Production Plans
<b>Price</b>	- Price

Source: Research Results

Table 4 shows the information according to chain and category. The values were calculated by taking the average of the ratings for level of importance given to each of the categories of performance criteria by the first tier suppliers and according to their perception of the value given to these criteria by each of their main customers segmented according to place of origin. The last column provides the data about the relationship between values of the group of companies from the European and US chains.

Table 4

**Comparison of the Categories of Performance Criteria**

<b>Categories of Performance Criteria</b>	<b>Europe</b>	<b>US</b>	<b>Europe vs. US</b>
Quality	8.1	7.3	10%
Performance	25.4	24.4	4%
Collaboration	14.8	17.7	-19%
Price	6.8	5.6	18%

Source: Research Results

Collaborative practices make their presence felt in a more effective way in relations between suppliers and US automakers than between suppliers and European automakers. The ratings given to this category by the supply chains linked to US automakers were 19% higher than those associated with European automakers. On the other hand, these same supply chains

gave a rating to “price” that was 18% lower than the supply chains belonging to European automakers.

This information backs up the evidence that the higher level of alignment found between first tier suppliers and European automakers does not necessarily mean that there is collaboration between these companies. On the contrary, the companies belonging to the other group whose strategies had the lowest level of alignment were precisely the ones which demonstrated the most collaborative behavior on the basis of an analysis of performance criteria.

## **5. Final Considerations**

The aim of this research was to study the companies making up the supply chains of the Brazilian automotive industry in order to identify alignment in their strategies based on the collaborative principles described in the literature. To this end, evidence was sought for the acceptance and implementation of collaborative practices in the relations between automakers and their first tier suppliers as well as practices of the same type between these first tier suppliers and their (second tier) suppliers.

The analysis of the responses was segmented according to the automakers place of origin in either Europe or the United States. The aim was to compare the strength of alignment found according to variations in these parameters.

The main conclusion of this study was that collaborative performance criteria were not prevalent in the automotive supply chain beyond the first tier, irrespective of the culture established according to the automakers’ place of origin. The fact that the automakers adopted collaborative practices that gave importance to performance criteria concerning “sharing of information about production plans”, “openness about information on costs” and “joint development of new products” had no influence on the supply strategy used by first tier suppliers

Even though the US automakers implemented these practices to manage their relations with first tier suppliers, collaboration is not a priority for performance in the relations between first and second tier suppliers. In other words, it seems that the governance that has been established in relations with suppliers in the automotive chain is limited to the supplier-first tier dyad. This may be due to the difficulties caused by the complexity of the items supplied or distance or inability to provide guidance about practices as a result of the fact that the market in which first and second tier suppliers operate has its own specific dynamic and determinants.

Therefore this analysis indicates that even with innovation and the implementation of practices for managing the supply chain, the Brazilian automotive industry still has room for developing relations on a more collaborative basis in all supply chains in order to maximize the advantages deriving from alignment between company and supply chain strategies.

The analytical model used in this study provided evidence that the principles of collaboration are not prevalent in the criteria which form the basis of relations in the automotive chain. According to Spekman et al. (1998), the relations between the tiers of the chain are aligned by the automakers in order to coordinate them, but their only strength is at the level of information exchange. According to Monczka et al. (2002), these relations may be described as cooperation, Phase 3 of the model, where emphasis is given to strategies that reduce the total cycle time.

However, based on the sample analyzed in this study, it is possible to conclude that the European automakers operating in Brazil are missing the opportunity to extend collaborative practices to their supply chains to the extent found in the automotive industry internationally. By not giving as much importance to collaborative aspects as US automakers, according to

the perceptions of first tier suppliers, these automakers have established a model of governance based on weakened links between actors.

It must be emphasized that these results should be interpreted according to the limitations of the research. Although the model used has already been tested in studies carried out in other countries, the results obtained may be distorted by the fact that they reflect perceptions from one single tier of the supply chain. In contrast, chains where assets are highly specific, for example, trucks and agricultural equipment, or where a strong cultural element is present, as in the case of recently arrived Asian automakers, or when companies decide to engage in manufacture far from the customary geographical locations, such as the states of Bahia and Goiás, may behave in a significantly different manner than those studied in this research.

This study suggested a number of possible topics for future research based on the contribution it makes to a greater understanding of relationship management in supply chains, especially those chains which operate in an international environment marked by intense competition and rivalry. One of the opportunities refers to the possibility of analyzing the influence exercised by the type of product sold, especially its level of technological complexity, on the practices described in the present study. Another possibility concerns the study of changes in supply practices as a result of the use of information technology improving information flow in the supply chain.

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## **REFERENCES**

Anderson, J. C. & Narus, J. A. (1990). A model of distributor firm and manufacturer firm working partnerships. *Journal of Marketing*, 54 (1), 42-58,

- ANFAVEA - National Association of Automotive Vehicle Manufacturers. (2010). *Anuário da Indústria Automobilística Brasileira*. São Paulo.
- Barbara, G. (1991). *Collaborating*. San Francisco: Jossey-Bass.
- Barbieri, P. & Mahapatra, S. (2009). Buyer-supplier relationship in supply network: implications of tier-II supplier management practices. In *European Operation Management Association Conference*, Göteborg.
- Barratt, M. & Oliveira, A. (2001). Exploring the experiences of collaboration planning initiatives. *International Journal of Physical Distribution e Logistics Management*, 31 (4), 266-289.
- Borgatti, S.P. & Li, X. (2009). On network analysis in a supply chain context. *Supply Chain Management*. 45 (2), 5-22.
- Burt, D., Dobler, D. & Starling, S. (2003). *World class supply management: the key to supply chain management*. 7<sup>th</sup> ed. New Delhi: Tata McGraw-Hill.
- Chopra, S. & Meindl, P. (2007). *Supply Chain Management: Strategy, Planning, and Operation*. 3<sup>rd</sup> ed., Upper Saddle River, New Jersey: Pearson Education, Inc..
- Christopher, M. (2005). *Logistics & Supply Chain Management: creating value-adding networks*. 3<sup>rd</sup> Edition, London, UK: FT Press.
- Collis, J. & Hussey, R. (2009). *Business research: a practical guide for undergraduate and postgraduate students*, 3<sup>rd</sup> Edition, Basingstoke: Palgrave Macmillan.
- Cooper, M. & Ellram, L. (1993). Characteristics of Supply Chain Management and Implications for Purchasing and Logistics Strategy. *The International Journal of Logistics Management*, 4 (2), 1-10.
- Correa, L. H. (2001). The VW Resende (Brazil) plant modular consortium SCM model after 5 years of operation. In *Annual Conference of the Production and Operations Management Society*, Orlando.
- Creswell, J.W. (2003). *Research design: qualitative & quantitative, and mixed methods approaches*, 2<sup>nd</sup> Edition, Thousand Oaks, CA: Sage.
- Di Serio, L. C., Sampaio, M., Pereira, S.C.F. & Moreira, M. A. S. (2005). Supply chain design in the Brazilian automotive industry. In *Annual Conference of the Production and Operations Management Society*, Chicago.
- Dierickx, I. & Cool, K. (1989). Asset stock accumulation and competitive advantage. *Management Science*, 35 (12), 1504-1511, Dec.
- Dyer, J. & Chu, W. (2000). The Determinants of Trust in Supplier-automaker Relationships in the US, Japan and Korea. *Journal of International Business Studies*. 31 (2), 259-285.
- Dyer, J. H. & Singh H. (1998). Response to Relational View Commentary. *The Academy of Management Review*, 24 (2), 185-186.
- Dwyer, F. R., Schurr, P. & Oh, S. (1987). Developing Buyer-Seller Relationships. *Journal of Marketing*, 51, 11-27.
- Ellram, L. (1992). Partners in International Alliances. *Journal of Business Logistics*, 13, 1-25.
- Fischmann, E. (2007). *O papel da engenharia local dos fornecedores de autopeças e a integração com as montadoras no desenvolvimento de novos produtos*. (Master's degree dissertation) Universidade de São Paulo, São Paulo.



- Gadde, L.E. & Hakansson, H. (2001). *Supply Network Strategies*. Chichester: John Wiley & Sons.
- Hair, J.F., Anderson, R.E., Tatham, R.L. & Black, W.C. (2005). *Multivariate Data Analysis*, Upper Saddle River, NJ: Prentice Hall.
- Hardy, C., Phillips, N. & Lawrence, T. (2003). Resources, Knowledge and Influence: the organizational effects of interorganizational collaboration. *Journal of Management Studies*, 40 (2), 321-341.
- Hiltz, R.S. (1998). Collaborative learning in asynchronous learning networks, building learning communities. From [http://eies.njit.edu/~hiltz/collaborative\\_learning\\_in\\_asynch.htm](http://eies.njit.edu/~hiltz/collaborative_learning_in_asynch.htm).
- Hines, P. (1995). Network Sourcing: a Hybrid Approach. *International Journal of Purchasing and Materials Management*, 31 (2), 17-24.
- Johnson, D. & Johnson, J. (2008). Cooperative learning. From <http://www.clcrc.com/pages/cl.html>.
- Lambert, D. M., Cooper, M. C. & Pagh, J. D. (1998), Supply chain management: implementation issues and research opportunities. *International Journal of Logistics Management*. 9 (2), 1-19.
- Liker, J.K. & Choi, T.Y. (2004). Building Deep Supplier Relationships. *Harvard Business Review*, 82 (12), 104-113.
- Malhotra, N.K. (2001). *Marketing Research: An Applied Orientation*, Upper Saddle River, NJ: Prentice Hall.
- Martins, R.S., Souza Filho, O.V. & Pereira, S.C.F. (2010). Collaboration in the Brazilian automotive chain: Are there strategic alignment in this industry? In *European Operation Management Association Conference*, Porto.
- Monczka, R., Trent, R. & Handfield, R. (2002). *Purchasing and Supply Chain Management*, 2<sup>th</sup> Ed. Cincinnati: Thomson Learning.
- Morgan, R.M. & Hunt, S.D. (1994). The commitment-Trust Theory of Relationship Marketing. *Journal of Marketing*, 58, 20-38.
- Ogden, J.A. (2006). Supply base reduction: an empirical study of critical success factors. *Journal of Supply Chain Management*, 42 (4), 30-40.
- Pires, S.R.I. (2004). *Gestão da Cadeia de Suprimentos: Conceitos, Estratégias, Práticas e Casos*. São Paulo: Atlas.
- Quinn, F.J. (1999). Cooperation and collaboration: the keys to supply chain success. *Logistics Management & Distribution*, 38 (2), 35.
- Skjoett-Larsen, T. (1999). Supply Chain Management: a new challenge for researchers and managers in Logistics. *International Journal of Logistics Management*, 10 (2), 41-53.
- Spekman, R., Kamauff, J. & Myhr, N. (1998). An Empirical investigation into Supply Chain Management: a perspective on partnerships, *International Journal of Physical Distribution & Logistics Management*, 28 (8), 630-650.
- Stank, T.P., Keller, S.B. & Daugherty, P.J. (2009). Supply chain collaboration and logistical service performance. *Journal of Business Logistics*, 22 (1), 29-48.

- Vachon, S., Halley, A. & Beaulieu, M. (2009). Aligning Competitive Priorities in the Supply Chain: the Role of Interactions with Suppliers. *International Journal of Operations & Production Management*, 29 (4), 322-344.
- Venanzi, D. & Gobbo Júnior, J.A. (2009). A Study of new production models from an operations strategy perspective: the case of modular consortium (MC) and industrial condominium (IC) in Brazil's automotive industry. In European Operation Management Association Conference, Göteborg.
- Webster, F. E. (1992). The Changing Role of Marketing in Corporation. *Journal of Marketing*. 56 (4), 1-17.