SUPPLY CHAIN AND NEW INDUSTRIAL ORGANIZATION FORMS: THE CASE OF BRAZILIAN AUTOMOBILE COMPLEX

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Abstract

This paper brings a review about Brazilian automotive industry and an analysis of new trends on its organization. After a period following international standards in work organization and supply chain relationship, this industry is a kind of laboratory where transnational companies are applying models like modular consortium and industrial condominium to improve their competitivety. These models are according to globalization trends where automotive industries looking for worldwide partners. Most of Brazilian autoparts companies have been sold or closed due to this trend. A case study about relationship between suppliers and automotive companies are showed.

key words: *supply chain; Brazilian automotive complex; globalization*.

1- The History of Brazilian Automotive Industry

Brazilian automotive industry was created during 50's through an planned action of government which target was developing the Brazilian industry and updating the way of life in the society according to standards of the United States and European countries.

The development of this industry has been made in steps. The first step was in 50's, when many international automotive companies (like Volkswagen and Mercedes Benz) built factories in Brazil. Others companies like General Motors and Ford, which had started their activities in Brazil in the beginning of the century, have enlarged their activities. These investments were based on official incentives and protection against foreigners competitors.

The second step was between 1958 and 1962, when a fast increase of production and sales. The next step is between 1963 and 1968, when a big recession was responsible for a very small annual increase in automotive production. After that, a new period of development (up to 1974) and a new stagnation period (from 1974 to 1980). This last period was called “the lost decade”, because the production level in the end was almost the same of the beginning and there were almost no change in the produced vehicles.

In the beginning of 90`s, two important things have happened. On one hand, the creation of the concept of *popular cars* , with small tax for car which price was around US$ 7,000.00[1]. On the other hand, the Brazilian market was opened to foreigner vehicles and autoparts. This fact has finished the protection that Brazilians companies have had during almost thirty years and that has caused technological, organizational and quality discrepancy between these companies and their original units in United States, Japan and Europe. In a second moment (1994, with *Real Plan*), the end of high inflation levels has eliminated the financial profit of the companies. Then they have passed to look for profit in their core business.

2- The modernization Process

The opening to international markets has put Brazilian autoparts companies face to face with international players and costs. This situation has obligated these companies to make big efforts to attain international level of quality and productivity. Automotive companies has improved day by day the quality requirements of products that they were buying. Certifications according to quality standards like ISO 9000, EAQF 1994, AVSQ 94, VDA 6.1 and/or QS 9000 have became essential for al suppliers. For some automakers to have a quality system certification is not enough any more. The target is zero defect and preventive and corrective actions have strict monitoring by automotive companies. Defective parts are not acceptable any more and parts must be delivered directly in assembling line, without any inspections by automotive company.

With option to import autoparts and vehicles, automotive industry, which has established the principle to buy the world wide best price, has forced autoparts companies to achieve international prices. This means that autoparts companies need to improve their productivity and most of them are making these through *lean production* principles.

Brazilian macroeconomics trends play an important role. From 1994 up to 1998, with exchange rate of R$1.00 to US$1.00, automotive companies were importing a big quantity of autoparts. At the same time, it was very difficult to Brazilian autoparts companies to exports their products. After January 1999, with a new exchange rate[2], Brazilian autoparts are very competitive in internal and international markets. Besides that, this new exchange rate has made possible to sell Brazilian vehicles abroad.

This modernization process has happened with models produced in Brazil ,too. During the 80’s only two new models were launched and almost all of others cars are old European models, projected in 60’s and 70’s, except of course, the Beetle which project was made in 30’s. In this period, Brazilian exported cars were very different (in technological way) of their “similars” which were sold in internal market. During 90’s a very strong replacement of models has taken place. Nowadays most of Brazilian cars are updated with international markets in design and technological aspects.

Brazilian automotive industry has achieved international cost and quality level. Some Brazilian units has become so competitive that workers in the original country of the company have made protests and strikes against Brazilian exportations of cars and trucks.

3- The Mercosul

Another international point which has influence over Brazilian automotive and autoparts industry is the relationship with partners of Mercosul[3], mostly with Argentina. With an industrialization process similar to Brazilian's one, Argentina's automotive and autoparts industries has passed by a big crises in 80's (worst than Brazilian's crisis). This crises has resulted in a technological backward. Besides that, the Argentinian population is smaller than Brazilian one, therefore the market is smaller, too. The last, but not the least point, is the exchange rate. Argentinian government has maintained the parity between Peso and Dollar. These conditions have made Argentina's automotive and autoparts industries a "satellite" of Brazilian complex. The original idea was to maintain an equilibrium between two partners, with free circulation of autoparts and vehicles. Nevertheless, a lot of Argentina's autoparts companies have been bought for Brazilians ones. Most of Automotive companies have established their headquarters and main factories in Brazil. As a consequence, the industrial activity has decrease and the unemployment rate nearly doubled in one year. Argentinian government, industrial and workers leaderships are claiming against this situation and a lot of meetings between Brazil and Argentina have happened to find an equilibrium in this relationship. As a result, after a long discussion, a new automotive trade pact was signed in March, 2000. Trade rules will be gradually removed up to be totally eliminated in 2006. Fines were established for companies that abruptly abandon Argentina. The target of this action is maintaining some stability in Argentinian automotive and autoparts sectors. It is important to understand that this situation is due to a specific moment. Any change in exchange rate could invert this trend.

4- Relationship between autoparts and automotive companies

Before discussing the new pattern of relationship amidst suppliers (autoparts) and their clients (automakers), we'll try to analyse the evolution of this kind of relationship, since of the beginning of the automobile industry. Already in the primes of the former industrial production principles, the big companies within the automobile sector called forth the emerging of a countless number of small companies, suppliers of auto-parts, that started to produce many kinds of parts and components for the large car manufacturers of that time (first half of this century). Even though companies such as Ford and General Motors showed high standards of vertical integration, while Chrysler and the European companies tended to buy greater part of the components from independent firms, the fact is that subcontracting has been present since the very birth of the automobile industry.

However, although a great number of parts and components had been bought from "captive subsidiaries", such companies developed their own projects independent from the final product (automobile) on which these parts were to be used. Thus, a number of problems arose in the relationship between the contracting firms (manufacturers) and suppliers of auto-parts, such as:

1. Irregularity in delivery times, in many cases due to their own informality in contracting individual items.

2. High rate of faulty or defective pieces, incompatible with the parts with which they were to be assembled. (Not assured quality).

3. Conflictual relationship between suppliers and vehicle manufacturers, mainly during the frequent strikes occurred in the 1960-ties and 70-ties, in the North-American industry, which aggravated the delivery problems. This whole situation forced the large manufacturing companies of the time to seek schemes of *double supply* in order to prevent eventual gaps in delivery (and consequent lack of parts).

On the other hand, the Japanese automobile industry has developed a very different system of relationship between suppliers and manufacturers. The basic idea of this subcontracting system consists in greating narrow links between the small auto-parts supplying companies and the large car manufacturers. Such links include cooperative development of new projects and/or improvement of already existing parts/products by means of technical assistance, mutual use of laboratories, personnel, test equipment, etc., as well as the possibility of financial support from the large manufacturer (usually tied to huge conglomerates) to the small and medium size industries.

Some of the main benefits gained through this scheme by the large manufacturers should be emphasized:

1. Within the logic of the "just-in-time production system", the intention to eliminate or at least minimize the maintenance of stock is amply favored by the possibility of transferring to the suppliers the onus of high stock of parts and components. This means very little demand of high rate rolling capital on the part of the manufacturers. It should be further pointed out that the physical proximity between supplier and manufacturer represents the "key" to success of the "just-in-time" system.

2. In times of uncertainties and instabilities of the market, the risk, associated to high investments in a very verticalized plant, becomes significantly smaller, when the manufacturers transfer the task of producing their different types of components and sub-products to smaller size companies.

3. The managerial decentralization accomplished by this subcontracting arrangement, makes the productive system (manufacturer and suppliers) much more efficient as a whole. In special, the search for "total assured quality" production or for "zero error" becomes more and more facilitated at smaller size industrial units.

Nowadays, in order to improve their competitivety, automotive companies have started a new kind of relationship with their suppliers. A new concept: the modular system has appeared and a lot of new obligation were passed from automakers to the supplier. The responsibility over development and production of one or more systems has made necessary that the autoparts companies have a high level engineer team. This team is very expensive and the companies need to have high production level (in worldwide scale) in order to share costs. It is not the condition of Brazilian companies, which are, most of them, local player.

The international competition has created the concept *follow sourcing*, which means that a supplier will work together with an automotive companies any country which the last one has factories. It makes necessary that the supplier has several factories (most of then very small) and far from each other. There are few Brazilian companies that are able to attend this condition.

Finally, the Brazilian market as a whole is very attractive for international autoparts companies and they can buy Brazilian companies very cheap (according to international prices).

Considering these facts it is easy to understand why most of Brazilian companies was sold during the last ten years. Even companies which were considered with international level of performance was sold. The number of Brazilian independent companies has become smaller day by day. According to Sindipeças[4], in 1994 the share market of Brazilian autoparts industries was around 50% according criteria like value of capital, autoparts sales or value of investments. In 1999, using same criteria, the share market of Brazilian companies is around 30%. Ten years ago Brazil had 38,000 autoparts companies, today it has 8,000 but up to 2010 they will be only 2,000. Brazilian autoparts companies do not participate in new developments anymore because they are not able to attend new requirements of automotive companies as a worldwide player. They do not have capital and production level to develop new products and new production process. Beside that, with new automotive companies have arrived several international autoparts companies. These companies need to achieve high production scale and are fighting over market share with Brazilian companies. Therefore, in a few years, they will probably be working only in aftermarket. Brazilian aftermarket is very profitable, so profitable that automotive companies are working very hard to establish themselves into it. With so powerful competitors, the future of Brazilian independent companies is not clear.

There is an international process of concentration of autoparts companies. Big companies have bought others in order to have high production level and to be able to make big investments in product development. In fact, the automotive components and production process have become so sophisticated that to be a global player to have adequate return of the investment. Just to illustrate this tendency it could be mentioned the following companies: Delphi, Visteon, TRW (that bought an important Brazilian autopart company-Freios Varga, in the recent years), Magnetti-Marelli (that, in the recent years too, bought another global Brazilian autopart company-Cofap), Valeo, Meritor, Mahle (that is another company which bought an important Brazilian autopart company-Metal Leve- in the recent years) , Eaton , in the midst of others.

After 20 years with only eight companies (Ford, Fiat, General Motors, Mercedes Benz, Toyota, Scania, Volkswagen and Volvo) assembling cars, busses and trucks, Brazil has received investments of new automotive companies (Honda, Renault, Peugeot, Kia, Audi, Chrysler, Navi Star, Nissan, Rover, Iveco, etc). Besides, older players have opened or are building new factories (Ford, General Motors, Mercedes Benz, Volkswagen and Toyota) and some of then have changed their core business (Volkswagen has started operations with busses and trucks; Mercedes Benz is assembling cars, Toyota has started assembling cars after thirty years assembling a kind of Jeep). So many new factories and companies make sure that Brazil is a very interesting place for transnational automotive companies both due to internal potential market and to be an exportation base. On one hand Brazil is against the international trend because there is a superabundance of automakers plants and many of then have been or will be closed.. On the other hand, Brazilian automotive industry is following the international trend of productive alliances. While PSA and Renault are producing together vehicles and engines in Europe, Chrysler and BMW have a joint venture to produce small engines in Brazil. PSA's car will be assembled with engines produced in Renault factory. New factories are been built out of the traditional industrial center (São Paulo State) and most of them have received tax incentives. Sometimes local governments have made investments and are owner of a part of new companies. Besides, official banks have made loads with reduced interest tax for some automotive companies. There are official benefits for autoparts companies to establish themselves in this new areas too, but most of times this benefits are not so good than those received by automakers. Governments have justified these benefits with the generation of a lot of jobs. In fact, the industrial job in these places have improved, but the amount of workers in automotive and autoparts industries is very smaller than that one which has been announced. In these areas of later industrial development salaries are smaller than in São Paulo, where unions are stronger and have more effective actions. The payment of a worker in Curitiba - Paraná State is one third of the one with similar job in São Paulo. Therefore, logistics costs due to be far from São Paulo (which is the most important market for cars) are compensated by smaller salaries and tax incentives. Nevertheless, nowadays workers are protesting against this policy and there are doubts about how long this difference should be maintained. A new concept has been used in new plants of automotive companies*: "systemist supplier" or* "modular supplier". A *systemist* is a company which is responsible to assembly a big and important system (engine, suspension, people control, vehicle control for instance) of vehicle and sell it to automotive companies. The parts that form the system can be produced or bought by the *systemist*. This concept was not only in use in Brazil.

This concept share responsibilities between supplier and automotive companies. A lot of work is passed to the supplier and it causes a cost reduction for the vehicle producer. This reduction is due to smaller salary that suppliers use to pay for their workers. In addition that, this kind of organization transfers the stock (and it cost) to the supplier

The concept of systems was based on three points:

1.) suppliers must to be close to assembling factory.

There are two usual ways to manage this point. First, the supplier is established into the automotive factory and its workers are responsible for assembling and test a part of vehicle (one or more systems). This system (Modular Consortium) is being applied in Volkswagen trucks factory in Resende - Brazil. The other option is the Industrial Condominium, where suppliers are established in the automotive`s plant but they maintain their independent factories.

2.) make assembling operation simple.

Vehicle must be design to be easily assembling. The assembling operation must be to put twelve (or less) systems together. It means that only 10% of operations are realized in automotive factory.

3.) integrated logistic

With small distance between factories, the shipment can be just in time and batches can be very small. In this system, the automotive industry is responsible by the project, the management of production and quality control. Several activities of vehicle assembling are transferred to suppliers. Automotive companies concentrate their efforts to car conception and marketing activities.

According to this model, suppliers are responsible for design of each systems. The automotive companies define performance, lay out, interfaces, quality aspects and costs. Sub suppliers development is a task for suppliers. If the supplier cause any problem (like a assembling line stopped), it will receive a penalty, most of the time paying for all costs that automotive company have. In this kind of production organization, the relationship among automotive company and its suppliers have changed a lot. In traditional model, there were few commitment between two suppliers. In *Modular Consortium*, for instance, the payment for all suppliers is making only after the quality control approval. If a vehicle was rejected, no supplier would receive the payment (it does not matter who is responsible for the rejection). On the other hand, in *Industrial Condominium* the supplier must have just in time production and delivery. Automotive industry do not allow finished products stock, because it means high final costs to vehicle.

5- The case of "X" company

The "X" is a North American company which produces autoparts to automotive companies. Its factories are dedicated to one or few clients. These factories are localized very close to clients units and it is necessary to follow clients in new units. Deliveries are made in sequential just in time. It means that products are shipped to the client just after to receive a communication and in the correct order to assembling in the correct car.

According to the director of one unit of "X", the company is totally dependent of the main office in United States. New commercial agreements are made abroad and Brazilian units are responsible only to inform costs and time to produce. Subjects like development of products and process, human resources development policy, lay out of factory, measurement of performance and project of new factories are defined in United States. Nowadays it is making a co-design of products together clients because they do not want to left the design to their supplier. Nevertheless, in the future, the target of the company is to make all design of product, receiving from the client only the basic specification. This kind of development will be made in design centers (in United States, Germany and, maybe, in

Brazil) in order to reduce costs. This products will be for worldwide application. To make worldwide projects is the only way to justify a project team in Brazil.

The relationship between “X” and customers are not so easy. The so called “partnership” between autoparts and automotive companies is, according to an “X’s” director, a force relationship, with all benefits to automotive company. For instance, if the supplier had any problem and its delivery fail, it would pay a very expensive fine for each minute that assembling line would be stopped. On the other hand, if the automotive company stopped its assembling line, it would pay nothing due to stopped supplier production. Since most of time suppliers plant are dedicated to a client, to stop deliveries means to interrupt all activities in the supplier. It makes more important to have a strong capital structure to support crises’ periods without production.

An interesting point of this analyses is the facilities of this unit of “X”. It is clear that the factory was designed to be possible to move fast and with low cost, if necessary to follow the client.

In the past, both Brazilian than international autoparts companies are complete units, with factories, product and process development and a kind of autonomy to work.. The new trend, with includes “X”. is to have factories in Brazil totally dependent of others units in United States and Europe.

It is important to notice that there are some criteria that is almost eliminating Brazilian companies of the competition with “X”. First, they do not have capital enough to follow the clients, building as many units as client’s plants and some of them very far from the others. Second, Brazilian companies usually do not capital to survive during crises periods with low or without production. The necessity of worldwide products development makes difficult for a company localized in only one country to attend international autoparts requirements.

6- Conclusion

The incitement of the competition conditions resulted from the new international economy rules (reorganization of the central economies, creation of large economy blocks, technological revolution, new ways of social organization of production work, etc.), have been imposing deep and urgent changes to the companies that intend to continue being competitive at the turning of the third millennium. Particularly, on the organizational level, significant alterations are being imposed to the companies that look for more advantageous positions in the inter-capitalist competition process.

The analysis of some aspects related to the supply chain and new patterns of industrial organization in Brazil points to some conclusions (although preliminary); but at the same time it reveals another list of questions that should deserve further and deeper reflections.

Initially, we should emphasize some tendencies may already be seen with more evidence; among these we could point out:

1. The big enterprises (car manufacturers) have demonstrated the optional preference for "*global suppliers*", when it comes to their supply strategies of parts/components. Obviously, this kind of option may - at short term - bring some benefits for each manufacturer, in an isolated form. However, the implications of this kind of foreign supply may - at long term - bring unfavorable implications to the interests of various partners ("stakeholders"), that are presently involved in the process of domestic outsourcing. In particular, all and any initiative for the establishing and/or strengthening of a chain of more qualified domestic suppliers (with high rate of "excellency" in delivery), would be seriously compromised, if that "global sourcing" strategy were to dominate, at long term, the market in question.

2. Another outstanding tendency of the outsourcing system within the Brazilian industry refers to a significant reduction in the staff of the majority of the "pioneer-companies", that originated this process. It can also be noted that more frequently there is a series of questions, both juridical and institutional, to be solved, in order to avoid that the relationship between "partners": employees and employers, is not marked by severe juridical collision and by labor hindrances, that would make difficult or even obstruct the process of productive decentralization. In the question of "(un)employment", for instance, the argument of the "pioneer-companies" - that the elimination of some work stations (at the "mother-company") would in some ways be compensated by the creation of new jobs in a series of small or medium size "third" or subcontracted companies (SMSC's), - does not find support on theoretical bases, neither is proved by any empirical evidence. What is being observed in fact (although through isolated cases), is that there is - on the part of Brazilian enterprises - a very little organized and not negotiated practice (between companies and employees) of outsourcing. In many cases, the jobs created by "third" companies involve different kinds of labor irregularities, as for instance the so called "black market" of work (under-employment, salary reduction, irregular contracts, etc.).

It is the responsibility of the "actors" involved in this problematic scenery (companies, employees and the State), to reach an ampler and a more lasting understanding in the different aspects and implications brought forward by this process of outsourcing, that affect the various interests involved.

From the part of the contracting enterprises, it is important to have a long-term planning, in order to establish priorities as to the possible areas/sector that are to be outsourced or sub-contracted. At the same time, they should show a greater disposition to negotiate with their employees the basic parameters of transition from the present organizational and productive structure to another one more "dried-up" and more efficient. These parameters would be: time or term for the desactivation of a line or some production process; compensations due to the loss of employment, generated by an outsourcing program; proposals (to the ex-employees) of the creation of new "third" companies and technical and managerial support to these new companies, etc.

From the part of the workers (through the Unions) it is important to create greater conscientiousness that this process of outsourcing is being outlined as something irreversible, having in mind a greater industrial efficiency as a whole (as already demonstrated by the international experience of several industrialized countries) and not only as one more strategy to be used against their (workers) own interests, although, in some cases (as mentioned before), that could evidently occur. At the same time it is opportune to think about new ways of labor remuneration, also considering the real participation of the employees in the company's revenues.

It is up to the State to assume some tasks particularly important in this context, such as: 1) Through its various resorts of authority (central, regional or local) and a whole set of instruments of industrial policy (combined with the fiscal and the financial politics, etc.), to promote in a coordinated way, incentives for a greater strengthening of the Brazilian "industrial network", mainly in the more strategical and dynamical sectors. These incentives should consider both the generation of income and employment, as well as the possibilities of incorporation/generation of new technologies. 2) The coordination of efforts for the creation and/or development of a "chain" of companies (small, medium and large size), under the perspective of "flexible specialization", thus opening and deepening spaces of discussion and collective negotiation (as is already the case with the so called "Sectorial Chambers"). In some aspects of such politics this could constitute a greater motivation the perspective of creating/developing a more efficient and really competitive industry, according to the competition standards around the world.

This work has not dealt with some other not less important aspects, connected with the process of outsourcing, such as those related to the expectations and possible strategies of small and medium size companies, in face of this phenomenon. It could, certainly, constitute another line of research of fundamental importance.

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[1] Today this kind of cars are responsable for almost 60% of Brazilian market.
[2] Nowadays the exchange rate is around R$1.80 to US$ 1,00.
[3] Mercosul is economical comunity formed by Arg6entina, Brazil, Paraguay and Uruguay
[4] Sindipeças is the Brazilian Autoparts Industries Confederation

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