NEW PRODUCTIVE SYSTEMS IN THE AUTO INDUSTRY: THE MANAGERIAL CHALLENGES OF AUTOMAKERS AND SUPPLIERS AT THREE NEW BRAZILIAN PLANTS

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Over the last five years, significant investments have been made in the Brazilian automotive industry and new managerial experiments and innovations have been implemented in plants installed around the country. Some of these new plants have quickly become references for several basic processes in the sector (such as inbound logistics) and have attracted the attention of most of the automotive community. Basically, these new plants have significantly reconfigured their relationships within the supply chain, thereby producing a new series of challenges for both automakers and suppliers. This reconfiguration, in turn, has led to a series of transformations and to the internationalization of the supplier base operating in Brazil, characterized by a large number of mergers, acquisitions, alliances and closedowns.

The main purpose of this proposal paper is to present the basic characteristics of three new and innovative productive systems recently implemented in new plants in Brazil and to discuss some of their current implications, focusing on the managerial challenges involved in the management of competences and in organizational learning by both automakers and suppliers. In order to contextually the description and analysis of this proposal paper, a brief history of the Brazilian automotive industry is given below.

A BRIEF HISTORY OF THE AUTOMOTIVE INDUSTRY IN BRAZIL

The automotive industry in Brazil started its activities assembling vehicles during the 1930s by the CKD (Completely Knocked Down) method, and the country’s first passenger car and truck manufacturing units were only inaugurated in the late 50s. From the 60s to the 80s, Brazil’s economic policy strongly inhibited the import of vehicles and automotive parts, resulting in the significant growth of locally produced components. This nationalization process reached almost to 100% in the 70s. On the other hand, the government’s market reserve policy also resulted in a technological and managerial gap in Brazilian automotive

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plants in comparison to the majority of plants operating in Europe, in the USA and in Japan. Meanwhile, early in the 90s, the scenario of the automotive industry in Brazil began to change with the start of a liberal government and the gradual opening of the economy. This was followed by the establishment of Mercosul (the South American Free Trade Agreement), which created a common market among Brazil, Argentina, Uruguay and Paraguay. Another more recent and important event was the major reduction in inflation, which increased the importance of manufacturing since, during the long period of high inflation rates, there was a relatively heavy emphasis on financial activities. One important result of the stabilization and liberalization process has been the boom that the Brazilian automotive industry, along with other industries, has experienced since 1995, which has to date amounted to investments of almost US$ 20 billion. These investments have come both from companies already operating in the country (such as VW, GM, Ford, Fiat, Daimler-Chrysler) and from others that recently set up operations in Brazil (such as Renault, Peugeot, Honda, Toyota, Mitsubishi).

Ahead, this paper will briefly describes the three innovative productive systems implemented in the plants considered in this paper.

THE MODULAR CONSORTIUM OF VW’S TRUCK AND BUS CHASSIS PLANT IN RESENDE, BRAZIL

This plant was inaugurated in November 1996, introducing the innovative (and still unique in the automotive industry) modular consortium model, which delegated the responsibility for the final on-line modular assembly of the vehicle, the operational investments, and the management of the module supplier chain to seven module suppliers. The automaker provided the facilities and is responsible for the coordination of the plant and for new product development, marketing, and final vehicle testing. Before the new plant became operational, VW’s truck and bus operation purchased from 400 suppliers. This reduction in the supplier base led to some interesting situations, such as the case of the module supplier called Power Train, created by two traditional diesel engine competitors (MWM and Cummins) to supply VW’s new plant. VDO, the traditional German supplier of speedometers and tachometers, has implemented major expansions of its competencies in the Resende plant, becoming the cabin module supplier, and today is responsible for 60% of the items to assemble a truck. The paper will also deal with other contemporary issues (four years after the plant’s inauguration) regarding the daily cross-organizational teamwork inside the plant.

The general situation of the plant today

More than four years after the plant inauguration, most partners in Resende believe that the modular consortium model is successful in terms of concept, although in terms of production volume and quality it is still under the initial expectation.

Currently the plant has a total of 1565 employees with only 265 of VW. From them, VW has about 60 working on the shop floor in activities related to the quality control and prototype engineering.

With the exception of the painting cabin, the plant has operated in one shift of 8 hours, and in 2000 produced 13,163 vehicles (from 1996 to today the plant almost doubled the production volume) with a production mix of approximately 5 trucks for each bus chassis.
As it was projected to run in two shifts of 8 hours and producing approximately 150 vehicle/day, currently the plant is still over dimensioned and the current revenues does not assure all the planned ROI. However, what is happening is clearly a problem related to the market demand, not with the modular consortium system. Besides this, the market share of the company in the trucks & buses industry in Brazil has increased significantly in the recent years (from 17% in 1996 to 22% in 2000), mainly due to its trademark in Brazil is strongly associated to the products robustness ((Ribas, 2001).

During August 1999 the plant also faced its first general strike, with the participation of workers of VW and the module suppliers. There was nothing connected to the modular consortium system, they were only claiming a salary increase to reduce the gap in comparison to the automotive plants located around São Paulo city.

The formal basis of the partnership

Today it is possible to know more about the contract firmed by VW and the partners to construct the plant. The contracts with each module supplier are longer than those usually practiced in a traditional automaker-supplier relationship. They stipulate 5 years of validity to the assembly modules (chassis, suspension, wheel/tires assembled, engine and cabin assembly / trim), 7 years to the cabin structure module and 12 years to the painting module.

Also it is possible to know that the contract assures that VW will promote the amortization/payoff of the module supplier’s investments during its duration, decreasing significantly the module supplier’s risks. VW invested about US$ 250 millions and the suppliers US$ 42 millions in the plant.

The payment system determines that each module suppliers receives 90% of the value related to its module after the complete assemble of the vehicle and before the quality audit and test of VW. After this point, if the vehicle is proved by VW it is officially passed to the marketing sector and the module suppliers will receive the 10% that complete the vehicle payment. Consequently, this system causes a pressure among the module suppliers in order to fast complete the vehicle assembly, because if there is any problem to complete it none module supplier will receive the payment. On the other hand, VW also presses the module suppliers to complete a vehicle without quality problems because it is paying 90% per a vehicle without a total guarantee that is ready to be sent to the dealers (Dias & Salerno, 1998). Additionally, the payment of the module suppliers is not linked to the product sales, that is, VW assures the payment according to the production schedule conclusion. The risks of the module supplier decrease because in case of a marketing change all the risks are of VW. On the other hand, the production schedule depends basically on the performance of VW in the marketplace. As well pointed out Dias & Salerno (1998), in general, we can say that in Resende the module suppliers have adopted some procedures to decrease the division of risks with VW and, on the other hand, VW adopted some procedures to decrease the power division with the module suppliers.

The operations on the shop floor

On the shop floor processes there are no significant change related to the original plant project. The production process inside the modules is responsibility of each of the seven module suppliers. In case of gaining in productivity of the plant due to a process improvement, it is shared equally between VW and the module supplier that proposed the change, independently in which module it was implemented.
The logistic processes of the plant continue being responsibility of two companies, an external logistical consolidator (Binotto that replace CRTS) and an internal logistical operator (Union Maintein). Also, all the maintenance processes were outsourced, except within the painting module where the responsibility is of its module supplier. The logistical consolidator also implemented a "milk run system" to supply daily all the plant partners requirements.

In general, the level of relationship between the module supplier and VW depends on the level of autonomy of the module supplier. In some cases the module supplier inside the plant conducts it almost integrally, and in other cases it is a responsibility of its main office located outside the plant.

However, in the purchasing process there is a significant change related to the initial project of the plant. VW is still buying the material and/or components from the (now) second tiers suppliers (as before the new plant when they had the status of first tiers) and providing the seven module suppliers as in a consignment system. The main justification for this change is the VW’s greater power to negotiate with these second tiers suppliers, getting better contracts for the plant in terms of price and deliveries. This practice has some consequences in the relationship with the module suppliers. Buying directly from the second tiers gives VW important and accurate information about the real cost of the modules which are paying for the module suppliers. Then, VW knows the entire module cost structure, except for the module assemble processes (where VW knows only the value related to the direct workers) and about the components manufactured by the module supplier (which are not bought by VW). Additionally, VW also knows the fixed costs concerning to the modules operations. This becomes more difficult to the module suppliers to negotiate better prices with VW based only on the growth of the module costs. Dias & Salerno (1998) observed that some module suppliers consider this the main reason to VW to concentrate the purchasing activities and one module supplier pointed out that "is lacking trust to VW to delegate purchasing to the partners". VW also points out problems such as double taxation if the components would be bought directly by the module suppliers. In fact, new systems such as the modular consortia demands new systems of taxation and the Brazilian government is still indebt with a new tributary system to the country, which must minimize this kind of problem. However, in Resende certainly this is not the main reason to VW to bypass the module suppliers in the purchasing process.

On the other hand, this situation is favorable to the second tiers suppliers, because permits the continuity of a direct channel of communication with VW and the status of first tier supplier was not totally lost. Additionally, the situation decreases the power of the module suppliers to press the second tiers suppliers each time that VW presses them (the module suppliers) to decrease prices.

The situation also creates difficulties to solve some problems between the module suppliers and the second tiers suppliers related to the quality of the bought components. Many times, in case of a problem with a component bought by VW, the module suppliers need to contact VW to solve the question, because the second tiers suppliers do not accept to deal this subject directly with the module suppliers. This means more bureaucracy, waste of time and growth of costs.

In general all the decisions regarding the operations are conducted in common agreement between the seven module suppliers and VW, but the bigger power of VW is
clearly visible. The plant runs under a master production schedule of 9 weeks and every day, in the beginning of the journey, there is a meeting with representatives of all the companies working inside the plant to discuss and to define a production schedule for that day. Most vehicles are assembled as in a make-to-order system, depending on the marketing/dealers requirements and the availability during the definition of the production schedule. This schedule can change during the day and there is no concern to stipulate a possible better sequence of assembling, what denotes the flexibility of the plant regarding the product mix. Another interesting point on the shop floor is the high level of production synchronization between the two adjacent lines (engines and cabin assembly) with the main/final assembly line, which much has contributed to the lower level of inventory in the plant.

During the first years of operations there were also some problems concerning to the product quality, due mainly to the rigid and narrow standards required by VW, which was operating with corporate parameters and standards, that is, putting trucks at the same level of requirements as cars. Currently this position was revised and the standards to the plant decreased. In the end of 2000 the plant target Audit (VW’s system to measure the final quality of its products which aims a zero value) was 2.3 for light and 2.3 for the heavy vehicles and the performance was 2.4 and 2.3 respectively. For instance, 1.8 is the target Audit for the Audi A3 now being manufactured in Brazil in a recently inaugurated plant (see the case of plant B in this paper).

Another reason for some problems with quality in the plant still comes from the existence of different levels of quality performance practiced by the seven modular suppliers, but this gap is decreasing along the time. Figure 1 illustrates the basic assembly process and the current module suppliers in the plant.

Figure 1.- Basic assembly process and the current module suppliers in the plant (Pires, 1998)
The module suppliers operations

VW gave to the module suppliers the possibility to choose how to conduct theirs activities inside and outside of the plant. Consequently, most module suppliers decided to make the main activities of assembly inside the plant, which involved few fix assets. For example, Iochpe-Maxion produces most parts of the chassis in another plant located approximately 100 kilometers of Resende and only assemble them inside of it. Delga stamps the cabin structure parts near of Sào Paulo (far approximately 100 kilometers of Resende) and assemble them inside the Resende factory using dedicate space and facilities. MWM and Cummins manufacturer the engines in theirs factories and only make the assembly processes inside the Resende plant. The painting module is an exception and Eisenmann (Carese) carries out, all the painting process inside the plant, using dedicated space and facilities. This is because the assemble of the cabin structure is made by Delga inside the plant, what becomes practically an imposition to make the painting also inside the plant, subsequently to the Delga’s work.

THE INDUSTRIAL CONDOMINIUM OF THE VW-AUDI IN CURITIBA, BRAZIL

The Industrial Condominium concept

As pointed out earlier, in the recent years Brazil is probably one of the countries where the automotive industry has invested more in new and promoted improvements in existent plants. As a consequence, the automotive industry in Brazil has become a point of reference concerning to innovations and experiences in the sector. After the inauguration of the Resende plant, it is possible to realize its reflections in practically all the movements in the previous installed companies (such as GM and Ford) and in the new competitors that have recently installed plants in Brazil (such as Chrysler, Renault, VW/Audi e MB - A class plant). Most of these companies are implementing (even partially) a system being called by the generic label of “industrial condominium”.

In this system, some key system suppliers are physically installed around the automaker in order to provide it (generally in “just-in-sequence”) with components and/or systems.

Basically, the condominium is different from the modular consortium in two points:

- the system suppliers are installed outside and very near to the automaker plant and do not participate directly of the vehicle assembly;
- the suppliers’ facilities do not need to be dedicated exclusively to the specific automaker demand, i.e., the suppliers have increased their flexibility and decreased their dependency and risks.

In this way, the new plants have introduced a system to manage the supply chain not so radical as the modular consortium, but that clearly is going beyond the just in time as is illustrated by the Figure 2.
Moreover, it is important to note that all the plants where the industrial condominium system are being introduced are, or will, produce only cars and small vehicles. Then, certainly today it is possible to confirm what was stated when the Resende plant was inaugurated in November of 1996, i.e., it is really a special experiment, conducted in a special situation where the automaker does not produce any core component (the engines, for example), the products are not considered its core business and it is technologically easier to be divided in modules (Pires, 1998). Also, paradoxically, the new motor plant of VW (inaugurated at the same time of the Resende plant) never used the modular consortium as a model and is now going partially towards the condominium system, while most partners in Resende consider the current difficulties to manage the over capacity of the plant as a good opportunity to promote a more precise adjustment in a “successful and revolutionary system”. This, maybe, explains the fact that the plant has already received more than 6,000 visitors from 25 countries worldwide since its inauguration in November of 1996.

A brief background of the VW-Audi plant in Curitiba

The new plant of VW-Audi which was inaugurated in March 1999 in São José dos Pinhais (region of Curitiba) introduced the concept of the industrial condominium, whereby 10 system suppliers (installed in a closed condominium built around the VW plant, and called as “industrial park” by the partners) supply the plant’s assembly line with complete systems (such as the exhaust system) and they share several facilities such as a restaurant, bank, medical service, transportation system, etc. Currently, VW considers this plant a state-of-the-art in the sector and, in loco, the factory is a clean and modern space in which a highly precise logistical operation is conducted. The basic purpose of the plant is to produce with a minimum inventory, achieving high productivity and high flexibility on the shop floor. For this purpose, the plant uses an efficient logistical system encompassing the entire supply
chain, a just-in-sequence supply system involving the ten system suppliers installed in the park, and several efficient teams of approximately fifteen employees per station on the assembly line.

According to the company, there were four basic reasons for the construction of a new car plant in Brazil, which could be briefly explained as follow:

- The customer orientation: indicating a real demand concerning the vehicles produced in the new plant;
- The growth of Brazilian market: created mainly due to the economic stabilization and the emerge of a significant number of potential vehicles’ buyers in the recent years;
- The increase of Brazilian production: as pointed earlier, recently many automotive companies have announced significant investments in new plants or in improvements of plants already operating in Brazil;
- The import restrictions: the level of Brazilian taxation regarding the import of completely assembled vehicles as Golf and Audi A3 are relatively high, causing a significant increase in terms of vehicle’s price;

Additionally, VW considers five main reasons for the option for an Industrial Condominium in the new Brazilian plant:

- Assured supplying;
- Better control of responsibilities;
- Small distances to transport and small exposition to damages;
- Fast responses to changes;
- Small storage and handling costs;

The condominium and the automaker plant

All the site of the new plant is propriety of VW and is rented to the 10 system suppliers located very near the plant and inside the condominium borders. The installations of the system suppliers were provided and belong to them. The plant has one supplier assembling the cockpit just beside the final assembly line, in an attempt to facilitate the supplying in a just-in-sequence basis and to avoid frequent quality problems with the cockpits caused by the transport operations. In addition to the 10 system suppliers, the plant is still supplied by other 140 first tier suppliers operating in Brazil. An external logistical operator that had already a previous experience in working with VW in Europe provides all this inbound logistic operation.

The system suppliers operating inside the condominium (in the industrial park) and the physical area to them allocated are illustrated on Table 1.
Table 1. *The systems suppliers installed inside the condominium*

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Parts</th>
<th>Area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peguform</td>
<td>Bumpers</td>
<td>19,988</td>
</tr>
<tr>
<td>Johnson Controls</td>
<td>Seats</td>
<td>10,342</td>
</tr>
<tr>
<td>Walker/Gillet/Tenneco</td>
<td>Exhaust system</td>
<td>6,124</td>
</tr>
<tr>
<td>Arteb</td>
<td>Front Ends</td>
<td>5,479</td>
</tr>
<tr>
<td>Pirelli</td>
<td>Tires and wheels</td>
<td>2,995</td>
</tr>
<tr>
<td>Heidemann</td>
<td>Gear shifting</td>
<td>2,472</td>
</tr>
<tr>
<td>KMAB</td>
<td>Axles and auxiliary frames</td>
<td>11,965</td>
</tr>
<tr>
<td>Delphi</td>
<td>Cable cords</td>
<td>5,428</td>
</tr>
<tr>
<td>Kautex</td>
<td>Tank</td>
<td>3,174</td>
</tr>
<tr>
<td>Iramec/Küster/Albarus</td>
<td>Doors panel</td>
<td>2,356</td>
</tr>
</tbody>
</table>

Source: VW Business Unit Curitiba

The automaker plant has an innovative format of an inverted “Y”, composed by three productive areas (frame assembly, painting and final assembly line) interconnected by a central area called “communication center” and where the automaker’s offices are located and the partner’s common use services (such as restaurant, bank, book store, language school, etc.). The Figure 3 illustrates the industrial condominium being analyzed.

Figure 3. *An illustration of the industrial condominium of VW-Audi in Curitiba, Brazil*
As was pointed out earlier, VW considers this plant the state-of-the-art in the car production and most suppliers and visitors of the plant also think as the automaker. In addition to the existence of a very contemporary inbound logistics system, the plant has, for instance, approximately 190 robots operating only in the vehicle frame assembly. The plant also presents an interesting conciliation of productivity and flexibility, producing a vehicle in an average of 3 days and embracing approximately 500 diverse configurations in the final product.

Currently, the plant runs three shifts per day, producing approximately 400 Golf and 40 Audi A3 each 24 hours and 50% of its production is exported to the USA and Canada. The Brazilian plant supplies today all the demand of Golf to the American market. Until the end of 2001 the company intends to increase significantly the volume of the vehicle’s components produced in Brazil, reaching the level of 75%. A good example of this chased target is the recent beginning of production of a new 1.6 c.c. engine in the company’s motor plant in São Carlos. Meanwhile, the plant continues being supplied by other plant of the VW’s group, mainly those located in Germany, Argentina and Brazil. For example, from Europe comes from Audi the press parts of A3 and from VW all the vehicles platforms. From Argentina comes the transmissions and from other two plants in Brazil come the engines and some press parts.

**The operational basis of the condominium**

All the 10 system suppliers provide the plant in cycle times of 2 hours directly in the final assembly and according to a sequence stipulated by the automaker 2 hours earlier and communicated via an EDI system. The plant runs served by one logistic operator responsible for the logistics processes inside the painting area and by the milk run system implemented from the system suppliers installed within the condominium to the assembly final line.

The plant runs under a production planning with one year of horizon, weekly revisions for frequent adjustments and two weeks of frozen schedule. The communication among the partners inside the condominium is conducted by an EDI system using a dedicated communication channel. The planning process is aided by a production management system called Pluma which is a proprietary system developed by VW. This system is integrated with the SAP/R3 used in the financial and controlling area of the company. The inbound logistics are consider a key process in the plant and the automaker allocates approximately fifteen workers only to assure the operation of the just-in-sequence supply system in the final assembly line. Nowadays the plant is near of reaching its basic targets concerning the inventory management, that is, two days of in-process inventory inside the plant, four days of inventory turnover for all domestic suppliers and from twelve to sixteen weeks for the imported items. The payments of the systems suppliers are made everyday and according to the real daily production. As in the Resende plant, there exists a special system to conduct the taxation of the material movements among the systems suppliers in an aggregated way at the end of the day, instead of the conventional taxation for each transaction.

Curiously, part of the amount of investments in assets and the experience acquired by VW in the logistics processes with the new plant (mainly concerning import and export under the Brazilian rules), are now being sold as service to other automotive companies operating in the region of Curitiba such as Renault.
Regarding the job organization on the shop floor, the plant operates with semi-autonomous teams of fifteen workers (in average) in each workstation. These teams have frequent shifts in the role performed among them, including the team coordinator position. The flexibility of the team is a key point for the company to reach its targets and a significant amount of training hours have been spent towards this direction. The cycle time (tact time) of each vehicle in each workstation is of approximately 3 minutes and the ergonomic project of the plant was conducted in order to assure this performance without causing any physical problems to the workers. Also, all the employees on the shop floor have already concluded the high school level, what is not still common within other Brazilian plants.

THE DEDICATED SUPPLY SYSTEM OF DANA-CHRYSLER AT DAKOTA PLANT IN CURITIBA, BRAZIL

A brief background of the dedicated system

Chrysler’s plant in Campo Largo (region of Curitiba) which was built to produce the Dakota pick-up in Brazil, was inaugurated in July of 1998. At the same time, Dana inaugurated a new plant very close to the Chrysler site, which was built exclusively to supply Chrysler’s pick-up chassis requirements. For this project, the two companies jointly developed a new technology that they dubbed “rolling chassis”, with Dana supplying Chrysler on a just-in-sequence basis every 3 hours. As the chassis represents about 30% of the pick-up’s total cost for Chrysler and as Dana had a plant dedicated exclusively to one customer, they have created a partnership with a high level of interdependency. Recently, in February 2001, the Daimler-Chrysler group announced that the plant will stop operations until the end of April 2001 due to its current high level of idleness, what will have a series of implications for both Chrysler and Dana and reflections in the entire automotive industry.

The Dana’s plant

Dana was the fifth automotive supplier worldwide with a global revenue of US$ 10 billions in 1999, which US$ 450 millions were produced in Brazil where there are several plants (Rosenburg, 2000). In July of 1998 the company inaugurated a new factory in Brazil with circa of 100 employees and that was built exclusively to supply Chrysler’s Dakota pick-up chassis requirements.

All the project of the rolling chassis was developed jointly with the Chrysler’s engineering project team and the adjective “rolling” is because of its rolling arrival in the Chrysler’s assembly line. The chassis has approximately 340 items and represents 30% of the pick-up cost which needs another 2,000 items to be totally assembled.

Until the end of 2000 all the production planning of the Dana’s plant was totally guided by the Chrysler production planning. The plant runs under an aggregate planning of 10 months detailed in a weekly basis. When reaching a horizon of 2 months it changes to a daily basis. Every morning, Dana receives, via a dedicated EDI system, a new version of the production planning that pointed out automatically the changes related to the document of the previous day. Each time when a vehicle leaves from the G point (after the painting area) in Chrysler’s plant, a related chassis begins to be assembled in the Dana’s assembly line and 3 hours later it needs to adequately meet the rest of the vehicle in the Chrysler’s final assembly line. All the deliveries to Chrysler are made in lots of 3 chassis and using trucks to transport them through approximately 5 kilometers.
In terms of products mix, the plant assembles circa of 15 distinct chassis that permits from 10 to 15 variations. In order to attend these requirements, the plant strongly depends on the import of several items coming weekly from the USA by ship service. The plant maintains 4 days in average of components inventory and some measures concerning to the import process need to be provided in a horizon of 2 months, what creates a series of difficulties when a significant change in the production schedule is demanded. Dana also extended its experience with Chrysler for some of its supplier. Goodyear, for instance, supplies the company with assembled and calibrated tires.

In spite of its innovative assembly system, due to the lower demand from Chrysler, the plant produced 5,500 chassis during 2000, what represents only 14% of its capacity (Rios, 2001). To minimize this problem, since last January the company transferred to the plant (projected to be dedicated) all its chassis assemble operations to attend Volvo trucks in Brazil which was made in an old plant located near the studied plant. This changed significantly the configuration of the plant, mainly its shop floor and internal logistics operations.

Curiously, when the plant was inaugurated many experts in the automotive industry stated that an automaker had never depended on only one supplier such as the case of Chrysler with the rolling chassis. Less than three years after and with the announced closure of the plant, the history showed exactly the contrary. Dana invested US$ 14 millions in this originally dedicated plant to supply Chrysler with the rolling chassis, but now with the end of Dakota’s assembling in Brazil it needs to redefine urgently the future of the plant, based on the bitter taste of its experience with Chrysler in Brazil.

The Chrysler’s plant

Chrysler assembled cars and trucks in Brazil during the 70’s and in the beginning of the 80’s decided to close operations in the country. During the 90’s the company returned the operations to the country by importing expensive vehicles. At that time, the company took advantage of its good moment worldwide in terms of competence on vehicles design and the strong movement of newcomers arriving in Brazil. In this direction, the company inaugurated its new factory in July of 1998 exclusively to produce the Dakota pickup.

The plant demanded investments of US$ 315 millions and during January of 2001 operated with 250 workers of Chrysler and other 70 provided by service suppliers. Planned to produce 40,000 vehicles per year, the plant produced 4,600 pick-ups in 2000, that is, using only 11 % of its capacity (Rios, 2001). In spite of its lower commercial performance, recently the plant invested more than US$ 40 millions also to produce a pick-up with double cabin in the plant, which was released in February 2001. Curiously, this happened at the same time that the notice of the end of the Dakota production was officially announced by the DaimlerChrysler group, the current proprietary of the plant. As Dakota is the unique product assembled in the plant, this means that it will be closed in the end of April and the corporation will decide about its future.

Analyzing the main reasons for the plant closure it is possible to highlight some relevant points:

- It was impossible to maintain a new plant running and using only 11 % of its capacity;
The valorization of the US dollar comparatively to the Real after the plant inauguration increased significantly its production cost because most part of the components was imported;

The existence of a very small number (only 25) of Chrysler’s dealers in Brazil comparatively to the country’s dimension;

The controversial and difficult merger of Chrysler with Daimler group that is facing a series of drawbacks around the world and needs to increase the profitability of its operations.

Additionally, the closure of the plant will have direct impacts on all the Dakota supply chain, mainly on its 345 first tier suppliers and the 25 dealers operating in Brazil. This paper highlights this impact on Dana, but there are other critical situations, such as the case of Lear that carried out significant amount of investments in order to also supply Chrysler with seats by a just-in-sequence system each three hours and guided by a dedicated EDI system.

The closure of the Dakota’s factory also shows the risks of the current tendency in the automotive industry to go towards the sole-global relationship between automakers and suppliers, as illustrated by the “supplier profile matrix”, proposed by Collins et al. (1997). The model exhibited in Figure 4 illustrates nine different options in the supplier-customer relationship, regarding the geographic focus (rows) and the number of suppliers involved in the partnership (columns).

In the matrix the “single” case means that the customer has more than one qualified supplier, but decides to buy from only one, while in the “sole” case the customer has just one qualified and exclusive supplier. This passage to the sole position clearly represents a growth in the commitment and risks of partnership as the present situation of the Dana’s plant is showing to the automotive industry.

Figure 4.- The supplier profile matrix (Collins et al., 1997)
FINAL REMARKS

This paper presented some relevant aspects of the current situation of the three productive systems the automotive industry systems recently implemented in Brazil. The first case provided a follow-up of the modular consortium, emphasizing the current difficulties and changes in operation procedures related to the original plant design. The second case illustrated a successful implementation of an industrial condominium, with a very efficient logistics system and having the half of its production focused on the external marketplace. The third case showed an innovative and dedicated system that had a very short cycle of life and caused negative impacts on all the automotive industry with its recent closure.

It is important to note that all the three cases have the over capacity as a point in common. As pointed earlier in this paper, during the last years a considerable amount of investments were implemented in the Brazilian auto industry and today the country has a capacity of producing 3,3 millions of vehicles per year but are using approximately 59 % of its capacity (Olmos, 2000). Almost all the already established and new players that arrived in Brazil during the last years, over estimated the growing speed of the local market.

Concerning to the three cases analyzed in this article, it is possible to state different considerations to each one. In the first case, the partners are trying to use the under load situation to promote adjustments in the system while waiting for a growth in the trucks and bus demand. In the second case VW really decided to decrease the dependency of the domestic market by increasing significantly the volume of the exports from the plant, mainly to the American market. In the third case the under load of the plant was so larger and the possibilities of focusing on the exports were remote because of the high production cost of the plant. In spite of implementing an interesting productive system, the case also shows an example of a large business project with a series of unaccepted lacks in the current automotive industry.
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