

## 9 The VW Resende Modular Consortium<sup>1</sup>

The sun that rose on the morning of November 2, 1996, witnessed the greatest event in the history of the peaceable city of Resende, in the interior of the State of Rio de Janeiro, Brazil. José Ignacio López de Arriortúa, the polemic Basque executive, three years before had left GM to assume an important position in the VW corporation, generating a lawsuit where GM accused VW of an unlawful association, and he was about to see in operation his most revolutionary project.

The “modular consortium” took to extremes the idea of partnership with a small quantity of seven suppliers in charge of increased responsibilities, in both project and production. The suppliers would design and assemble the bulk of the seven modules (large sub-assemblies) in which the products (trucks and buses) were divided, but also they would be solely responsible for the module assembly on the VW production line. For the first time, a plant of the German company would not have assembly employees direct from VW—only from the partners.

The inauguration of the Resende plant attracted a lot of attention from academics as well as professionals, not only in Brazil, but also all over the world. Brazilian authorities, among them President Fernando Henrique Cardoso, were present at the inauguration.

The pioneer experience of Resende, if successful, could become a standard for VW worldwide, beginning a new era in the automobile industry. In an interview to the *Folha de São Paulo*, one of the leading newspapers in Brazil, days before (16 October, 1996), López said:

*We qualify our relationship with the supplier as a revolution, but it is also a strong partnership. This partnership is clear for Volkswagen, now, with the installation of the new truck and omnibus plant that, through the “modular consortium,” will bring the suppliers inside our plant, with their employees, to assemble our trucks and omnibuses. The same will happen in the future engine plant. Additionally, we are in a simultaneous engineering process with our suppliers. In a few months, Volkswagen begins a development and design programme of parts of new products, in a new and important partnership with its suppliers. Volkswagen Brasil is the creator of the “modular consortium” production process and will be the first company in the world to implement it. The Resende unit will become the first plant of this new generation in the manufacturing process. Resende is the new “plateau” of the third industrial revolution [. . .] With the advent of the “modular consortium,” the discussion about productivity will end. No manufacturing process will be more modern and will have more productivity and quality when this concept is definitely applied in all the Volks plants worldwide.*

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1. This case was written by Professor Henrique Luiz Corrêa © (hcorrea@rollins.edu), Professor of Operations Management at the Crummer Graduate School of Business, Winter Park, Florida, and does not intend to illustrate good or bad management practices, but just to serve as a basis for classroom discussion.

In spite of all the optimism showed in the interview, at the time of the inauguration, many doubts were in the minds of the executives of the German assembly plant: was the modular consortium really a trend in the world automobile industry? In spite of all gains resulting from this model (as a greater commitment of the suppliers, less time for product development, smaller and decentralised structures, etc.), would VW be in a fragile position in relation to its suppliers, even becoming dispensable in the medium term?

Less than one month later, López de Arriortúa left VW, supposedly due to a sentence favorable to GM given by a judge in Detroit. The departure of López would bring more doubts on the future of the modular consortium: would this really be a revolutionary idea capable of changing the way of production of the world automobile industry, or would it only be the last try of a director under strong pressure and with his career at risk? Was the adoption of the Modular Consortium model at VW Resende a result of a rational analysis of the different alternative models or was it influenced by the imposition of an executive going through a delicate situation in his career?

Extracts from the article entitled “Depois de López, o que?” (After López, what?), of the *Exame* magazine of 12/18/1996, by Cláudia Vassalo, give an idea of the atmosphere in which López left:

*What does the departure of José Ignacio López de Arriortúa from Volkswagen mean? Sorcerer, visionary, dictator, white collar thief, the charismatic Basque executive had his head delivered on a tray by his former bosses, at the end of November: nearly on its knees in front of General Motors that is suing it for industrial spying, cornered by the threat of a billionaire fine, the Wolfsburg assembling company did not have another alternative if not to force him to resign. In exchange, Volkswagen expects, if not definite peace, at least an armistice with GM capable of interrupting a tiring judicial battle that has already lasted 3 years. López leaves behind the strategic post of purchasing director for the group, but the question remains: what will happen with Volks Wagen worldwide and in Brazil? What will be of his works, such as the modular plant concept introduced in the Resende truck plant, or the ambitious worldwide program of cost cutting?*

Although López said that he strongly believed the Modular Consortium model should be the final point of the supply chain project model for all VW plants worldwide, neither of the plants owned by the German group inaugurated in Brazil after 1996 were designed according to the consortium model. The first was an engine plant in São Carlos, built to supply the high demand for 1000 cc engines. Although it had been announced by López as one more plant to use the modular consortium concept, it was in fact drastically altered when López left the company. The second plant inaugurated was of São José dos Pinhais, Paraná, to assemble Golf and Audi A3 vehicles.

Although strongly adopting a modular philosophy, having over 20 suppliers of large sub-assemblies, co-located in a so-called “industrial condominium” around the assembly plant itself, just around 20% of the module suppliers are responsible for assembling their modules on the vehicle. Another difference, even more substantial in relation to the Resende Model, is that the main vehicle modules (including the engine and transmission) were not outsourced, continuing to be manufactured by internal operations of VW. Would this denote the failure of the modular consortium? If the idea seemed so good, why was it not followed in the subsequent plants?

## What Now?

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After five years of operation of the Resende plant, the contract foresees a revision of the agreement between the assembly plant and the module suppliers. Volkswagen's Board of Directors decided to have a meeting in order to assess the modular consortium experience and decide whether or not to propose a contract renewal to the module suppliers. An executive ponders:

- We are more skilled in producing trucks and now owners of the equipment (the contract provided that during the 5 years the assets belonging to the module suppliers would be gradually transferred to the assembly plant)—is it still justified to be so dependent on our suppliers?
- Let's not forget also that VW recently acquired Scania, and, therefore, we now have a strong competency in the production of trucks and some of their modules within our group.
- Fiat returned to the promising Brazilian truck market (through Iveco) and we must pay attention to this competition.
- With Internet (e-procurement) allowing quotations between the suppliers, receiving fast answers from all over the world, are such intensive partnerships still justified?

## Background

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Between 1987 and 1995, a joint venture between VW and Ford, called Autolatina, existed in Brazil and Latin America. Although both the original brand names were maintained in the vehicles manufactured, they were produced in common plants and there were vehicles marketed with the brand name and finishing of Ford equipped with VW engines and vice-versa. The trucks both of VW and Ford were produced by Ford's plant in Ipiranga, a district of the city of São Paulo.

In 1995, Autolatina was dissolved, and after the division of assets, VW was left without the truck and the 1000 cc engine plants (these returned to Ford). The dissolution of the agreement provided that at the end of 1996, Ford would no longer supply trucks and engines to VW.

Thus when VW required a truck plant in Brazil, López was the vice-president of operations for Latin America. Having an important past in supply management (where he in fact built his reputation as an executive in GM) and being a strong defender of the outsourcing policy, he decided that the new plant would have a revolutionary configuration, in which no employee of VW would execute any assembly or manufacturing operation—all of these operations would be outsourced to suppliers.

Before beginning a more detailed description of the model adopted in the Resende plant, however, it is a good idea to analyze the Brazilian truck market and its development as time went by. This can help to explain why some decisions were taken that led to the choice of the Modular Consortium model for the Resende plant.

The first important aspect is to note that VW, in 1996, did not have a solid tradition in manufacturing medium and large trucks. Though strongly established in the Brazilian market as one of the leaders in automobile manufacturing, it had only recently entered the promising truck market (approximately 50% of the total shipment of cargo in Brazil is carried out on land, while 20% is by river, 25% by railroad, 4% by pipeline and 1% by

air—percentages calculated in ton per km). Table 1 shows a historical summary of truck manufacturing in Brazil.

As can be seen in Table 1, VW relied on more experienced partners worldwide in the production of trucks for both situations—when it began to operate in Brazil (in 1980, when it benefited from Chrysler’s experience) and when Autolatina was created (in 1987, when it benefited from Ford’s experience in designing and manufacturing trucks).

Table 1 Historical summary of truck manufacturing in Brazil	
YEAR	RELEVANT FACTS IN THE BRAZILIAN TRUCK MARKET AND MANUFACTURE
1951	Daimler (Mercedes) Benz begins to study the possibility of manufacturing trucks in Brazil
1953	Mercedes begins to build its first plant; production starts in 1956
1957	Ford starts production at its first truck plant in Brazil
1959	Scania and GM both begin production in their new plants in Brazil
1965	Chrysler begins to manufacture trucks in an old plant of International Harvester
1968	Mercedes manufactures its Brazilian truck number 100,000, already having 30% of the market
1968	Alfa Romeo buys FNM and starts producing trucks in Brazil
1975	Scania starts producing heavy duty trucks
1976	Fiat buys the Alfa Romeo truck operation and starts to manufacture Fiat trucks
1978	Mercedes reaches 50% of the market share; Brazilian market still closed for imports
1978	Volkswagen buys 67% of Chrysler Brazil, manufacturer of Dodge trucks
1980	Volvo inaugurates a new plant in Paraná to manufacture heavy duty trucks
1980	Volkswagen assumes 100% of Chrysler Brazil truck operation
1981	Volkswagen Caminhões launches its own trademark of medium and light trucks
1985	Fiat closes its truck manufacturing operation in Brazil
1987	Autolatina is created, a joint venture between VW and Ford for Latin America
1987	Autolatina trucks start to be manufactured by Ford (Ipiranga)
1990	Brazil begins to open its economy—GM, Asia, Kia start to import trucks
1991	Volkswagen (Autolatina) begins to produce heavy duty trucks
1994	Fiat begins to import trucks
1995	Autolatina ends—in the division of assets, Ford keeps the Ipiranga truck plant
1996	New VW plant in Resende starts operation in November
1997	GM begins to market Isuzu and GMC trucks in Brazil
1998	New products are frequently introduced into the market
1999	VW buys Scania Trucks’ world operation

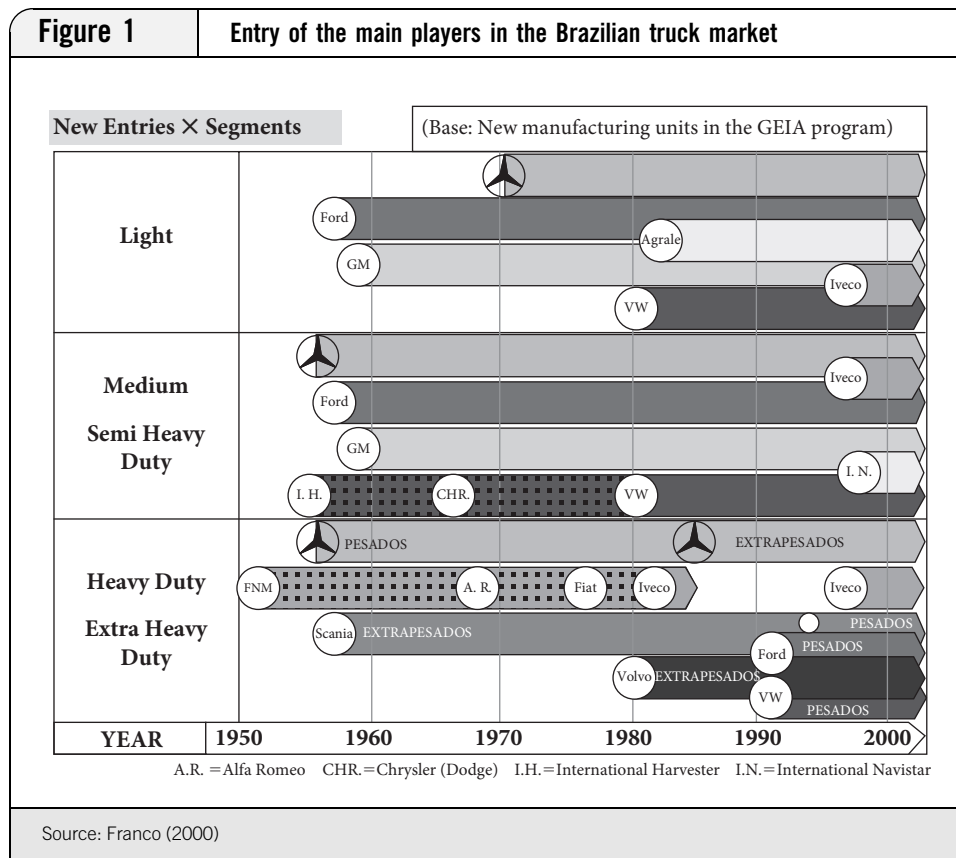


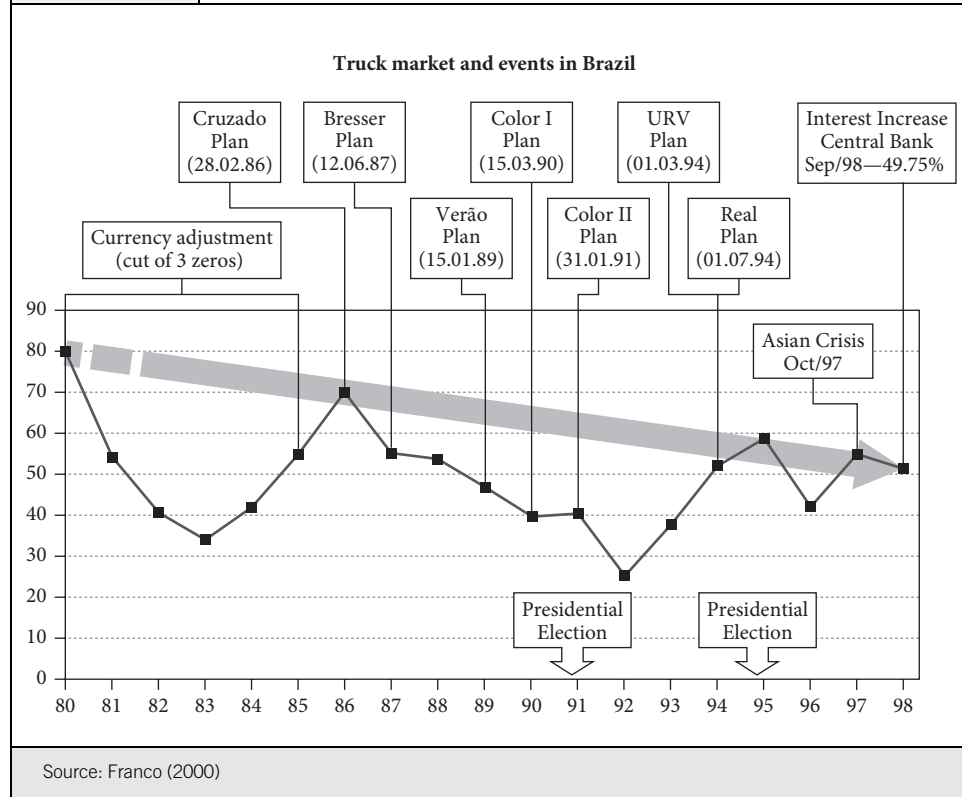
Figure 1 illustrates the entries over time, of the various players in the Brazilian truck market, showing how recent the VW presence is in this market.

<b>LIGHT:</b>	Up to 10 tons
<b>MEDIUM:</b>	From 10 up to 20 tons
<b>SEMI HEAVY DUTY:</b>	From 20 up to 30 tons
<b>HEAVY DUTY:</b>	From 30 up to 40 tons
<b>EXTRA HEAVY DUTY:</b>	Over 40 tons

Figure 2 shows the development of the whole truck market (in thousands of units) in Brazil during the '80s and '90s and the main political and economic events of the period. Meanwhile, Figure 3 illustrates the historical development of the market share of the several competitor trademarks.

The market share graphs are practically self-explaining, but it is clearly noticeable that the traditional leaders (mainly Mercedes-Benz) lose share at the end of the '90s, opening space from new entries, among which is VW. Except for the growth of VW, only Volvo's and Scania's shares grow, but compete only in the super heavy duty segment, outside the range of VW, Ford and, to a certain extent, Mercedes. This means that practically the only company in the small and medium segment that grew in market share in the last years of the '90s was VW.

When Autolatina ended and the operations of VW and Ford were divided again, VW was left without a truck plant. At that time, the trucks of the VW trademark had about 18% of the global truck market in Brazil. This meant that VW urgently needed a plant capable to maintain the truck production in Brazil.

**Figure 2****Development of the global truck market and relevant facts of the period**

## The Original Conception of Resende's Modular Consortium

Resende's Modular Consortium was built based on the logic that VW would outsource the manufacture of all the parts of its trucks. It decided to only maintain internally the activities of coordination (purchases, planning, production programming and control and materials), end product quality control, and engineering for configuration of the omnibuses and trucks produced, as well as post-sales distribution and service.

Designers divided the product into (large) sub-assemblies or groups of components (modules) whose supply would be completely outsourced—Volkswagen would not be in charge of any module. The module suppliers for the Resende plant would also have the additional responsibility of *assembling the modules directly on VW's assembly line*. Thus, the plant was designed to house the vehicles' final assembly operations, as well as the assembly operations of the modules of seven suppliers:

- Maxion—supplier of the chassis module;
- Meritor—supplier of the axle (front and back) module;
- Powertrain (MWM + Cummins)—supplier of the engine and transmission module;
- Remon (Bridgestone + Borlem + Maxion)—supplier of the wheel and tire module;

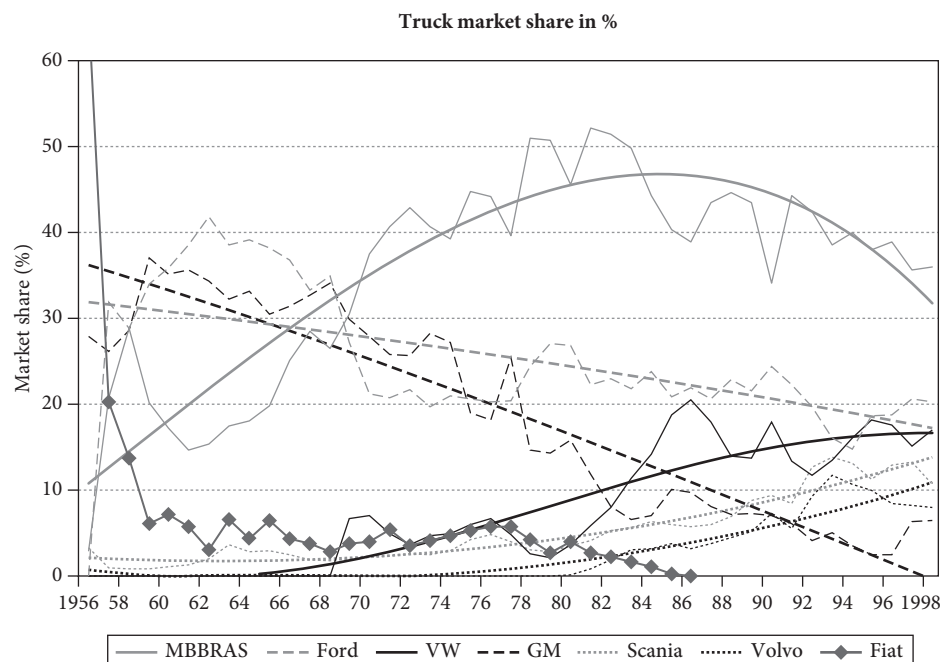
- Delga—supplier of the cabin panel and structure module;
- VDO/Mannesmann (now Siemens)—supplier of the instruments and cabin interior module;
- Carese (Eisenmann)—supplier of the cabin paint services.

In fact, the choice for a modular configuration seemed right and was following a trend of the industrial sector, as many experts agreed that modularity has allowed the companies to handle increasingly complex technologies. Breaking up the product into modules or sub-assemblies allowed designers, manufacturers and users supposedly to gain tremendous flexibility and speed in the development and launching of new products.

Interestingly, of the approximately 1,400 people working in the plant, only 270 were VW employees, and none assembled the products. Additionally, some of the “modulists” (as the module suppliers are sometimes called) were joint ventures of companies that, in the outside world, competed with each other (for example, the supplier of the engine and transmission module, “Powertrain,” is a partnership between MWM and Cummins, both diesel engine manufacturers and competitors in the outside world of the Resende plant). As well as the module companies, there also were, working within the plant, other companies involved in support activities: internal logistics, food, cleaning and security, among others. This indicated the need to manage a cultural mixture that included companies with varied backgrounds, sizes, origins and management policies, all living under the same roof.

**Figure 3**

**Development of the market shares of the various truck trademarks in the Brazilian market**



Source: Franco (2000)

It is easy to imagine the difficulties during the initial designing phase of the plant: signing services contracts, service-level agreements, defining responsibilities and a large constellation of different aspects involved in an enterprise such as this. The challenge was to try to anticipate possible problems and develop contingency plans to handle them. Not an easy task, it consumed a large quantity of management effort and negotiation, both from VW as well as its partners. The result of the concentrated effort was a 90-page contract, subsequently kept secret. At the limit of the skill of the partners involved, several aspects were included in the contract: salary and equivalent career policies between the partners, identical uniforms, and a series of other visible aspects. They also established clauses on less visible aspects—for example, the accountability policies. With all the difficulties, the Resende plant started operations in November 1996, within the established schedule.

## Modifications in the Initial Model

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After five years of operation at the Resende plant, there were alterations in relation to the original model, although they cannot be considered substantial. The ideas considered when defining the original format of the consortium have been maintained, except for the changes listed in Table 2.

## Advantages and Disadvantages

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The experience of the operation of the Resende plant reveals various advantages of the Modular Consortium model. A survey recently carried out through interviews with different VW managers, as well as executives of the module companies, pointed out the following advantages from the point of view of those involved:

- Commitment of the module suppliers with the success of the final product and not of only their parts of the product, since they are only paid when the final product is approved and functionally accepted.
- Priority with the headquarters of the module supplier regarding delivery or quality problems, since there is an “ambassador” of the module supplier within the assembly plant.
- Improved assembly quality, since the module supplier tends to strictly follow the assembly instructions, which does not happen in conventional plants.
- Fast improvement of productivity and quality levels, since the cycle of problem solving and improvements is shortened by the presence of the supplier within the assembly plant.
- Increased apprenticeship by the presence, under the same roof, of numerous different companies, which bring rich know-how, allowing cross-fertilization.
- Shorter time for developing and launching new products, since the partnership is strong and there are no alternative partners; they have already been working together for a long time and simultaneous engineering becomes easy.
- For some module suppliers, there is a guarantee of supply, allowing planning for a longer time.
- A smaller and decentralized structure of each supplier within the Consortium allows a quicker decision than if taken within only one large structure, as is the case of a traditional assembly plant.



Table 2

## Changes/developments that occurred in the VW Resende plant

ASPECT	HOW IT WAS INITIALLY IMAGINED	HOW IT IS NOW
Supplies	VW would drastically reduce their supply base from 450 to 7.	<ul style="list-style-type: none"> <li>• VW still deals with 450 suppliers because of the added taxes—VW then buys the parts and the module manufacturers carry out the assembly.</li> <li>• VW prefers to buy direct to benefit from the scale economies: centralized purchases allow truck parts (86/day) to be negotiated in a package with purchases for light vehicles (1,500/day).</li> <li>• VW realized that module manufacturers would have cash flow problems when purchasing from third parties—VW then buys the parts and delivers them to the module manufacturers for assembly.</li> </ul>
Accountability	Payment at the end of the line implying that module manufacturers share losses caused by interruptions regardless of who originated them.	Unaltered.
Payment	Payment to suppliers was planned to be made at the quality audit point 7, before the end audit. Unfinished vehicles would be paid for even if the supplier involved had caused a missing part.	Payment to suppliers varies with time (between the quality audit points 7 and 8 (where the vehicle is made available to “Sales”) according to the quantity of problems of the period—when less problems are detected, they are paid at point 7 and when more problems happen, at point 8 (after the final audit).
Human resources	<ul style="list-style-type: none"> <li>• High school education required in all areas.</li> <li>• All the workers of the plant dress the same, eat in the same cafeteria, have the same payment scheme, and the plant’s HR is formed by a representative of VW and the 7 module suppliers.</li> <li>• The location of the plant was chosen, among other reasons, to avoid more industrialised areas and, therefore, more unions.</li> </ul>	<ul style="list-style-type: none"> <li>• Alterations had to be made, for example, in the bodywork shop; the schooling requirement had to be lowered and privilege given to professionals experienced in the area in order to obtain the intended results.</li> <li>• All the visible aspects are present today as planned; a consortium culture has already been created. Cooperation between the partners has substantially improved; they benefit from the cross-fertilization of solutions and competencies. It was hard in the beginning.</li> <li>• Resende became an industrial centre, including other assembly plants (Peugeot, for example). Unions organized themselves, and the first strike has already occurred. Today head-hunters of other companies besiege VW engineers and technicians, inflating local salaries.</li> </ul>
Quality	25% of quality improvement expected in relation to traditional plants.	High rates of improvement reached—the numbers of the VW Quality Audit (where numbers near zero indicate better quality) decreased from more than 4 to around 2 in 4 years, probably influenced by short problem solving cycles due to the proximity of the suppliers.

<b>Table 2</b> <b>Changes/developments that occurred in the VW Resende plant</b> <b>(continued)</b>		
ASPECT	HOW IT WAS INITIALLY IMAGINED	HOW IT IS NOW
Productivity	25% of productivity improvement expected in relation to traditional plants.	No available data for comparison due to the difficulties of finding proper forms of comparison with other plants. The productivity growth obtained, however, is relevant (possibly from an accelerated apprenticeship).
Capital investment	VW provides the housing and the module suppliers provide the furniture. Investments of the module suppliers in assets are gradually transferred to VW during 5 years.	The result is that sometimes the responsibility of capital reinvestment for process improvements, for example, is not very clear, which might at times result in the risk of no investment. Problems are apparently reduced now that the majority of the assets have already been transferred.
Market share	Increases expected in the market share.	VW market share for medium trucks went from 29% in 1995, to 27% in 1996, to 24% in 1997, to 31% in 1998, to 35% in 1999. In 2003, VW became the Brazilian market leader in trucks. In semi-heavy duty trucks a similar trend can be noted.
Introduction of new products	VW was planning to concentrate on medium trucks.	During the first 4 years, around 25 models were introduced, all using only one flexible assembly line; simultaneous engineering, in general, does not include module suppliers that supply "black boxes." Now VW is focusing on the heavy duty truck market with the purchase of part of Scania. Another recent decision is to produce pickups.
Logistics	Originally, it was planned that each module supplier would be responsible for its own logistics.	Later on it was decided that a third party should operate the logistics for all the partners.
Unfinished vehicles (missing parts at the end of the line)	MPC (manufacturing planning and control) system centralized and managed by VW expected to coordinate perfectly the supply and demand. Module suppliers were responsible for the assembly of delayed parts out of the line.	MPC system implanted as planned, but problems of delivery reliability still have caused a great number of unfinished vehicles. Nearly a third of the total of vehicles that leave the assembly line today require rework. At present VW pays for the assembly of parts that arrive late out of the line.

- Less tendency of parallel agendas of managers and executives interfering in the decisions, since the various managers of the different modules are not competing for the same promotions. There is a trend to work more towards mutual success.
- Organizational apprenticeship in negotiation. As they are separate companies, there cannot be an imposition of positions resulting in a loser and a winner. The only way of making a point of view prevail is to convince and persuade, which does not generate losers.
- Possibility of the physical presence of module suppliers without the need of establishing independent industrial units—relevant when it is a matter of production volumes that would make it difficult for these independent units to break-even.

On the other hand, some disadvantages are also observed, according to the opinion of the executives interviewed:

- Salary negotiation levelled by the standards of the assembly plant, with a possible loss of margin by the auto-part suppliers.
- Subjects discussed must be agreed on by all partners, which can take longer, as is the case of a union negotiation.
- The start-up, described by all those interviewed as having been difficult due to the management and cultural mixture, caused the learning curve to be arduous and could have taken a different direction.
- Labor issues appear due to the fact that the module manufacturers are executing end activities of VW and are incognito. What direction the jurisprudence can take is not known.
- Strategic risk of there being technological developments in one module that are not followed by the corresponding partner. The difficulty in changing partners highlights the need to take great care in choosing partners in a Modular Consortium model.

The central issue seems to be the strategic risk that the Modular Consortium model would represent in terms of outsourcing core competencies. In a continuous change from “making everything internally” to “outsourcing everything,” VW chose, for its Resende plant, the extreme of “outsourcing everything.” Thus one of the reasonable questions to be asked is to what extent VW runs the risk of becoming a hollow company, naked of competencies that distinguish it from competitors or that strengthen its importance for the supply chain in which it is inserted. In other words, to become hollow means to outsource all the competencies, and losing “muscle” to support competitive efforts. One of the employees of one of the module companies said in an interview:

*[A]t present we, the module companies, know a lot more about making trucks than VW itself—after all, it is us that are every day at the plant solving problems, improving processes and learning . . .”*

Is it possible that VW did not see the “potential trap” when it decided on the Modular Consortium model, outsourcing all the manufacturing and assembly operations?

## Discussion Questions

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1. Do you think the Modular Consortium model is a trend today? Why or why not?
2. Is there a risk of VW becoming empty of competencies and, therefore, dispensable?
3. Why do you think the new plants of VW and the other auto assembly companies have not followed the MC model?
4. Do you think the option for the MC was the result of a rational analysis of the various alternatives on the part of VW management?
5. Overall, does the Resende experience appear to be successful?

