

Current developments of the Brazilian automotive industry

José Roberto Ferro

IMVP

Toronto

June, 1995

Introduction

In the context of the stabilization and economic growth that has followed the Real plan introduced in mid 1994, the latest effort to curb dramatically high inflation, the Brazilian automotive industry has continued to grow following a series of policy changes occurred throughout the 90s.

The industry has "boomed" for two consecutive years, achieving record production and sales levels. In 1994 production volume reached 1.5 million units, domestic sales of 1.3 million and 380.000 units exported. And a record volume of 150.000 units of imported vehicles penetrated the Brazilian market. After more than a decade of stagnation and with a poor technological and efficiency performance, this partial success crowns a restructuring process that has implemented lean manufacturing principles as the new industry paradigm and a new set of industrial policies that has liberalized the Brazilian economy and has stimulated the cooperation among the major stakeholders - government, companies, labor.

This paper will focus on the most recent economic performance and policy changes in the Brazilian automotive industry, which faces the formidable challenge of being competitive internationally as new investments of US\$ 10 billion expected until the year 2.000 to raise the production volume of 2.5 to 3 million.

1. Economic performance: production and market

Production. After a poor performance during the first three years of the decade, in 1993 and 1994 the production growth was 30% and 14% respectively, as shown in table 1.

Table 1
Motor vehicle production: 1989-1994 (in 000s)

	1994	1993	1992	1991	1990
Total	1.590	1.390	1.070	960	914
Cars	1.250	1.127	816	705	663
Light commercials	250	224	197	182	184
Trucks	65	47	32	49	51
Buses	18	18	24	22	15

Source: ANFAVEA

With the past two years' volume improvements, Brazil has increased its position in the international ranking, moving up to the 9th position in 1994 as a vehicle producer.

Domestic sales. Local market has grown substantially following recent policy changes such as tax reductions, economic growth and improved efficiency and modernization.

Table 2
Domestic sales: 1991-1994 (in 000s)

	1994	1993	1992	1991
Total	1.390	1.121	747	789
Automobiles	1.120	917	597	593
Light commmericals	210	161	112	129
Trucks	50	32	25	41
Buses	10	11	13	16

Fonte: ANFAVEA

In 1994, the small car segment represented 48% of the total market while the share of "popular" car alone was 37%. The best selling models were the VW Gol (a smaller Golf) and the Fiat Uno, respectively with 226.000 and 221.000 units sold.

Exports. Throughout the 80s the export volume jumped from 157.000 units in 1980 to 345.000 in 1987 to descend from then on until 1992, when the volume started to grow again. In 1994 the volume reached a new record of 380.000 units. Table 3 shows Brazilian exports in number of units and the percentage of total production from 1990 to 1994.

Table 3
Motor Vehicle Exports: 1990-1994 (in 000s units and % of vehicle production)

	1994	1993	1992	1991	1990
Total	380 (23%)	330 (23%)	340 (31%)	193 (20%)	187 (20%)

Source: ANFAVEA

A major turn in the exports orientation occurred with Argentina becoming Brazil's most important market. For the period of 1978 to 1985 Argentina imported 321.000 vehicles, representing only 3.4% of total exports. It became the most important from 1991 and in 1994 exports to Argentina totalled US\$ 734 million (41% of the Brazilian total)¹.

Imports. The imported vehicle market has been growing exponentially, jumping from 10.000 units in 1990 to almost 20.000 units (2.9% of the vehicles market) in 1991, 32.000 (4.2%) in 1992 and 80.000 (5.7%) in 1993. In 1994 more than doubled again, reaching almost 190.000 units (13% of the market).

This market has been occupied by new brands that have been gradually establishing their own distribution network² and by the established assemblers, which have begun importing vehicles since 1993 to complement their local lines, besides the vehicles coming from Argentina (about 20.000 in 1993 and 35.000 in 1994 under the protocol 21³).

The most successful model has been the Fiat Tipo⁴, the best selling imported car the country since August 1993. In that year 10.000 units were imported and in 1994 this figure reached 70.000 units, almost the same volume as the other importers combined. GM Astra, Ford Fiesta and VW Golf have also been major import models more recently.

The presence in the small commercials (pick-ups and small vans) has also been important. The best selling imported brands in 1994, not considering the imports from local assemblers, were Renault, Peugeot, Honda, Kia, Asia, Mitsubishi, Toyota and Citroen and the best selling models were the Renault 19, the Kia Besta van and the Honda Civic.

¹ Argentina's domestic production has been growing very fast, more than tripling in 3 years, from less than 100.000 in 1990 to almost 500.000 in 1994.

² The exclusively import dedicated distribution network has over 600 dealerships in the country and the local manufacturers have around 1.800 by April 1995.

³ An agreement within Mercosur to allow for tax free imports within certain volume limitations.

⁴ In the phase out process, to be substituted by the Bravo in 1995.

Table 3
Imported vehicles (1990-1994)

Year	Total	Argentina@	OEMs^	Others+	Market (%)
1990	9.358	--	118	9.240	---
1991	19.843	3.946	582	15.315	2,9
1992	32.200	13.169	1.376	10.388	4,2
1993	79.900	22.607	17.876	34.444	5,7
1994	190.000	35.000	75.000	77.000	13,0

@ Protocol 21/ACE

^with a manufacturing base in Brazil

+New brands

Source: ABEIVA, ANFAVEA

Table 4 summarizes the main performance elements of the Brazilian industry for the past four years.

Table 4
A summary of the Brazilian automotive industry performance: 1991-1994 (in 000s units)

	1994	1993	1992	1991
Production	1.590	1.390	1.070	960
Domestic Sales	1.370	1.140	762	890
Imports	190	80	32	23
Exports	380	330	340	193

Source: ANFAVEA

3. Assemblers and suppliers structure

All the vehicle assembly companies are subsidiaries of foreign companies from the U.S. (Ford and GM), Italy (Fiat), Sweden (Volvo and Scania) and Germany (Volkswagen and Mercedes-Benz). It's noticeable the small presence of Japanese investment, with Toyota limited to an old plant producing aged pick-ups and Honda with a motorcycle plant.

The structure of the automotive industry has been changing recently. Autolatina, a merger of Ford and Volkswagen in Brazil and Argentina

set up in 1987, decided to split late 1994. They had maintained separate distribution networks, brands and products and had integrated partially their operations and product lines and rationalized their production facilities. It had 46% of the total vehicle output in 1994 and the most diversified product line, ranging from cars and trucks to buses.

Fiat has been the fastest growing company acquiring market share from all other assemblers. It doubled its share from 1990 (15%) to 1994 (31%). It was the first and, for a few years the only company, to profit from a tax break for smaller cars. It was the first assembler to import massively and has been aggressive in relocating and restructuring its supplier base and reducing its verticalization level. It has been the sector's largest exporter, mainly to Italy and other European countries.

General Motors has been very aggressive in updating its product line, which is currently the most modern, besides greatly improving its quality and productivity. It produces cars, light and medium trucks in two assembly plants. Its production share was 18% in 1994. Its participation was not higher mainly due to production volume limitations for the Corsa.

In the commercial vehicles segment (buses and trucks), Mercedes Benz with two assembly plants, one for buses and another for trucks and components, continues to dominate but has faced much competition from Autolatina, whose performance in this segment has been impressive. Scania and Volvo concentrate in the heavy truck and bus market.

Figure 1 shows the main assembly plants, products being manufactured by the end of 1994 and figure 2 presents the main car models manufactured in Brazil.

Figure 1. Vehicle Assembly Plants in Brazil (1995)

Company	Plant	Products
V.W.	Anchieta	Beetle, Santana/Versailles, Kombi, Voyage engines, transmissions, parts and components, foundry
	Taubaté	Gol
Ford	Taboão	Escort/Verona, Logus/Pointer engines, transmissions, parts and components
	Ipiranga	trucks and buses
G.M.	São Caetano	Omega, Vectra, Monza, Kadett
	São José	Corsa, trucks, engines, foundry
Fiat	Betim	cars and small pick-ups
Mercedes	São Bernardo	trucks
	Campinas	buses
Scania	São Bernardo	trucks and buses
Volvo	Curitiba	trucks and buses

Source: companies

Figure 2. Car models assembled (1995)

Company	Market segment	Products
VW	Small	Beetle*, Gol*
	Mid-sized	Logus, Pointer, Voyage,
	Large	Santana
Ford	Mid-sized	Escort*, Verona,
	Large	Versailles
General Motors	Small	Corsa*
	Mid-sized	Kadett, Monza, Vectra
	Large	Omega
Fiat	Small	Uno*
	Large	Tempra

@ Not considering station wagons and light truck versions

* Included in the "popular car" regime

Source: companies

Suppliers structure and performance. In the autoparts sector there are MNC and local companies. The international trends towards a lean supply structure have already been seen, causing a major restructuring of the sector. The number of first tier suppliers has been reduced from 730 in 1990 to 420 in 1994, in part due to some single or double sourcing or more systems integrators suppliers. The assemblers have been also reducing their levels of vertical integration and simultaneous engineering efforts have increased with suppliers assuming more responsibilities in the design process and in the integration of systems components.

Many suppliers have improved their production processes and achieved significant cost reduction and quality increase with the pressure from global sourcing processes implemented by three major assemblers (GM, Autolatina e Mercedes). Although materials costs were reduced for over 25% in the last two years, costs are still high internationally. And spite of volume growth, suppliers have had their profitability level reduced.

Colocation has been spreading out. Fiat, away geographically from the traditional supplier base, has been successfully attracting suppliers closer to its manufacturing site in the State of Minas Gerais. Some of them are located inside its plant or very near by, facilitating the JIT process and the delivery of more complete systems. VW Taubaté and Ford Taboão plants are pursuing similar strategies.

Figure 3
Main autoparts suppliers

company	main products	93 sales (US\$mi)	control
Bosch	electric parts, electronic	650	German
Cofap	shock absorber	377	Brazilian
Metal Leve	pistons	251	Brazilian
Z.F.	transmissions, gear boxes	194	German
T.R.W.	transmissions	169	U.S.
Clark	transmissions, gear boxes	159	U.S.
M.W.M.	diesel engines	155	German
Varga	brakes	151	Brazilian
Wapsa	electric parts	150	German
Allied-Signal		118	U.S.
Albarus/Dana	transmissions and components	118	U.S.
Cummins	diesel engines	117	U.S.

Source: "Revista Exame - Maiores e Melhores", 1993.

4. Modernization and performance increase

The industry's restructuring process has brought updated and increasingly global products, diffusion of lean manufacturing practices helping to increase productivity and quality levels, upgrade in the automation and scale levels, improved relations with labor, etc.

Product modernization strategy. The average design age has already been reduced from 11.4 to 7.2 years from 1990 to 1994. However, it is still more than twice the international average, but in two more years, with the expected new investments, the average design age gap will be much reduced⁵.

Companies have taken different product modernization approaches⁶. GM decided on a "follow Opel quickly" strategy and has already substituted most of its old models, introducing successively the Omega, Vectra and Corsa, one a year from 1992 on, having the most competitive and updated product line of the country. Their other two old models (Monza and Kadett) have been complemented in their market segment by the import of Astras from Europe.

Autolatina accommodated basically two different product modernization strategies: "unique" based on the more self sufficient and autonomous VW's models versus "world" cars adapted from Ford Europe designs. It introduced the new Ford Escort platform and based on it the Verona, Logus and Pointer, with a more local design.

With the Autolatina split, Ford and VW- will rely even more on their parent companies models. Ford decided to import the small European Fiesta as part of its effort to produce locally the replacement model in 1996. And it will continue to bring the Taurus, Mondeo and the

⁵ The commercial vehicles, buses and trucks in Brazil are much more updated due to the large size of the domestic market. The country has been able to export those products in part due to its modern designs and technology.

⁶ Europe has been the source of product technology for the Brazilian industry because their products are more adequate to this market than the U.S. based models. Ford and GM utilize their European design centers and products. And the other two car companies (VW and Fiat) and truck and bus producers are European. However, much adaptation has been made historically in the Brazilian made products basically for the local supplier base, the different fuel and road conditions, safety and emissions legislation. Particularly VW has done much styling locally.

Ranger to complement its product line. VW in the midst of a restructuring of its product lines in Europa has decided also to rely on their global models for Brazil. It will import the Passat to gradually substitute its aged Santana along with the Golf which will be produced locally by 1997. The 80s best seller VW Gol, the Beetle substitute launched in 1981, has been replaced by a new restyled model late in 1994.

Fiat has expanded its product line, composed basically of its highly successful Uno platform, introducing the more modern Tempra for the larger car segment where it didn't have a product before. To complement its line, it has been importing massively its midsized Tipo from Italy. A new model (project 178) designed by a team of Brazilians and Italians will be positioned between the Uno and the Punto and will be launched in 1996.

The local content level has been reduced in order to accommodate faster development programs for updated models and the new procurement policies around global sourcing programs.

Productivity, quality and management practices. The industry has been implementing the lean manufacturing approaches in order to increase productivity and quality. At the shop-floor level such practices as team work, training, participation, involvement and commitment of the work force, increased communication and decentralization, emphasis on problem solving activities besides the elimination or significant reduction of quality inspectors and organizational flattening with the cutting of managerial and supervisory layers, among other items, have been very common. There has been a reduction of inventories and lead times as well, through the diffusion of JIT deliveries.

With the major help of newer and easier to manufacture products, along with scale and automation increments and the managerial change effort, productivity at the assembly level has increased by about 40% from 1990 to 1994⁷. In 1990 the assemblers employed 117.000 people, a number maintained in 1994 with a production volume 60% higher. And quality measured by the number of defects has been improved by approximately 35% during this period.

⁷ A rough estimate based on the assemblers own metrics.

Automation level and scale. The automation level is very reduced but the product substitution, particularly the new Gol and the Corsa, has triggered the introduction of automation, particularly at the welding process. In the GM- São José dos Campos 60 new robots were introduced, VW-Taubaté plant 57 robots and for the new Ford Fiesta plant some 92 robots will be put into production.

Investments in new machinery and equipment in the past were not considered necessary due to the very high cost of modern equipment and import tight controls along with existing idle capacity. And besides, labor costs are still low compared to international levels (US\$ 5-6 hour for direct work, including wages and social benefits), although raised in the past years. As new investments for capacity expansion are expected to continue to occur in the near future and imported equipment becomes ever cheaper, the automation level tends to continue to increase rapidly.

With the volume of 1994 in 6 assembly plants, the industry has achieved an adequate production scale (average 250.000 units/year/plant). Although most assembly plants remain having high levels of product complexity and variety, having to cope with many platforms and models, the increase in popular car's production has brought adequate scale in the small car segment. For example, the VW Taubaté plant and the GM São José plant produce only one model, the Gol and the Corsa, respectively, with volumes of over 200.000 units/year.

Human Resources and Labor Relations. Spite of its lack of formal education and training of the work force, now partially minimized by the company's own efforts, the willingness to learn and motivation to participate, when properly recognized and compensated, are industry's strenghts.

The number of hours of training has dramatically improved (by 4 times increase since 1990) and the direct workers' involvement in the production and administrative problems and in the improvement processes has helped to increment the industry's performance.

Labor relations have been improved. The unions used to be very antagonistic, answering the companies authoritarian industrial relations model. However, more recently, the labor intense and decisive participation in the formal agreements led by tripartite "Camara Setorial" has increased the unions role in the industry. The

most organized unions have been actively discussing strategic issues such as quality programs, outsourcing policies, education, wages structure, career planning, employment levels, work journey, etc.

Employment levels in the manufacturing area have not been increasing because of the productivity gains. But the car utilization diffusion has helped to increase the levels of employment throughout the vehicle value chain (raw materials, fuel, services, etc). And the real wages have grown by about 30% from 1990 to 1994.

5. Government policies: from control and protection to cooperation and competition

Price control policies, economic recession, labor disputes, etc, built up a considerable pressure on the industry throughout the 80s. In 1990, the government policy stimulated the competition through the opening of domestic markets, stimulating the domestic demand and helping to increase the cooperation of all major stakeholders. This policy has been implemented through the market liberalization, the "popular" car regime and the new Camara Setorial arrangement.

Market liberalization. In March 1990 the Brazilian market was open to imports. Initially very high, import tariffs for the auto sector went down in four years from 85% to 20%. The import tariffs for autoparts were gradually reduced as well, to reach 20% in September 1994⁸. However concerns with a possible "flood" of imports in 1995 following also the favorable exchange rate, the government decided to increase import taxes to 32%. It followed some other measures such as reduced consumption financing schemes. At that time there was an expectation of possibly 500.000 units imported in 1995⁹. In April the tax was raised again, this time to 70%. Tariff shuffling has been due to policy inconsistencies, macroeconomic uncertainties, lack of competitive capacity and an overvalued Real. The import market share in the first three months of 1995 has been over 36% and a trade deficit in the sector would likely occur for the first time in decades.

⁸ High tariffs are the only instrument dealing with the imports. There is no anti-dumping legislation and non-tariffs barriers are very limited.

⁹ Mexico's currency crises played a significant role in those changes.

Figure 5 Import tariffs for vehicles

1990- 85%
1991- 60%
1992- 50% to 40% (from October)
1993- 40% to 35% (from July)
1994- 35% to 20% (from September)
1995- 20% to 32% (from February) and to 70% (from April)

A new institutional arrangement: the "Camara Setorial". The Automotive Sectorial Chamber has been the main policy arena after the liberalization. Under the coordination of the Federal Government, it has involved since 1991 the whole production chain (suppliers, assemblers, distribution), importers, labor unions and government agencies in formulating and implementing policies for the industry

As an strategic arena, some critical decisions were consensually taken that have helped to restructure the industry. This negotiation process in this Chamber resulted in a first landmark agreement in March 1992 with a 22% price reduction as the keystone (11% due to taxes reduction and 11% due to profit margin reduction through the production chain), along with other issues such as a long term wages and employment agreement, policies for financing the purchase of trucks, buses and cars, an investment program and a production volume goal definition of 2 million units in the year 2.000, among others. This agreement was extended in 1993 with further tax and margin reductions (10% total). Those agreements had a very direct and immediate result of reducing car prices in general.

The "popular car" regime. Another important policy element has been the popular car policy. Since 1990 there has been a small tax deduction for less than 1.000 c.c. engine cars, following much significant federal tax reduction in 1993. The total tax volume for those models ended up being 17% against 34% for most of the other models. The products were either previous existing models with a 1.000 c.c. engine (Gol, Uno, Escort), the relaunched Fusca, the new GM Corsa launched in 1994 with a 1.000 c.c. engine and the old Kombi van. It ended up stimulating the new car market since prices for those models stay around the US\$ 7.000 to US\$ 8.000 mark (except the Kombi). As a result, popular car share has been dramatically

increasing. In the beginning of 1994 it was 31% of the car market to end the year with a 52% participation.

A production restructuring has followed this change in market demand conditions. VW and GM already have plants dedicated exclusively to their small car production (Taubaté and São José) , leaving the other plants for the upper level products creating scale for the small cars (namely the new Gol and the Corsa) but bringing excessive variety and lack of scale for all the other models.

The growth in this market segment relies exclusively on the tax incentive. The products are basically the same, adapted for a smaller engine. Those products are not available anywhere else and were not designed for the powertrain they have and it is a diversion of international, not allowing for consumers satisfaction, technological improvements or competitiveness increase.

Through 1994 popular cars were charged with a premium for the consumers because the companies were not fulfilling the heated demand. Early 1995 the government decided to increase the IPI (a federal government tax) from 0.1% to 8% and maintained the remaining taxation levels, still one of the world's highest. The total taxation for "popular" cars is now 23%, vehicles up to 100 HP is 33% and above 100 HP is 35.3%. The figures for some countries are: Argentina, France and Italy (16%), Germany (12%), Japan (8%), USA (6%). [Source: ANFAVEA].

6. Future challenges

Though impressive those past years developments might be, the Brazilian auto industry is still far from being competitive internationally. The present growth may hide some prevailing structural problems such as very heavy taxes reducing market expansion possibilities, an undesirable overspecialization in "popular" car production, a lack of competitiveness in quality, costs and technology, unstable industrial policy, etc which might reduce future growth perspectives.

Therefore, many challenges lie ahead and the priority agenda for the industry and government focus around the following topics:

- . continuing efforts to improve technology, efficiency and quality. The concern for more efficiency increases should be ever present and it is

the way to pave a better export performance, shorten the productivity and quality gap and to compete with imports, thus allowing a more open and growing market.

. establish a long term industrial policy with clear rules for market protection and investments. Lack of stability and excessive and frequent policy changes result in an unattractive environment for new investments.

. create a competitive integrated South American industry. The Mercosul agreement should help to create a competitive and modern South American automotive industry. The foundations to establish the Mercosul agreement are the creation of free trade amongst the countries by the year 2000 through the establishment of common internal and external taxes and tariffs, regional content levels, among other issues. Many other items are not yet commonized since the two countries have specific automotive agreements with a particular web of regulations and policies that don't converge in many points¹⁰.

Most of the assemblers present in Brazil have been investing in Argentina. Autolatina was set up exactly to take advantage of the countries integration and has the most complete exchange of vehicles, parts and components, built an updated transmissions plant in Argentina to supply all its product lines in both countries and eventually export elsewhere. Ford and VW now separated want to maintain this flow. Fiat has a minority participation at Sevel, the largest Argentinian assembler, a engine plant and will set up its own assembly plant. G.M. after a long withdrawal from Argentina, decided to return, assembling pick-ups originally produced in Brazil. Mercedes and Scania have manufacturing facilities in both countries with an intensive interexchange of parts and components. And Toyota has decided to assemble pick-ups in a new plant in Argentina by 1995. Some autoparts companies such as Cofap, Varga and DHB have assumed the control of Argentinian autoparts companies to exploit opportunities in that growing market.

¹⁰ The Automotive regime in Argentina has the following rules. The import policies for companies that produce in the country impose no limits on the total volume imported but commerce has to be balanced. And for foreign producers there is a quota system (10% of the total market in 1994) and a bidding system with 20% of tariffs for cars. The domestic/regional content levels is 60%. Brazilian made parts are considered domestic when compensated by exports on an equal basis and Argentinian exports of parts and components to Brazil are accounted on a 1,2 basis.

. restructuring the taxation system and product mix. The tax policy challenge is to create the conditions to improve motorization levels and to offer a fairly good range of products through local production in a context of globalization. Present tax structure gives excessive advantages for the popular car segment and penalizes the medium and top segments. In order to have a more complete mix of products manufactured in the country the taxation system should create opportunities for a more even distribution of the product mix. Otherwise, Brazil will specialize excessively in small cars, diverting from the international pattern, reducing export possibilities, being less prone to technological development, etc¹¹. There is also much room for overall tax reduction since Brazil still charges vehicles very heavily.

Growth perspectives and new investments. The next phase will imply an even more rapid modernization process to face global competition and additional capacity investments to supply the expected increasing demand. The domestic market will be the main driving force since persists low motorization levels (11 vehicles per inhabitant against 5,5 in Argentina, 2,2 in the developed countries and 1,3 in the U.S.A.) but it shouldn't be seen any longer as isolated from the international markets.

Since the liberalization in 1990, the existing firms have invested heavily on new products but there hasn't been yet a need for production volume expansion. Some bottlenecks have been eliminated and plant restructuring efforts have allowed minor capacity improvements without major financial investments. The continuing growth of the Brazilian market will require additional capacity investments by the present players which require some clear and stable policies. Some of new players that have only imported vehicles up to the present have also declared their intent to invest. The Korean, Japanese and French assemblers appear as the most likely candidates.

¹¹ It is a much different picture as compared for instance with China's strategy. That country's government has invited all the world's major assemblers to propose a small and inexpensive car project to be built in China. In this case the present proposed alternatives have varied from existing models to brand new ones. A much needed genuine popular car there would fulfil a huge demand for a populous country with a very low motorization level and low income. Car production reached only slightly above 300.000 units in 1994, a volume much smaller than Brazil's, whose fleet is already much larger.

Investments of US\$ 10 billion are expected until the year 2000 to expand capacity to reach 2.5 to 3 million units¹² and for new products. Product lines will be further modernized but companies will no longer develop products specifically for the Brazilian markets, tending to produce in the country the most updated models available worldwide. The lag time between the introduction of those new global products abroad and its production in Brazil will shorten. And plant modernization will support the required performance gap reduction.

¹² Those figures have been settled in February 1995 by government and industry.

Bibliography

Autodata. Diversos números.

Carta da ANFAVEA. Diversos números.

Ferro, J. R. (1989) Strategic alternatives for the Brazilian industry. III Policy Forum, International Motor Vehicle Program, MIT, Acapulco, México.

Ferro, J. R. (1990). Para sair da estagnação e diminuir o atraso tecnológico da indústria automobilística brasileira. Relatório de Pesquisa. Secretaria de Ciência e Tecnologia de São Paulo.

Ferro, J.R. (1992). A produção enxuta no Brasil in Womack, Jones e Roos, A máquina que mudou o mundo. Editora Campus, R.J..

Ferro, J.R. (1993). The diffusion of lean production in Brazil. IMVP Research Briefing Meeting, Cape Cod, Ma.

Ferro, J.R. forthcoming. Shifting policies: the rebirth of the Brazilian automotive industry. in Van Whiting (ed). Liberalization and development in emerging economies. University of California Press.

Revista Exame. A Grande Reação. 7.7. 1993.

Revista Exame. Fiat - a empresa do ano. 1. 9. 1993.

Revista Quatro Rodas. Diversos números.

Womack, J (1990). Development strategies for the Brazilian auto industry. Relatório de Pesquisa. Secretaria de Ciência e Tecnologia de São Paulo.

Current Developments of the Brazilian Automotive Industry

José Roberto Ferro

A summary of the Brazilian automotive industry performance (in 000s units)

	1994	1993	1992	1991
Production	1.590	1.390	1.070	960
Domestic Sales	1.370	1.140	762	890
Imports	190	80	32	23
Exports	380	330	340	193

Main Assemblers

VW

Fiat

GM

Ford

Mercedes

Scania

Volvo

Modernization

Product

Productivity and Quality

Process & automation

Scale

Suppliers

Labor Relations

Government policies

Market liberalization

Camara Setorial

"Popular" car

Perspectives

**new investments for
capacity expansion (2,5 to 3
million by 2.000) and for new
products ---> US 10 billion**

**competitive integration with
Argentina**

new industrial policy