Globalisation, Foreign Direct Investment and the Restructuring of Supplier Networks: the Motor Industry in Brazil and India*

John Humphrey, Institute of Development Studies, University of Sussex
Avinandan Mukherjee, Indian Institute of Management, Ahmedabad
Mauro Zilbovicius, Department of Production Engineering, University of São Paulo
Glauco Arbix, Department of Sociology, University of São Paulo

In M. Kagami, J. Humphrey and M. Piore (Eds), *Learning, Liberalisation and Economic Adjustment*, Tokyo, Institute of Developing Economies, 1998.

1. INTRODUCTION

The automobile industry in developing countries is experiencing a rapid transformation. Three key influences govern the change. Firstly, the global geography of the industry is being transformed by the rapid growth of automotive production and consumption in emerging markets. Over the next two decades, the major auto companies are expecting much of the growth in the world auto industry to theme in the larger emerging markets: China, India, Indonesia (and the ASEAN countries more generally), Brazil (and the Mercosur region) and Russia. They are positioning themselves to take advantage of the opportunities offered by these markets. Secondly, relationships between assemblers and suppliers are being restructured and globalised. The development of global supplier networks is increasing the centralisation of design activities in the core operations of the leading component producers while decentralising production activities around the world. These developments are having a significant impact on the distribution between countries and companies of the various activities involved in the production and consumption of automobiles (design, components, assembly, finance, and marketing). Thirdly, liberalisation policies have greatly freed up the flow of capital and products into and out of developing countries. While the automotive industry still remains subject to a high degree of policy regulation, the formerly protected and inwardly focused industries of the developing world are being integrated into broader regional and global networks of design, production and consumption.

This report examines the transformation of the automotive industries in two of the major emerging markets, Brazil and India. Governments in both countries adopted policies of trade liberalisation and deregulation of the economy at the beginning of the 1990s. In both countries, the automotive industry has shown enormous dynamism in the 1990s. Growth has been accompanied by major restructuring as huge inflows of foreign direct investment transform the assembly and components sectors. New relationships have been developed between assemblers and suppliers, and the importance of global and regional networks has increased.

The auto industry is potentially an important driver of technological capability in developing countries. It is keenly promoted by governments and is the subject of continuing government intervention in many countries, including those often considered to pursue market-oriented industry and trade policies, not only because of its impact on the balance of trade, but also because of its potential for upgrading the many different industries which feed into it and which sustain motoring activities.[1]

This paper discusses the development of the auto industry in Brazil and India under import substitution industrialisation policies and the extent to which local component manufacturers were able to acquire capabilities as a result of their relationships with assemblers. The paper then considers the reshaping of the global automotive components industry resulting from the development of global sourcing networks. Following this discussion, the transformation of the auto industry in the 1990s is examined and its consequences for the automotive component sector discussed. The paper argues that in the global auto industry relations between suppliers and assemblers have changed during the past decade. Design activities have been shifted from assemblers to suppliers, and there is a sharing of the responsibilities and risks involved in the development of new products. Assemblers and suppliers have developed strategic partnerships and have greatly increased information flows between them and gained advantages from mutual learning. However, in the developing countries, this global shift in assembler-supplier relationships may well undermine the learning processes which have enabled local producers to enter into the component industry and upgrade their capabilities.

2. THE CREATION OF THE AUTO INDUSTRY: BRAZIL AND INDIA

The emergence of the auto industry in both Brazil and India pre-dated import substitution policies. Fiat began production of vehicles in Brazil as early as 1908, and in 1918 Ford opened up an assembly plant in the centre of São Paulo, assembling kits exported from the United States. In the 1920s, General Motors and International Harvester also began assembly of kits in Brazil. Similarly, the "Indian car industry dated back to the 1920s when American automakers opened assembly plants in Bombay, Calcutta and Madras" (Satia and Thomas [1987: 1]).

The present-day auto industry in both Brazil and India were developed within the broader context of import substitution industrialisation adopted in the 1950s. The earlier assembly operations survived until then, but were made unviable by changes in economic policy. In

Brazil, imports of built-up vehicles vehicles were suspended in the early 1950s for balance of payments reasons. The Brazilian government then developed a new policy for the sector aimed at creating a locally-based industry. This formed part of a broader strategy of rapid industrialisation adopted by the government of President Kubitschek. The auto industry played a central role in a programme of rapid industrialisation put forward under the slogan of “50 years in 5”. The aim was to develop import substitution industries, using foreign capital and technology in a rapid modernisation drive. The government supported foreign capital involvement in the economy, but was concerned with shifting foreign investment out of the agricultural and minerals sector and into manufacturing, and in particular to consumer durables.

A special executive agency, GEIA (Grupo Executivo para a Indústria Automobilística), was set up to establish the auto industry.[2] The agency invited foreign companies to enter the vehicle market on condition that within a five-year period they would source 98 per cent by weight of vehicles from the domestic market. The incentive was access to the Brazilian market which would be closed to imports of built-up and CKD vehicles. In addition, the government offered companies beginning production in Brazil favourable terms for profit remittances, tariff-free import of machinery, preferential tariffs for component imports for priority vehicles (trucks and buses) and long-term loans from the national development bank (CNI, [n.d.: 23-4]). The companies which had grown up in the 1940s and 1950s to supply the after-sales market for components were expected to provide components for the new industry.

While the American producers (GM and Ford) were reluctant to begin local production of cars, a number of smaller companies entered the car market. These included Volkswagen, Simca, Vemag and Willys (a US producer). With the exception of Vemag, these companies were majority foreign-owned. They located their factories in the “ABC” region on the southeast side of the São Paulo metropolitan region. The ambitious indigenisation targets were reached with only a small delay: the 98 per cent by weight target being achieved in 1965. At this time, 96 per cent of the value of vehicles was sourced locally (Posthuma [1991: 35]). Initially, the government had given priority to production of trucks and buses, which were viewed as an economic and social need. Between 1955 and 1962 four trucks were produced for every three cars. However this priority was not translated into incentives or controls, and passenger car production rapidly outstripped production of trucks and buses. Between 1963 and 1968 nearly three cars were produced for every truck (Almeida [1972: 50]).

After a period of slow growth in the mid-1960s, the vehicle industry became one of the main beneficiaries and driving forces of the “economic miracle” period of rapid growth between 1967 and 1974, but recession followed by rapid expansion led to considerable restructuring. By the early 1970s, there were three significant car producers in Brazil - Volkswagen (which had acquired Vemag), Ford (which had acquired Willys) and General Motors. By 1975 production of passenger cars and vans (including hatchbacks) had reached 772,000 units.[3] At this time, Volkswagen was producing more than 50 per cent of all Brazilian cars and dominated the market for low-cost models with the highly successful "Beetle".[4]

The auto industry in India was also developed within the general framework of an import substitution industrialisation policy, but with quite significant differences compared to Brazil. In the 1950s, pressures for local production led to the closing down of the operations of the US companies, just as it had done in Brazil. Imports of built-up cars were prohibited after 1949 and CKD kits were subject to a 50% tax. Rather than attracting European producers to the market, the Indian government favoured local companies. Two main producers emerged: Hindustan Motors (HML), which had begun assembly of CKD kits in 1948, and Premier Automobiles Ltd (PAL), which had begun assembly of the Fiat 1100 in Bombay in 1950.

Government policy was directed at local manufacturing with a high degree of local content and the transfer of technological capability to local firms. HML began production of the Ambassador car, which was a development of the 1953 Morris Oxford. PAL began little production of the Fiat 1100 up to 1972, replacing it in 1975 with the Padmini, a locally-designed car based on outdated technology. These cars continue to be produced today.

The development of the auto industry in India reflected the government's broader policy of national development through state intervention and regulation. Industry policy was driven forward by (i) a preference for central planning in order to offset market failures, (ii) a suspicion of the private sector and monopolies, (iii) hostility to foreign capital, and (iv) a perception that rapid industrialisation oriented towards the internal market was the key to sustained growth.

As in other countries which sought to promote industrialisation, India erected tariff barriers. The precise levels of tariffs varied according to the balance of payments situation and the availability of foreign exchange, but by 1980, the modal tariff rate on non-durable consumer goods was 100 per cent, on consumer durables and intermediates, 60 per cent, and on capital goods, 40 per cent. These tariff barriers were supplemented by various non-tariff barriers. Licences were used to curb the imports of "all but a few consumer goods" (Auty [1994: 189]), and those goods whose import was allowed were generally products for which locally-produced equivalents were not available.

While tariffs were relatively high in India, the really distinctive feature of industrialisation in the 1950s and 1960s was the state's regulation of the domestic economy. As well as reserving significant areas of economic activity for state-owned companies, the state controlled the activities of large companies through the Monopolies and Restrictive Trades Practices Act (MRTP). It also limited foreign ownership of companies based in India to a maximum of 40 per cent through the Foreign Exchange Regulation Act (FERA). Finally, and perhaps most importantly, a system of industrial licensing gave the state extensive powers to control the entry and exit of firms into particular areas of production, control prices, output and product lines. Lall describes the system in the following terms:

> “Indian industrial policies cover the whole gamut of a manufacturing firm's experience, from the activities it is allowed to enter, the size of plant it can install, the source of its equipment, technology and its raw materials, to the remuneration it can offer its executives, the expansion it can undertake, the amount of foreign capital it can invite or borrow and, often, the final prices it can charge to its customers. The broad directions of industrial expansion are set under the Five-Year Plans....The licensing authorities follow the priorities and specific capacity targets laid down in the Plans” [1984: 229-30].

For many consumer goods, including cars, the licensing system restricted output to below the level of demand. The government regarded passenger cars as a luxury item which had low priority in the five-year plans. Production was restricted and long waiting lists for cars developed. As can be seen in **Erro! Argumento de opção desconhecido.**, production of cars and jeeps reached almost 50,000 units in 1971. Eight years later, production was only 41,000 units. This level of production was easily outstripped by production of commercial vehicles and tractors. The Indian government, unlike the Brazilian, had the means to enforce its views on social priorities.

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The contrast between the two industries is summed up in **Erro! Argumento de opção desconhecido.**. By 1970, car production in Brazil was seven times as great as in India, and by 1980 the ratio was 20:1. In Brazil, production was dominated by four transnational companies, while in India, local producers were making cars in very low volumes. While both countries developed auto industries using quantitative restrictions (QRs) and tariff barriers, the industry in Brazil had been shaped by the entry of transnational producers and the rapid expansion of demand for cars. The market for cars was dominated by the low-cost VW beetle. The availability of these cars second-hand and the availability of widespread low-cost repair services meant that car ownership was extended relatively widely by the end of the 1970s. While the VW beetle was a design which had been developed in the 1930s, it was still popular in industrially advanced countries, and other Brazilian producers were making more up-to-date models. In India, the industry was largely isolated from international contact, and technology transfer was very limited following the initial implantation period. The market was dominated by two low-volume producers of outdated cars which had long been supplanted in the West. The dominant customers were the government, which bought about half of the production of Hindustan Motors each year, taxis and relatively affluent people who relied on chauffeurs. Private motorists driving their own cars were relatively rare.

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2.1. The Development of the Components Industry

In both Brazil and India, QRs made it impossible to import components on any significant scale. One of the major challenges for the assembly sector was to ensure that parts producers were available.

In the post-war period, the leading auto assemblers in North America and Europe had sought efficiency through combining high levels of vertical integration with "arm's-length relations" with a large number of suppliers. Contracts were short-term and awarded predominantly on the criteria of lowest price (Helper [1993: 143-4]). Supplier and assembler had limited commitment to each other. Contracts were policed by the threat of non-renewal, and companies were geared to ensuring that alternative sources of supply are available. To do this, firms had to (i) keep design capability in-house so as to minimise supplier expertise, (ii) source the same part from a number of different suppliers, and (iii) place orders for small, easy-to-make parts, which could then be assembled in-house (Helper [1993: 143-44]).

Typically, auto assemblers had two types of suppliers: sub-contractors and "catalogue suppliers". The former were given specific tasks to carry out following detailed instructions provided by the assemblers. Their position was precarious and they could not expect a long-term relationship with the assembler. The latter "produced and designed a 'catalogue' product, that is to say one whose design was often not adapted for each assembler" (Laigle [1995]). In this latter case, too, the relationships between assembler and supplier were not necessarily close. Companies such as Bosch in Europe would make a range of products which were available to a wide range of assemblers and would not be modified to meet their particular needs.

Paradoxically, the assemblers which began operations in Brazil were forced to adopt closer relationships with their suppliers. According to one expert who carried out a detailed study of the components industry in Brazil, the transnational assemblers were obliged to act as mentors to the local component manufacturers:

> "During the years preceding the implantation of the motor vehicle industry (1956), hard-fought battles by small auto parts firms and Sindipeças [the component manufacturers association] led to governance arrangements that forced assemblers to mentor suppliers. The suppliers and the trade association successfully lobbied for protectionism, high levels of local content, and state oversight of assembler-supplier relations. Since assemblers were required to produce almost all of their vehicles in Brazil they were forced to play the role of mentor to suppliers, showing them how to set up factories, introducing them to foreign sources of technology, and offering single-source agreements and long-term contracts" (Addis [1995: 11-12]).

A similar position is argued by Posthuma, although she gives less weighted to the role of political pressures in defining assembler-supplier relationships:

"Given the local content legislation, which prevented imports of components, and the low level of technological capability amongst most Brazilian components producers, the OEMs were forced to assist their suppliers in upgrading their production techniques and designs. Hence, out of necessity, a hybrid model of Brazilian assembler-supplier relations evolved, which was generally more co-operative and communicative than those common in the United States and Europe. This type of relationship facilitated a more rapid transfer of technology and technical upgrading in the components sector" (Posthuma [1991: 37]).

The development of these relationships and the acquisition of new competences by the suppliers were facilitated by the very features which enabled the assemblers to apply arm's-length relationships in the advanced economies. Firstly, many components had been designed by the assembler, and the detailed drawings could be passed on to local companies and producers. Secondly, the policy of breaking down sub-assemblies into simple parts, which had been used in order to maximise the number of potential suppliers, also had the effect of reducing the barriers to entry of firms in developing countries. The assemblers asked them to do relatively simple tasks. In addition, a third factor was important. In a number of cases, firms produced cars which were designed specifically for local markets. This meant that local companies had be able to produce the parts, and possibly design them as well. While initially such activities were relatively simple, they provided a starting point for local companies, which were then able to develop their capabilities further.

Import substitution industrialisation involved the creation of self-contained local industries which were, in some respects, small-scale replicants of industries in developed countries, which were still largely nationally based, with local designs and local component producers at this time.[5] This pattern of development is shown in **Erro! Argumento de opção desconhecido.**. The Brazilian subsidiary recreates a supply network similar to the one created by the parent company. The suppliers may not all be locally-owned, but they produced locally for locally-based assemblers producing for the domestic market.

This model has certain clear consequences for ownership structures and inter-firm relationships in developing countries. In this model, information about the basic design of cars is transferred between the parent assembler in the core country and its subsidiary. The latter then develops a relationship with local component suppliers. The local component manufacturer might (but might not) have links with one or more developed country component manufacturers. These could take the form of technology agreements, a joint ventures, or ownership (the local component supplier is a subsidiary of a transnational company). The local assembly operation would not take responsibility for organising these relationship, and there would be no preference for a local supplier with links to a supplier to the parent company. The local component manufacturers might, however, rely solely on the subsidiary for their technology and designs.

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Co-operative relationships between assemblers and suppliers in Brazil did not persist. Addis argues that during the 1960s they were undermined by economic crisis and the arrival of transnational components producers, which were attracted by the growth of the domestic market after 1967. Just as Ford and GM were finally attracted into the Brazilian car market by rising demand and the reassurance of military dictatorship after 1964, so many transnational component producers also developed operations in Brazil.

However, by this time, the local producers had developed their competences. Competition between producers in the domestic market encouraged rivalry and improvement. The frequent transfer of managers between companies also meant that international practices spread among locally-based firms. In the 1970s, the Brazilian industry (assemblers and suppliers) was able to develop alcohol-fuelled cars, and the assemblers introduced models made in only for the Brazilian market, including the VW Brasília (a derivative of the Beetle) and the Ford Corcel (designed by Renault for Willys before it was taken over by Ford). Increasing exports stimulated by the government's export promotion programme, acted as a further stimulus to improvement in the 1970s.

To a large extent, these influences were absent in India. Both Brazil and India were protected from direct competition from foreign cars and components by QRs and high tariffs. However, in Brazil competition between assemblers and component manufacturers, together with the transfer of knowledge between overseas producers and Brazilian producers allowed learning to take place. In India, the learning processes were much weaker. On the one hand, the close regulation of the economy and the absence of competition removed the need for improvement. The car producers could sell badly-made, out-of-date products. On the other hand, the linkages to the global car industry were much weaker. The assemblers had few ties to international producers, and the FERA regulations prevented foreign companies from having controlling stakes in Indian operations. Lall [1984: 231] suggests that these regulations "constricted the inflow of new technologies into the country and/or has raised its costs." Further, the Indian government's regulation of technology agreements between Indian and foreign companies, while intended to maximise the transfer of knowledge, may well have prevented foreign companies transferring their best available technology because of the restrictions imposed by the government (Lall [1984: 238]). These factors, together with the restrictions on the industry's growth meant that the industry remained isolated and backward. While protection did encourage some technological innovation in industry more generally, particularly with respect to using local materials and adapting products to local conditions (Lall

[1984: 227-30]), the outcome in the car industry was that the assemblers were inefficient, and innovative and dynamic firms in the components industry were few and far between.

2.2. Transformations in the 1980s

The auto components industries in both Brazil and India changed in the 1980s, but for markedly different reasons. In Brazil, the driving force for change was recession and an increased orientation towards export markets. In India, it was the transformation of the domestic market which induced change.

2.2.1. The Shift to Export Markets in Brazil

In the case of Brazil, the industry continued to grow up until 1980, when total vehicle output peaked at 1.165,000 units,of which 980,000 units were sold in the domestic market. Three important developments took place in the latter part of the 1970s. Firstly, Fiat entered the passenger car sector, choosing to site its factory near Belo Horizonte in Minas Gerais, far from São Paulo. Secondly, the government introduced an export promotion programme, BEFIEX, and the major automobile producers began to site export-oriented plants making engines and power train equipment in Brazil. Thirdly, as output grew, the firms in the industry began to construct new plants. These were located along the industrial corridors to the East and North-west of São Paulo.[6] However, the industry remained largely inward-oriented, importing and exporting little. The industry produced many models which had either been designed especially for the Brazilian market or had been withdrawn from production in the Industrially Advanced Countries. Even in the late 1980s, the production profile of the passenger car industry remained outdated. According to Ferro [1989: 6] at the end of the 1980s the average age of designs produced in Brazil was 11.4 years, compared to under four years in Europe and the United States.

The rapid expansion of the 1970s was followed by a long period of stagnation in the 1980s. The economy was beset by macroeconomic disequilibria and suffered a series of recessions. The first impact of the debt crisis and the long overdue economic adjustment was a collapse in domestic vehicle sales from the peak figure of 980,000 in 1980 to just 581,000 in1981, as can be seen in **Erro! Argumento de opção desconhecido.**. Over the decade as the whole, domestic vehicle sales averaged 711,000 per annum, which was just 73 per cent of the peak 1980 level. The auto industry partially offset the decline in sales by increasing exports, which accounted for an increasing share of total production in the latter part of the decade.

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The auto parts industry increased its exposure to foreign markets in the 1980s, both indirectly through vehicle exports and through direct exports of components to foreign assemblers and to overseas replacement outlets. This is shown clearly in **Erro! Argumento de**

opção desconhecido.. Exports of components were four times higher at the end of the 1980s than they had been a decade earlier. As important, the share of exports in total component production had grown from under five per cent in the latter part of the 1970s to well over 10 per cent a decade later.

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There is no doubt that the larger component companies, which were disproportionately responsible for exports, benefited greatly from this increased exposure to export markets. The largest export market was the United States, to which more than half of Brazil's component exports were sent throughout the 1980s. The Brazilian producers increased their exports just when the US assemblers had recognised the importance of quality. The leading Brazilian producers were forced to improve their levels of final product quality and also their basic quality systems in order to gain access to the US producers. Studies of the spread of total quality management in the auto components industry show that the key factor in the adoption of these new approaches to quality was the requirements of export markets (Fleury and Humphrey [1993]). Many of the first experiments with Statistical Process Control, Quality Function Deployment, etc. date from the mid-1980s.[7]

At this time, the export drive was, to some extent, subsidised by the continued rent provided by protection in the domestic market. Companies acquired quality competences without necessarily developing their cost control capabilities (Fleury [1995]). This was partly because of the conditions of high inflation in the Brazilian economy, which made cost control difficult, but it also reflected the key challenge for firms entering export markets, the need to raise quality to international standards.

For some leading Brazilian companies, the entry into major export markets in the 1980s was not of a broader internationalisation strategy. They targeted Europe as well as North America, and they were willing to set up local production or assembly facilities in order to win major contracts. In the case of one leading company, Metal Leve, the logic of this strategy led it not only to build a North American factory, but also to open a research and development facility in Michigan. In order to compete with global companies in its field, pistons and rings, it needed to have the capability to develop the latest technologies.

2.2.2. India: the Entry of Maruti

In the 1960s and 1970s Indian car producers had enjoyed a "sellers' market": demand exceeded supply, no new entrants were allowed, and no competition existed between the producers. The transformation of the auto industry began in 1983 with the entry of Maruti Udyog Ltd (MUL). Originally set up as an independent operation by the Prime Minister's son, Sanjay Gandhi, it ran into difficulties even before beginning production and its operations were closed down in 1977. The assets of the failed operations were transferred to a state-sector company in 1981, and in 1982 an agreement was reached with the Suzuki Motor Corporation of Japan in 1982 (Satia and Thomas [1987]). Suzuki took a 20 per cent stake in the new venture and supplied the design for a small car. Initially, most of the components were sourced from Japan, but the intention was to develop a local supply base.

At this time, the existing producers also attempted to upgrade their production. HML began production of the Contessa, based on a Vauxhall design from the early 1970s, using an Isuzu engine. PAL began production of a "new" Fiat Model, the 118 NE, using a Nissan engine. Mahindra & Mahindra, a company producing Jeeps, entered the production of utility vehicles (Range Rover type), using Peugeot power train technology. Relaxations of the licensing system which regulated industrial production allowed greater competition between enterprises and greater freedom to expand production and gain market share.

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The entry of Maruti and relaxation of the licensing policy had a dramatic impact on the industry, as can be seen in **Erro! Argumento de opção desconhecido.**. Output of cars and jeeps increased from 66,800 in 1983 to 218,700 in 1990, a compound rate of growth of 18.7 per cent per annum. Almost all of this increase was claimed by MUL, as can be seen in **Erro! Argumento de opção desconhecido.**. HML and PAL did not counter the rise of Maruti, which came to occupy a dominant position in the market. By 1991-92, MUL's share of the car market was over 70 per cent.

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MUL marked a radical departure for the Indian auto industry, with the following distinctive features:

- Production of a relatively modern small car design. It was fuel-efficient and cheap, and its overall quality was much superior to its competitors.
- Location away from established industrial areas. The MUL plant was set up on a greenfield site at Gorgaon in Haryana State. Although close to New Delhi, the plant drew its labour force predominantly from surrounding agricultural areas. PAL was situated in Bombay and HML in Calcutta - both hot-spots of labour militancy in the 1970s and 1980s.
- Achievement of scale economies. Within three years of starting production, MUL expanded its capacity to 100,000 units per annum.
- Supplier network. MUL developed a supplier network which imitated some of the features of the Japanese supplier system as it existed in the early 1980s.

The entry of MUL had a profound effect on the components industry. Firstly, it increased the scale of the whole industry. Secondly, it raised quality standards among existing component manufacturers. Thirdly, it introduced the ideas of partnerships and tie-ups between assemblers and suppliers. In its public discourses on suppliers, the company has consistently emphasised trust, partnership and continuous improvement. The following statement from one of its supply managers is typical:

> "The main elements of the customer-supplier relationship at Maruti have been: (i) long term partnership approach with vendors based on mutual trust and fairness, (ii) continuous improvement of vendors. Vendors have been treated as partners of the company. They have been treated with respect, trust and fairness in a professional manner" (Dayal [1996: 452]).

Located on a greenfield site away from the traditional auto producing areas, MUL set about creating a supplier network which would be capable of sustaining an operation which bought a high proportion of the value of its cars from its suppliers. In order to do this, it brokered the formation of joint ventures between Indian and foreign firms (many of them suppliers to the minority partner in MUL, Suzuki) and established an industrial park for its suppliers close to the plant. By the mid-1990s, it had brokered 45 technology tie-ups (26 with Japanese companies, 19 from other countries) and set up 12 joint ventures producing 23% of the value of MUL's bought-in parts. These were for "critical, high-value parts with large investment requirements" (Dayal [1996: 456]). It held small equity stakes in a number of these suppliers, in the manner of the Japanese keiretsu.

The supplier network created by MUL shows many of the characteristics of obligational (as opposed to arm's-length) contracting, which are summarised in **Erro! Argumento de opção desconhecido.**. Relationships are long-term, and contract allocation procedures are not open. The supplier's quality record and its understanding of the customer's requirements are critical. Supplier and customer are mutually dependent, and there is intense and multi-channelled communication between them. All of these features could be seen at MUL. However, MUL did not organise its suppliers into tiers, and it is unclear how non-adversarial the process of price determination was. In India, as in Japan, long-term relationships and single- or dual-sourcing do not preclude considerable pressures on suppliers to reduce costs.[8]

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The arrival of MUL transformed the auto industry, but state regulation remained important. Maruti was the only new entrant allowed into the car industry. Tie-ups for car production between Isuzu and HML, Nissan and PAL, Honda and TELCO, and Citroen and Escorts were all rejected by the government in the 1980s. At the same time, tariff protection and non-tariff barriers continued in force. An almost total ban on imported built-up vehicles and CKD kits remained, and tariffs on components remained over 100 per cent.

2.3. The Two Industries Compared

The characteristics of the Brazilian and Indian auto industries at the end of the 1980s are summarised in **Erro! Argumento de opção desconhecido.**. Brazilian production of passenger cars was much greater than in India, although the gap had been narrowed significantly in the 1980s as a result of the stagnation of the Brazilian industry and the entry of Maruti into India. In both countries, there were a small number of passenger car assemblers. In Brazil, these companies were transnationals, while in India, the two smaller companies were Indian-owned and Maruti was a joint venture between the Indian government and the Suzuki Motor Company. Brazil was a significant exporter of cars, while in India exports were very limited. In both countries, imports were negligible. The components industry in Brazil was significantly larger than that in India, and the presence of transnational companies, both in joint ventures and as wholly foreign-owned companies, was much more pronounced. In the course of the 1970s, transnational companies and joint ventures strengthened their position within the components industry. By 1979, almost half of the largest components companies were joint ventures or wholly-owned subsidiaries (Posthuma [1991: 66]). In India, in contrast, the FERA regulations restricted foreign ownership to 40 per cent of any company, and, at the same time, the small size of the market made it less attractive to foreign investors. Both countries exported a relatively small proportion of total components production. In the case of Brazil, the major markets in 1990 were the United States, Mexico, West Germany and the United Kingdom. These four countries accounted for 75 per cent of all exports. In the case of India, almost half of all exports were directed to Africa and South and West Asia, where competitive pressures were much lower than in North America and Europe.

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3. GLOBAL SOURCING AND ITS CONSEQUENCES FOR DEVELOPING COUNTRIES

The auto industries of both Brazil and India have been transformed in the 1990s. These transformations are the outcome of two processes: changing relationships between assemblers and suppliers within the global auto industry and changes in auto industry policy in each country arising from economic liberalisation. The first of these factors will be discussed in this section, and the second in Section 4.

One of the most striking recent features of the global auto industry is the development of global supply networks. Over the past two decades, there has been a tendency for relationships between suppliers and assemblers to move towards obligational contracting (see **Erro! Argumento de opção desconhecido.** above). Suppliers have become more responsible for design and assemblers are outsourcing more of their productive activities. In many respects, Western firms are emulating practices developed by Japanese companies. It might be expected, therefore, that new sourcing practices in both Brazil and India would be similar to those developed by Maruti, which had replicated certain key features of Japanese-style supplier relations. In fact, the dynamics of supplier relations in Brazil and India are rather different. This section explains why.

3.1. Global Sourcing

Over the past decades, relationships between suppliers and assemblers in the West have been transformed. Suppliers now perform a greater amount of the work involved in producing cars than was the case in the past. The assemblers are focusing increasingly on their core competences and seeking partners for the provision of complementary competences. Palpacuer [1996: 23-24] defines the core activities in terms of the value-adding services which are difficult to imitate and learn (hence creating barriers to entry). The focus on core competences redefines relationships between companies, establishing three distinct situations:

- core competence. Activities relating to core competence remain within the company. These are the activities which create competitive advantage.
- complementary competences. These are competences which are important for the final product, but which the company chooses not to have. The company develops relational contracts - obligational contracting in the terminology used by Sako [1992] - with the suppliers of these competences.
- standard competences. These are the competences which are generally available in the market. While these may involve high standards, etc., there is no need to use relational contracts. Arm's-length contracting is the norm.

It was suggested in the previous section that relations between suppliers in the West had previously been of two sorts: catalogue suppliers who produced basic designs which were bought ready-made by the assemblers, and sub-contractors who worked to the assemblers designs. Laigle [1995: 26-29] suggests that three major changes in supply relationships have taken place in Europe. First, the catalogue suppliers have become more involved with their customers and have begun to design parts specifically to meet functional objectives defined by them. Some sub-contractors may also move towards supplying design solutions, and the components industry has restructured so that companies previously confined to sub-contracting have merged and acquired design capabilities. Secondly, the assemblers have become more involved in the specification of the production and quality systems of their sub-contractors. This is most typically seen in the specification of quality systems by the assemblers. Thirdly, there has been a shift towards the supply of complete functions (sometimes termed "corners") rather than individual components. The first-tier supplier becomes responsible for not only the production of parts but also the management of the second-tier suppliers and the assembly of parts into complete units (dashboards, rear axle assemblies, body panels, seats, etc.). In many cases, these assembly operations would have been carried out in-house previously.[9]

What are the consequences of these changes for the global organisation of the components industry? The consequences of the shift of design towards the suppliers can be clarified by using the distinction made by Clark and Fujimoto [1991: 140-45] between three types of design relationship:

1. Black box parts. These are designed by suppliers to meet the specifications of the assembler. This is the area where relational contracting is most critical.
2. Detail-controlled parts. Here, design is carried out in-house and detailed specifications are supplied to contractors.
3. Supplier proprietary parts. These are mainly standard parts (spark plugs, etc.) which are made independently of any particular car project.

The industry is moving away from the second and third types of product and towards the first. There may be several companies capable of supplying the second and third types of product, and the same plant may source parts from more than one supplier. The production work can be allocated to any competent supplier. In the case of black box parts, however, the design is the property of the supplier, who controls access to the technology and designs. For a given component, this supplier then becomes the main or sole source. The contract is generally for the life of the product. Previously, design was concentrated in the hands of the assembler, but now it is concentrated in the hands of particular suppliers. If production of a particular car is carried out at more than one location, then the lead component supplier is expected to organise a network of supplying plants.

The shift towards global supply networks co-ordinated by the network organiser is further encouraged by the increased emphasis on timely delivery and reliable quality. Once again, the assembler benefits from dealing with a few companies. To the extent that the assembler has to invest in the supplier in order to establish effective communication and quality systems, the number of suppliers will be reduced and those which remain will have longer-term relationships. When the assembler moves to a new location, it is convenient to work with associates of known suppliers, as there will be no need to take responsibility for organising quality and production systems. The global supplier will do this.

These factors favour global supply networks. The supply of sub-assemblies favours the location of the supplier close to the assembler. The sub-assemblies are costly to transport, and where the sequencing of production has to be dominated with the assembler's operations, a close location is essential. This involves investment in dedicated facilities by the supplier which can only be justified on the basis of a long-term relationship. This factor applies independently of whether the supplier or the assembler is providing the design.

These factors have led assemblers to look increasingly for global supply networks to meet their needs. They wish to have the same part, with the same technology, the same quality system and the same underlying basis for inter-firm communication wherever they are making cars. This process is most advanced in the case of the most internationalised producers - those whose operations are most located outside of their home bases. As can be seen in **Erro! Argumento de opção desconhecido.**, the most internationalised companies are Ford, General Motors, Chrysler and VW. Ford and GM already negotiate one contract for parts such as rates brakes for each new model. The winner arranges supply not only to North America and Europe, but to Mercosur and India as well. For some products which have high value-to-weight and for which there are few problems in supplying parts from a distance (for example, parts which vary little according to product mix), widely spread assembly sites can be supplied from a centralised location. In the case of bulky or heavy parts, or parts which have to be produced to match complex and changing production schedules, the assemblers would expect a supplier to be available in each major market. Other things being equal, the ideal component producer is one which can supply a standard product to any assembly location around the world.

Erro! Argumento de opção desconhecido. ABOUT HERE

This tendency has been reinforced by the standardisation of model ranges at the global level. In the 1960s and 1970s, companies produced model ranges in developing countries which were either specifically developed for local markets or used models which had been replaced in developed countries. In Brazil, Ford and VW had model ranges in the 1970s which were unlike any produced in Europe or North America at the same time. This is now changing. Companies are standardising their model ranges and reducing the number of platforms and standardising production across countries (**Erro! Argumento de opção desconhecido.**). This further centralises design activities and places a premium on global supply.

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The impact of this globalising tendency on the structure of the world components industry is already apparent. Firstly, the scale and regional scope required to be a successful components producer is rising rapidly. A process of consolidation is taking place in the global auto parts industry, and mergers or take-overs between companies in different regions have become common (Freyssenet and Lung [1996: 49-50]. Secondly, collaboration agreements are increasing. Companies may retain (formal) independence, but they form networks to secure access to technology and worldwide production facilities. Thirdly, those firms wishing to occupy a key place in the industry are spreading their coverage. There has been a flood of FDI not only into the advanced countries, but also into the emerging auto markets. The leading world components producers are seeking to build up their own operations or make alliances with local producers. As the share of world auto industry production located in these countries rises, the importance of production facilities within them will rise.

3.2. Consequences for Emerging Auto Markets

These changes have a profound influence on the structure of the auto industry. It has been suggested that close ties between assemblers and suppliers were developed in the Brazilian auto industry in the 1950s and 1960s. The assemblers developed a local supplier base, because they were committed to local content targets. In India, Maruti created a local supplier network arranging technology transfer and brokering joint ventures with Japanese companies.

The development of global sourcing networks radically changes these relationships, and not in the way which might be expected. In Japan, OCR was associated with the formation of supplier networks linked to the major assemblers. Many small suppliers were closely tied to major customers, on whom they were highly dependent. As assemblers look for global suppliers, the relationship between assembler and supplier in developing countries is no longer based on strong local ties. The key relationship for component companies in countries such as Brazil and India is not the link between local supplier and local assembler, but rather the link between the global operations of the assembler and the global sourcing network. This relationship is depicted in **Erro! Argumento de opção desconhecido.**. In this hypothetical case, an assembler has operations in three countries. Its preference is for a single supplier of a part or module to be available in each of them. The choice of component manufacturer can take place in two ways. For companies which have most of their operations in one geographical area, a supplier is likely to the chosen for this market. If production begins in other areas, the first preference for a local supplier will be an associate of this first supplier.

Erro! Argumento de opção desconhecido. ABOUT HERE

For companies which are highly internationalised (such as Ford, GM, Chrysler and VW in **Erro! Argumento de opção desconhecido.**), a decision on global sourcing may be made from the outset. Supplier X wins the contract for Assembler A because it is able to supply all three of Assembler A’s plants. This is the situation depicted in **Erro! Argumento de opção desconhecido.**. It supplies the assembler’s core operations, and plants in Countries 1 and 2. If the assembler starts production in a country where Supplier X does not have an operation, it has the options of setting up a new factory (follow sourcing), entering into a technology agreement arrangement with a local company, or supplying from other location (if logistics and trade barriers permit). In both these situations, the decision about which component company in Countries 1 and 2 wins the contract to supply Assembler A is made centrally and depends more on the global network than the characteristics of competing potential suppliers in the country.

The supply network depicted in **Erro! Argumento de opção desconhecido.** may consist of a single company and its subsidiaries, or of an alliance of formally independent firms, possibly with cross shareholdings, or through the constitution of joint ventures. Whatever the arrangement, both market access and the allocation of R&D are decided at the network level. Outside of these networks, the main market niches available to local components producers are to enter into the second-tier of a network or supply the after market. The after market is more fragmented, is open to lower quality substitutes and has few barriers to entry.

Erro! Argumento de opção desconhecido. ABOUT HERE

With the development of global sourcing, inter-firm linkages change. These are shown in **Erro! Argumento de opção desconhecido.**. Firstly, the relationship between the parent assembler and its key supplier (No. 1 in the figure) involves greater co-ordination and two-way information flows. It is also much more intense than in the past. These features are denoted by the thickness of the line drawn between the two companies and the arrows pointing in both directions. Secondly, the key supplier acts as a network co-ordinator. For the supplier in the developing country, the relationship with the network co-ordinator (relationship 4) is more important for contract winning and design information than the relationship with the assembler's subsidiary (relationship 3). Thirdly, the relationship between the network co-ordinator and the component supplier in the developing country will change. The assembler will generally prefer this relationship to be close, because the co-ordinator then takes responsibility for local supply. Ownership or joint ventures are preferable. At the same time, the network co-ordinator may prefer a relationship which offers greater access to potential profits in emerging markets. With liberalisation and globalisation, technical tie-ups become harder for developing country firms to negotiate. Paradoxically, just when technology becomes easier to import, transnational companies are less willing to sell it. The price of technology becomes increasingly a joint venture with the technology provider.

The implication of this model is that for component producers in developing countries access to customers depends more on their linkages to global supply networks than their ability to meet the cost, quality and delivery requirements of the customer. Clearly, these requirements remain order qualifying criteria, but the decisive criterion for winning orders is the link to the favoured global supplier. Developing country component producers need to think about acquiring partners rather than acquiring technology.

4. LIBERALISATION AND THE TRANSFORMATION OF THE AUTOMOTIVE INDUSTRY IN BRAZIL AND INDIA

Both Brazil and India adopted more liberal economic policies in the 1990s. They reduced trade barriers and welcomed foreign direct investment. However, the auto industry continues to be regulated by government policy, and there are important differences between the two countries with regard to the nature and speed of the liberalisation process. These had important consequences for the development of the auto industry.

4.1. Liberalisation Policies in Brazil and India

The government of President Collor in Brazil introduced major policy changes in 1990 and 1991. Collor had been elected on an image and policy of "modernity": the solution to the stagnation and economic failures of the 1980s lay in integration into the modern world through liberalisation of trade. The performance of industry would be improved only by exposure to international competitive pressures and standards. The inevitable rise in competitive pressures would be met through policies aimed at improving quality and productivity. In many respects, the Collor administration was following a long tradition of Brazilian politics in so far as the core political project was defined in terms of a gap between Brazil and the modern world and the need to close it. The difference between President Collor and his major modernising predecessors, Getúlio Vargas in the 1930s and Juscelino Kubitchek in the 1950s, was that Collor saw integration with the world economy as the route to modernity, whereas Vargas and Kubitschek followed import substitution policies in order to break with economic integration based on agricultural and mineral exports.

The presidential system of government in Brazil imposes many obstacles to Presidents who wish to introduce reforms, but policy changes can be made by presidential decree. The extensive use of "Provisional Measures" (the introduction of laws by decree, supposedly as emergency measure until they can be considered properly by Congress) enabled certain changes to be introduced rapidly. Quantitative Restrictions were abolished through Provisional Measure No. 158 in March 1990. Provisional Measure No. 161 then suspended or eliminated the majority of tax incentives and subsidies for industry. In June 1990, the government defined a general policy statement for foreign trade and industrial policy. For tariffs, the reform proposals introduced a phased programme of reductions designed to cut the average nominal tariff from 37 per cent in 1990 to 20 per cent in 1994 (IDB [1992: 230 and 248]). The scale of the proposed reductions in nominal tariffs in the period 1991-94 can be seen in **Erro! Argumento de opção desconhecido.**. Tariffs were to be cut from the 50-60 per cent range down towards 20 per cent. At the same time, the government removed certain export subsidies and simplified the export trading regime.

Erro! Argumento de opção desconhecido. ABOUT HERE

Trade liberalisation was a shock to Brazilian manufacturing. In some sectors the impact of the reforms was severe and immediate. The micro computer industry was restructured as soon as the policy of promoting a home-grown industry was abandoned. Parts of the chemical industry could not survive the rapid entry of imported products. Chinese toys flooded the Brazilian market for the first time. In 1989 manufactured imports totalled only 9.2 per cent of industrial production. By 1994, this figure had risen to 16.7 per cent. Over the same period, the ratio of manufacturing exports to manufacturing output increased by only two percentage points (Bielschowsky and Stumpo [1996: 170]).

In India the reforms were more oriented towards easing internal constraints than to trade liberalisation. Some reforms to the system of government control of the economy had already been put into place in the 1980s, but an acute balance of payments crisis in mid-1991 provided the impetus for more sweeping reforms.[10] The foreign exchange crisis was a symptom of deeper problems. Apart from the underlying external imbalance, the fiscal deficit had reached 8.4 per cent of GDP in 1990-91, inflation was above ten per cent and rising, and both internal and external debts were growing (Ahluwalia [1995b: 15]).

The main changes to external policies were a devaluation of the currency, simplification of exchange controls and the introduction of partial currency convertibility, abolition of quantitative restrictions on imports of raw materials, intermediates and capital goods, and reductions in tariffs. This shift was radical compared to the timid reforms of the 1980s, but it cannot be considered "shock treatment" of the type seen in Brazil. The World Bank estimated that the average tariff in the manufacturing sector in India at the end of the 1980s was 121.7 per cent (World Bank [1989]). Following tariff reductions between 1990 and 1993, the average nominal tariff in India fell to 70 per cent (Ahluwalia [1995a: 249]). In countries such as Korea, Mexico, the Philippines and Indonesia, nominal tariffs were lower than this before tariff reform was introduced. Following tariff reform, they were in the 10-30 per cent range. However, quantitative restrictions and high tariffs remained important for consumer durable goods.

Possibly of more significance for the economy were the reforms to the system of state controls. These included:

- Ending of the reservation of many areas of economic activity for the State.
- Relaxation of the FERA restrictions on foreign capital. Foreign participation in companies up to 51 per cent was permitted automatically in 34 industries.
- Relaxation of the anti-monopoly restrictions (MRTP) on large firms.
- Scrapping of the licensing system by 1992.

These measures were introduced gradually by a government which was anxious not to allow opposition alliances to coalesce. There was a strong sense of the need to reform the system of internal controls and to increase the openness of the Indian economy, but neither government nor business wanted to engage in "shock treatment" of the sort seen in Brazil. Indian sentiment was much ambivalent about the benefits of "modernity" and wholesale integration into the international trading and finance system.

4.2. Brazil: The Auto Industry in the 1990s

It was shown in previous section that the Brazilian auto industry stagnated during 1980s. Domestic demand declined, and output was only sustained by increasing exports. This gloomy panorama was transformed between 1992 and 1996. The overall programme of trade liberalisation played a part in this transformation, but it was by no means the only or most important factor. It will be shown that the success of policies aimed at revitalising the industry ended up undermining much of the policy of trade liberalisation for cars.

4.2.1. Policy shifts, 1990-94

Four factors contributed to changing competitive conditions in the auto industry in the early 1990s: trade liberalisation, the "popular car" policy, policies agreed through the Sectoral Chamber for the automotive industry and regional integration. In line with its overall policy on trade, the government of President Collor announced a phased policy of reductions in automotive tariffs in 1990. The planned tariff reductions on cars are shown in **Erro! Argumento de opção desconhecido.**. As will be seen below, these tariff reductions had a dramatic impact on the industry.

Erro! Argumento de opção desconhecido. ABOUT HERE

A second important policy change in the early 1990s referred to incentives for the production of low-cost cars. President Collor introduced special tax concessions on cars costing less than US$7,000. This led to the major car producers developing variants of their smaller models which reduced costs by taking out expensive options such as central locking, power steering, tinted glass, advanced brakes, etc. and using the simplest possible basic parts.

A further set of policy changes arose from a new policy body which brought together government, the automotive industry employers and the unions. The Sectoral Chamber for the Automobile Industry was set up in 1992 in response to the continuing crisis of the sector.[11] It quickly reached agreement on measures to revive demand for vehicles and improve conditions in the industry. Demand was to be stimulated through improvements in consumer and firm credit, incentives for exports, and, most importantly, a cut of 22 per cent in the price of passenger cars and vans, achieved through reductions in federal and state taxes, trimming of profit margins for assemblers and components producers and dealers.

Following further rounds of negotiations, a second agreement in February 1993 reaffirmed and extended the first. This agreement represented an alliance of employers and labour in favour of the auto industry. The state supported this policy as a means of reviving the economy, and expected that reductions in tax rates would be offset by increasing sales.

The fourth key element in the transformation of the auto industry was regional integration. Already in the early 1990s, there had been increasing trade in automotive components between Argentina and Brazil. The assemblers saw advantages in a more extensive division of labour between the two countries which would increase economies of scale. At the beginning of 1994, the Mercosur agreement signalled the beginning of a deeper integration, based on the principles of liberalised trade between member countries and the continuation of protection against imports from outside the region. It began a process of specialisation and regional division of labour between Brazil and Argentina and constituted a single market for the four participating countries: Argentina, Brazil, Paraguay and Uruguay.

4.2.2. Production, Consumption and Trade, 1990-94

These policy shifts had a direct and major impact on the auto industry. The "popular car" policy and the measures proposed by the Sectoral Chamber led to a rapid increase in demand and a shift in the composition of demand towards smaller cars, as can be seen in **Erro! Argumento de opção desconhecido.**. Output of cars leapt by 120 per cent from 1990 to 1996, following a decade of stagnation, and in the same period car sales rose by 173 per cent. The share of "popular" cars total vehicle output (in unit volumes, not value) rose from 4.3 per cent in 1990 to 45.9 per cent in 1994. Price reductions, the scramble by manufacturers to supply low-price, small cars, and the renewed availability of credit had reinvigorated demand.

Erro! Argumento de opção desconhecido. ABOUT HERE

In the context of tariff reduction, rapid rapid growth in the domestic market led to increasing imports of vehicles and components. The data in **Erro! Argumento de opção desconhecido.** shows that as the tariff rate on vehicles fell, so import of cars and the total cost of imports rose rapidly. The balance of trade in vehicles had become negative by 1994. Only a small part of the increase in vehicle imports derived from the developing division of labour between Argentina and Brazil: 85 per cent of all vehicle imports in 1995 came from outside Mercosur (Carvalho et al. [1997: 27]). Some highly visible imports came from companies without car production facilities in Brazil (for example, Mercedes, BMW, Honda and Ferrari), but the most substantial importers were the main Brazilian car producers themselves. They began to import vehicles on a large scale, particularly larger models whose sales were low in Brazil. This reflected the development of an international division of labour in which Brazil specialised in smaller cars. This integration of Brazil into the broader production and sales strategies of transnational companies was seen more generally, particularly in sectors such as chemicals (Fleury [1997]).

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By 1994, nearly 200,000 vehicles were being imported, and in spite of a continuing strong growth in vehicle exports, the balance of trade on vehicles turned negative for the first time. In 1995, a flood of vehicle imports created severe balance of payments problems. The trade deficit for vehicles reached $2.8 billion, and this was the basic reason for the introduction of a new policy for the automotive sector in 1995. From 1994 onwards, the impact of tariff reductions was exacerbated by the *Plano Real* stabilisation policy, which resolved Brazil's inflation problem by linking the local currency to the dollar. As it took time to squeeze inflation out of system, the currency appreciated against the dollar, making imports cheaper and exports less competitive.

4.2.3. The "Automotive Regime", 1995.

The prospect of unfettered import of vehicles, which would not only cause balance of payments problems but also undermine the rapid growth of the domestic auto industry, forced the government to make a drastic exchange of direction in 1995. The tariff rate for vehicles, which had been reduced to 20 per cent, was raised to 32 per cent and then to 70 per cent, not far below the level existing prior to liberalisation (**Erro! Argumento de opção desconhecido.**). Up to this time, the new policies for the sector, the opening up of the regional market through the Mercosur arrangements and the achievement of currency stability after years of extremely high inflation[12] appeared to offer a rosy future for the industry. But both the industry and the stabilisation policy might be undermined by a surge of imports. In addition, it was becoming apparent that the policy regime introduced by Argentina in 1991 was attracting considerable foreign investment and could undermine Brazilian dominance of the auto industry within Mercosur.

The Brazilian government introduced a new set of policies for the auto industry in December 1995. These effectively abandoned the liberalisation policy on built-up vehicles and sought to stimulate FDI in the terminal industry by reducing tariffs on component imports. While the policy has been modified repeatedly, the basic policy is structured along the following lines:

- Increase in tariffs on vehicle imports to 70 per cent, but with a preferential tariff of 35 per cent for companies producing cars in Brazil. This figure was to be reduced. In 1997, the rates were 65 per cent and 32.5 per cent.
- Temporary reduction in tariffs on components, tyres and raw materials: to 2.4 per cent in 1996, 4.8 per cent in 1997, 7.2 per cent in 1998 and 9.6 per cent in 1999.
- Reduction of 90 per cent in the tariffs on capital goods imports for the industry.
- All imports of vehicles, components, materials, component sets, etc. should be balanced by exports of an equivalent amount.
- Special incentives for exports of CKD kits.
- Imports from Mercosur countries to be exempt from tariff duties as long as they are balanced by equivalent exports.
- Specification of a local content requirement for new entrants into the vehicle industry of 50 per cent in the first three years and 60 per cent thereafter.

- New entrants to the vehicle sector would have considerable freedom to import equipment and tooling.

The aims of the Automotive Regime were threefold: (i) to stem the flow of imported cars and components, (ii) to introduce an auto regime to compete with that developed by Argentina, and (iii) to protect the assembly industry in the short-term in order to create a dynamic and efficient industry which could survive in a future, more open trading environment. To these ends, the policy combined high tariffs on built-up cars and cheap imports of components. It also specified a relatively high degree of local content in the first three years of operation. These policies greatly favoured the existing assemblers, while disadvantaging both the components sector and potential new entrants to the assembly sector. However, the attractions of the Mercosur market were strong enough to encourage the entry of new firms.

The consequences of the 1995 Automotive Regime were enormous. The regime, combined with trade liberalisation, regional integration and economic stabilisation in Argentina and Brazil, led to a rapid restructuring and integration of the auto industry in the two countries. Argentina began to specialise in the production of low-volume, niche vehicles with output of 15-30,000 units per annum. Brazil specialised small and medium-sized cars (or in North American terminology, subcompact and compact cars) such as the Ford-Fiesta, GM-Corsa, Fiat-Uno and Fiat-Palio. The volumes in these cases were large. In 1996 VW produced 347,000 units of the Gol (a Brazilian-designed small car similar to the Polo), while Fiat produced 204,000 Unos and 158,000 Palios. GM produced 204,000 units of the Corsa model.

The Automotive Regime, combined with the strong growth of demand in Mercosur created a stampede of foreign investment in Brazil and Argentina. Total investment by the assemblers in Brazil was expected to reach US$ 18 billion between 1996 and the year 2000. A large part of this investment was being made by the companies who were already producing vehicles in Brazil. All of the four passenger car manufacturing companies in the industry prior to 1990 modernised their model ranges and invested in both existing plants and in new operations. They rationalised their Argentine and Brazilian operations, integrating component supply and raising production scales.

At the same time, a number of new companies entered, or were planning to enter the Brazilian and/or Argentine markets. The full extent of the inflow of new companies and projects into Brazil is shown in **Erro! Argumento de opção desconhecido.**. The companies which announced investment plans in Brazil included Mercedes, Renault, Peugeot, Toyota, Mitsubishi, Honda, Chrysler and Hyundai.[13]

Erro! Argumento de opção desconhecido. ABOUT HERE

This list is incomplete. It does not include all investment projects. At the same time, not all of these projects listed in the table will come to fruition, although work has begun on a significant number of them. The stock market crisis in Brazil in late 1997, which followed the crisis of the Asian currencies and stock markets, created a crisis of confidence and forced the government to take difficult measures to stabilise the currency and tackle macroeconomic imbalances. Taxes interest rates were raised very sharply, and this had an immediate and direct impact on the motor industry. At the same time, it does not reflect all the projects being taken forward in Brazil. The established companies are likely to make further expansions of facilities.

The location of the new factories and companies being created as a result of the inflow of FDI has further developed the tendency to build new factories outside of the ABC region of São Paulo which was already evident in the 1970s and 1980s. None of the new operations has been located at the historical centre of the auto industry. As can be seen in **Erro! Argumento de opção desconhecido.**, the new plants are spread widely in Brazil. The new plants in the state of São Paulo are located in the Interior, some distance away from the ABC region. Some have moved towards Minas Gerais, where Fiat sited its plant in the 1970s. Other manufacturers have set up operations in entirely new locations, which have not previously had car assembly plants. Three companies - Audi, Renault and Chrysler - have decided to locate their operations in Paraná.

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The logic for the siting of new plants appears to vary. In part, companies are seeking locations where unions are not so strong as in ABC and where wages are lower. This explains the continuing movement away from the ABC area. Similarly, Mercedes chose not to locate close to the Fiat plant in Minas Gerais. Certainly, subsidies played an important role in locational decisions. Local governments offered a wide variety of incentives to attract new automotive plants, included free land, long-term exemptions from local taxes and interest-free loans with delayed payback options. However, the willingness to seek out new sites indicates that location close to existing component manufacturers is not the key factor in location decisions.

4.3. The Restructuring of the Indian Auto Industry after 1991

The Indian auto industry has been transformed over the past six years from a stagnant backwater of the world auto industry to a major growth area for the coming decade. Until 1991 the industry produced predominantly for a highly regulated and protected domestic market. By 1996, more than a dozen projects for automobile production had been started or announced. The most optimistic projections for car sales put domestic sales for the year 2000 at over 800,000 units, compared to sales of only 200,000 units in 1993 and 390,000 units in 1996 (AIAM [1997: 25]). How did this shift come about?

4.3.1. The Indian Policy Regime

The auto assembly industry was shielded from the process of tariff reform by continuing quantitative restrictions, but it has been radically transformed by changes in policy on FDI and the entry of new firms. As part of a broader programme of liberalisation, the government abolished licensing, allowed new companies to enter the industry and, in practice abolished the restrictions on foreign ownership. While QRs remained on built-up cars, they were abolished on CKD kits. These new entrants have also begun to transform the components industry, which has experienced tariff reductions and the scrapping of quantitative restrictions. These policy changes are summarising in **Erro! Argumento de opção desconhecido.**.

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The radical nature of these changes might appear surprising. The auto regime in India appears more liberal than in many other Asian countries. In part, this is because the auto industry was a highly visible sector which had been subject to regulation and isolation. It was a key test for the new, liberal policy on foreign capital. In part, it arose from confusions within the government about how to develop the industry. According to some industry insiders, the Indian government had intended to maintain QR as on not only built-up cars, but CKD kits as well. It expected the new entrants to source production locally more or less from the beginning. Little consideration had been given to the question of phasing in local production through a gradual transition from CKD to local sourcing. When the new entrants began to set up their operations, they found that the CKD kits needed to make market entry at low volumes viable were not to be allowed, and a crisis ensued.

In order to sustain its policy of promoting FDI and the entry of new companies, the government was obliged to make a change in policy. Instead of introducing a new and explicit policy for the sector along the lines of the Brazilian Automotive Regime, the Director-General of Foreign Trade signed confidential "Memoranda of Understanding" (MoUs) on a case-by-case basis with the auto companies. Generally speaking, they specified that companies were allowed to import CKD kits with a duty of 110 per cent if they made commitments on production volumes, localisation of content and exports. The foreign exchange costs of imports of components should be offset by exports of vehicles. Once certain levels of local content are reached, the remaining components can be imported at the prevailing duty rate of 20-40 per cent.

Until the end of 1997 their was no clear and uniform policy for the auto industry because each agreement was negotiated in secret. Pressure from industry for clear and transparent rules applicable to all companies equally resulted in cabinet approval for a new policy in November 1997. This specified:

- New projects should have a minimum foreign equity of US$ 50 million in the first three years of operation.
- Commitments to localisation of production. The targets for local production were set at 50 per cent in three years and 70 per cent by the fifth year. The component manufacturers might have preferred a high level of indigenisation, perhaps as much as 80 per cent within a specified period. [14]
- Specified levels of exports. The obligations begin from the third year of production, as requesting by the assemblers, who were clearly unable to meet export targets in the early stages of their operations.

4.3.2. Output and FDI in the Indian Auto Industry

The new automotive policies took time to have an impact. As can be seen in **Erro! Argumento de opção desconhecido.**, output of vehicles of all types declined between 1990 to 1992 as the economy suffered from recession. This did not make FDI attractive. However, by 1993 production of cars and jeeps had passed previous peak levels, and from then expansion was rapid. Output of cars almost doubled between 1993 and 1996. Maruti was by far the main beneficiary of this growth. Production at PAL and HML declined, while production at Maruti expanded rapidly, from 107,000 cars and vans in 1990 to 317,000 in 1996 (ACMA [1997a: 14]). The vast majority of this output continued to be directed towards the internal market. In the financial year 1996-97, a total of 37,161 cars were exported, only 9.1 per cent of total passenger car production in that year (ACMA [1997a: 67]). The Indian auto industry was still predominantly inward-focused and isolated from world trade. Up to 1996, liberalisation had merely induced strong growth in the car segment, establishing Maruti as a large-scale operator. [15]

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From 1996, the impact of liberalisation began to be felt through the entry of new companies into the passenger car sector. By the second half of 1997, the first results of a significant inflow of FDI were visible on Indian roads. Assembly had begun of cars by Daewoo (Cielo), PAL-Peugeot (309), General Motors (Astra) and Ford (Escort). Up to seven other companies had plans to enter the Indian market.

Erro! Argumento de opção desconhecido. ABOUT HERE

The extent of FDI and expansion plans for the auto industry is shown in **Erro! Argumento de opção desconhecido.**. The salient features of the table are:

- The large number of new entrants into the industry. In 1995 there were two small companies and one large (Maruti). Up to 10 new entrants are likely to be producing cars by 1999.
- Capacity plans total approximately 1.5 million vehicles, twice the maximum expected sales in the year 2000.

- Relations between Indian partners and transnational companies have frequently been strained. Suzuki was involved in an acrimonious dispute over the management of the company with the government of India.[16] Peugeot eventually pulled out of its joint venture with PAL; Daewoo bought out its Indian partner, DCM; Fiat took control of its Indian operation; Mercedes may take over its joint venture with TELCO.
- The new entrants are uncertain about how to deal with the dominance of Maruti. High volumes and localised sourcing enable MUL to sell the facelifted 1997 Maruti 800 for under US$ 8,000, a price which cannot be matched by cars made from imported components. The majority of new entrants chose to compete in the medium-car segment. This is relatively small, but it was expected to grow. However, in 1996 sales in this segment were disappointing. In 1997, the consultancy firm, A. T. Kearney predicted that total demand for medium-sized cars would only reach 110,000 units by the year 2000, far below planned capacity. This may be causing companies to revise their plans. At the beginning of 1997, the only company definitely committed to competing with Maruti in the small car segment was TELCO. By the end of the year, plans for this segment who had been announced by Daewoo, Ford and Toyota.[17]

As in Brazil, the new ventures in the auto industry are dispersed around the country. In India, there will be three main centres for assembly of vehicles, as can be seen in **Erro! Argumento de opção desconhecido.**. Daewoo and Honda have located on the outskirts of New Delhi. The Toyota joint venture is also likely to locate in this area. Mercedes, Peugeot and the Escort plant of Mahindra-Ford have been located at existing facilities of the partner companies in Maharashtra. Fiat will build a greenfield plant in Maharashtra for the Palio. The Bombay-Pune region has a strong infrastructure of component and engineering companies.

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The remaining three companies, Mahindra-Ford (Fiesta plant), Hyundai and Mitsubishi, have chosen to locate in the Southeast, in Tamil Nadu. Previously, there were no passenger car producing plants in this region. However, the Madras area has been a location for the production of trucks and two-wheelers, and many important component producers are located there.

It seems unlikely that all of these ventures will materialise as planned. In addition to the problems of relationships between the various joint venture partners mentioned above, the pace of growth in the industry slowed markedly in 1997, following four years of very strong growth. Unit sales of cars in the first half of 1997-98 (April-September) were “only” 9 per cent higher than in the same period of the previous year. In the previous year, the rate of increase had been over 20 per cent. If growth continues at 10 per cent per annum until 2000-1, production will reach 600,000 units per year, rather than the 850,000 units projected by a 20 per cent growth rate. Only companies capable of financing short-term losses to gain a position in a market which will expand considerably in the next century will remain in the Indian market. Peugeot may only be the first company to exit.

4.4. The Two Industries Compared

The prospects for the two industries are summarised in **Erro! Argumento de opção desconhecido.**. In both countries, car production and the number of car producers are set to rise rapidly. Each country should have at least ten car producers by 2000. Optimistic projections in Brazil estimate production at over 2 million units by the year 2000, although the figure could be considerably lower, depending on the state of the economy. Similarly, in India, the projections of production and sales at or above 800,000 units by the year 2000 depend on economic growth remaining above 5 per cent per annum.

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The major difference between auto industry policy in the two countries remains their trade regimes. In spite of the reversal of tariff reductions announced in 1995, the Brazilian car market is still much more open to international trade than India's. Cars can be imported, albeit with a hefty tariff, whereas in India quantitative restrictions will apply beyond the year 2000. Even after the 1995 tariff hike in Brazil, imports of cars from countries other than Argentina reached 8 per cent of car production in 1996, compared to negligible imports in India. In the components sector, tariffs are much lower in Brazil than in India. In Brazil, there is almost no barrier to entry of components, and this is one of the factors shaping the development of the components industry, which will be discussed in the next section.

5. THE COMPONENTS INDUSTRIES: RESTRUCTURING IN BRAZIL AND INDIA

What are the implications of the globalisation of the components industries and the restructuring of assembly industries in Brazil and India for the automotive component industries in these countries? The discussion of this issue will focus on the formation of global supply and the access of local components producers to contracts from new entrants to the assembly sector. The implications of changes in these relations for ownership and for the learning opportunities for locally-owned components companies will be considered. The analysis is based on secondary material and interviews with a small number of component companies and assemblers in both countries.

5.1. Globalisation and Restructuring of the Brazilian Components Industry

The automotive components industry was directly affected by trade liberalisation in the early 1990s. Liberalisation placed pressure on the assemblers to reduce costs, and these pressures were transferred onto the component manufacturers. At the same time, importing components became easier. In 1990, when the liberalisation policy was first introduced, the value of imported components was below US$ 1 billion. By 1995, component imports had reached US$ 2.9 billion (Carvalho et al. [1997: 18]). Liberalisation was a shock to even the leading components companies. Their export success in the 1980s had greatly improved their final product quality and quality systems, but their costs were much higher than international costs, and the assemblers pressed strongly for Brazilian component prices to match those available in North America and Europe. The threat of substituting local components by imported components was used by the assemblers to force agreements on phased reductions in prices. The introduction of the Automotive Regime in 1995 further intensified these pressures.

At the same time, there were clear signs that some of the characteristics of obligational contracting had developed. The assemblers were willing to work with suppliers, particularly smaller suppliers, in order to meet the new cost and quality requirements, and they led the way in specifying basic quality systems. The work of General Motors in upgrading suppliers is documented by Posthuma [1995]. The company provided training in Statistical Process Control and support for suppliers to upgrade their facilities. Similarly, Addis [1995] has analysed the work of Autolatina (the fusion of the Brazilian operations of Ford and VW which lasted for approximately 10 years from 1986) in financing consultancy support for small companies. The component manufacturers association and the state's small industry promotion board also supported this work. In the early 1990s, improved supplier quality was essential if JIT deliveries were to be achieved. Quality became an order-qualifying characteristic. The minimum level of quality was ISO 9000, but more onerous requirements were also imposed. The North American assemblers (GM, Ford and Chrysler) have begun to insist on QS 9000 certification, and the German assemblers prefer companies to have the A classification of the German VDA6 system.

The positive picture emerging from these micro studies of inter-firm co-operation has to be set against the overall trend in the industry. In the 1990s, the industry has been consolidated through the exit of many small firms, takeovers and mergers. In 1990, there were approximately 2,000 components companies. By 1996, the auto components manufacturers association, Sindipeças, estimated the number of companies to be 800, of which 500 were members of the association.

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The vast majority of these companies were, and continue to be, locally-owned. As can be seen in **Erro! Argumento de opção desconhecido.**, 74.6 per cent of firms were locally owned in 1994, and a further 5.2 per cent were joint ventures with majority local ownership. In the course of the period 1994-97 there was some movement towards increased foreign ownership, particularly towards majority foreign stakes in joint ventures, but most companies were still under local control.

However, figures based on numbers of firms are misleading. Local firms tend to be smaller than the foreign firms. An examination of the largest firms in the sector reveals two important factors. Firstly, a majority of the largest firms in the sector are foreign-owned. This is shown clearly in **Erro! Argumento de opção desconhecido.**. In 1995, 21 components companies (excluding tyre plants) had a turnover exceeding 100 million *Reais* (the local currency, roughly equivalent to one US dollar). Eleven of these companies were foreign controlled in 1995, nine were locally controlled, and one company's nationality was unknown.[18] Secondly, four of the nine locally owned companies in the Table were bought by foreign companies between 1995 and 1997, including three of the four largest. Cofap acquired Metal Leve jointly with Mahle of Germany. Later, Cofap was acquired by Magneti Marelli, a subsidiary of Fiat. The fourth largest Brazilian-controlled company, Freios Varga, had had a long-term partnership with the British company, Lucas (itself merged with Varity Corporation in 1995). At the end of 1997, Lucas-Varity bought the 66 per cent stake in the company which it did not already control. Finally, Plascar was bought by BTR.

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The most startling feature of these takeovers is that these were by many standards successful companies. As was discussed in Section 2, firms like Metal Leve had developed considerable technological capability. Metal Leve, Cofap and Freios Varga had all established factories in the United States and/or Europe, and they had won many supplier awards from overseas clients. However, in the context of the globalising automobile industry, they were just too small.[19] In this situation, the excellence of these Brazilian companies increased the incentive for transnational companies seeking global coverage and access to rapidly-growing markets to take them over.

When the family which had founded Metal Leve decided to sell out in 1995, one experienced observer of the auto components industry suggested that this marked the end of the "go-it-alone" route for the components industry: the road to survival lay in joint ventures, and that judicious selection of partners for tie-ups was the most viable strategy. Events in 1997 suggest that even this route had become problematic for local companies. The attractions of direct control for the transnational companies in the auto components industry increased with the dynamism of the Brazilian market and the increasing globalisation of supply. The first stage of restructuring in response to liberalisation involved improvements in the quality and productivity of existing suppliers. The threat of imported parts forced change. With the development of Mercosur and the renewed dynamism of the Brazilian market, a more thorough-going restructuring of the assembly and component industries began to take place. The roles of both assembly and component plants within broader international divisions of labour are being re-defined. This is responsible for the latest wave of de-nationalisation.

5.1.1. Assembler Sourcing Policy in Brazil

The new logic of assembler sourcing policies in Brazil will be examined through a discussion of the new Mercedes-Benz plant in Juiz de Fora, Minas Gerais. Mercedes is investing up to US$ 800 million in order to produce 70,000 units of the new A series per year. It aims to produce a car in Brazil which is identical to that in Germany and costs about the same to make. A rigid control over the product specification is being exercised, and no modifications to the product in Brazil are being allowed. The product was designed through a process of close collaboration with suppliers in Germany (Europe), and the supplier selection process was rigorous. These factors favour a policy of global sourcing. To what extent are the Brazilian suppliers the subsidiaries or associates of the companies supplying the German plant, and how important are location and obligational contractual relations?

Some key parts for the A car will be supplied from Germany, or from Mercedes itself in Brazil. These include the engine, gearbox, anti-lock brakes, sensors and rear axles. Mercedes estimates that it will develop a network of approximately 80 main suppliers, and 50 smaller suppliers. Of the main suppliers, 70 per cent of the suppliers operating in Germany already have operations in Brazil. Many important parts are being supplied in Brazil by the same suppliers as in Germany. The parts concerned are shown in **Erro! Argumento de opção desconhecido.**. While some of the suppliers to the German plant are themselves German, this is not a factor in selection for Mercedes. The company also uses a wide range of European and North American suppliers for its operations in Germany.

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The company's policy is precisely to encourage "follow sourcing" - the use of the same suppliers in Brazil, with some encouragement for suppliers not located in Brazil to open up operations there. Where possible, Mercedes will use the same suppliers as in Europe. The selection of suppliers in Brazil is a decision which is heavily influenced by managers in Germany and by the supplier structure established there.

However, **Erro! Argumento de opção desconhecido.** shows that the discourse of global sourcing is not applied uniformly. It is noticeable that even components such as brakes and instrument panels, which tend to have supplier design content are being supplied by companies which do not supply the Rastatt plant. If another company can offer guarantees on quality and delivery and also be more competitive on price, then they stand some chance of winning the contract. Costs are a particularly important factor in the industry.

Location is clearly an important question for Mercedes. It is constructing two industrial zones at Juiz de Fora. One is inside the factory boundary and will contain firms producing body panels, wheels and tyre assemblies and seats. These items are now typically located close to the assembly site as the logistics involved in their production and transport are greatly reduced by proximity. The second, external zone will have companies making wiring harnesses, exhausts, instrument panels, plastic parts, windows and the engine mounting. The construction of this type of component company zone follows the practice other companies in Brazil, including Fiat and Ford, which have encouraged suppliers to build factories close by. Such factories are particularly common for firms supplying sub-assemblies (such as brake, rear axle and shock absorber assemblies). The logistics problems posed by the supply of these products places a premium on proximity. However, alongside this group of locally-sited companies, many other suppliers to Mercedes will be based in São Paulo, which is still the largest centre for component production in Brazil. Mercedes chose not to locating close to these suppliers, nor near to Belo Horizonte, where Fiat has developed a supplier network. Proximity of supplier to assembler is only important for some components.

These findings were corroborated by information from a second new entrant to the car industry. This company is using many of its established international suppliers, but it is also using other suppliers with good reputations within the Brazilian car industry and suppliers which it has used for an existence factory not making cars. Once again, the question of scale is important. It does not make sense to request a dedicated supplier to set up a factory in Brazil if volumes are likely to be low.[20] However, if other suppliers are used, how is the question of proprietary design handled? We were unable to obtain an answer to this question, but it is clearly important.

Generally speaking, Mercedes is offering long-term contracts to its suppliers. The suppliers located at Juiz de Fora, which have made commitments to Mercedes, will have contracts for the lifetime of the part concerned. For suppliers located elsewhere, contracts of between 5-6 years are the norm. However, Mercedes is anxious to secure a cost structure comparable with that in Germany, and the base line for contract negotiations is the German price. Even though volumes in Brazil will be significantly lower than in Germany (70,000 as against 200,000), suppliers are expected to match the German price. This is a common practice throughout the auto industry. While importing parts from Europe and North America presents many problems - long lead times, uncertainties arising from poor port infrastructure, and the costs of transport, insurance and tariffs - the assemblers tend to negotiate on the basis of the

FOB price in the country of origin. The threat of imports is a major element in price negotiations.

5.1.2. The Consequences of Global Sourcing

The findings from Mercedes were confirmed through interviews with a small number of component manufacturers. They confirmed the importance of being part of an international network, and maintaining relationships with suppliers to the parent companies of the transnationals located in Brazil. However, they also reinforced the view that other factors, including price had an impact on sourcing decisions.

The use of follow sourcing and global contracts is much greater for complex parts which have a direct impact the performance of the vehicle. For such parts, a contract will be given for the life of the part, although the price will have to match the world price. In the case of parts which are less complex and have a lower technological content, contracts are shorter and price continues to be a critical factor. In these cases, the contract is frequently allocated on the basis of a "price auction". The FOB price for the component is taken as the starting point for negotiations, but then the various competing companies are expected to make successive bids for the contract, which drives down the price. It was also reported by one component manufacturer that these types of components are increasingly being integrated into sub-assemblies. The suppliers then become part of the second or third tier of the supply network. The first-tier supplier then takes responsibility for contract negotiation, quality and delivery.

In addition to the initial price negotiations, the assemblers expect annual reductions in the price of components. In some cases, this is a fixed percentage amount. In others, the assembler makes inspections to particular firms and "negotiates" price reductions. For many components manufacturers the process is not about joint problem-solving and improvements in efficiency (as suggested by the obligational contracting model), but rather the imposition of a predetermined reduction in price. One component manufacturer described how it would be easy to find one process in which potential cost reductions might be obtained, but no account would be taken of the difficulties in implementing change or the possibility of extending such improvements across all processes in the plant. In another company, the management said that they no longer allow customers' representatives in the plant precisely because of such practices. The relationship is frequently described by the assemblers in terms of "partnership", but power is distributed unequally.

In return for a price which will match or be close to the world price, the assemblers expect JIT delivery and, frequently, a location close to their operations. The emphasis on location is particularly important for companies providing parts which pose logistical problems. However, even when companies do not supplying products of this type, a close location may be convenient for resolving problems either at the customer or in the company's own plant. While the importance of problem-solving in the development of new products may decline as design becomes more centralised and standardised at the world level, there are two areas in which it remains important. Firstly, some components and sub-assemblies necessarily require adaptation to local conditions or materials. Secondly, if the component producers take increasing responsibility for operations within the customer's factory, they will necessarily have to set up some of their own facilities in the locality.

The components industry in Brazil is undergoing a radical transformation. It is clear that the globalisation of the components industry is having an enormous impact. However, relationships are still in a process of transition and the impact of global sourcing networks is unclear. The integration of day-to-day operations is now much greater, and local components producers, or the co-ordinators of their networks (parents or partners), are more involved in design. Global networks do matter, and companies in Brazil whose associates (parents or partners) are suppliers in other countries are in a strong position to win contracts. However, this is not the only factor. Firstly, the assemblers recognise that not all subsidiaries are as efficient as their parents, and they may still choose between rival companies. Secondly, the history of supply relationships still matters. Even when mergers and takeovers result in an established supplier to a particular assembler becoming part of a component group which is associated with a rival company, the Brazilian assembler may continue to use it as a source. For example, Fiat in Europe might buy a component from its own subsidiary, Magneti Marelli, in Europe, but it continues to source the same part in Brazil from companies taken over by global rivals. Cost and a history of supply still matter. For this reason, the component manufacturers interviewed frequently provided contradictory statements about their relationship. The discourse of global sourcing networks was frequently stated, but then it was contradicted by more detailed accounts of how contracts are allocated. To the extent that passenger cars become more standardised and more centrally designed, one might expect that the importance of global sourcing networks will increase, but this process is still being established.

In many respects, relationships in Brazil have moved towards obligational contractual relations (**Erro! Argumento de opção desconhecido.**). The length of the relationship is much longer, and there is a considerable degree of quality competence and a high level of mutual dependence. Two-way communication is intense, and there is a clear tendency towards tiering of suppliers. However, the tariff structure introduced by the Automotive Regime strongly favours the assemblers, who are able to use the threat of components imports to force down prices. Pricing still has strong adversarial aspects, and there are few signs of "risk sharing". The following press report indicates the attitude of the assemblers:

> "The producers of auto components for Volkswagen cars will not be able to pass on the increase in the price of steel [by 8.4 per cent] announced by the steel companies last

week. ‘We won’t accept price increases,’ says Rafael Piñero Prat, Director of Sourcing at Volkswagen. According to Prat, who considers the rise in the price of steel as ‘an unjustified policy’, the suppliers will have to maintain prices which are competitive in relation to the international market.” (Folha de São Paulo, 27 May, 1997)

The response of the component manufacturers was predictable. The President of Sindipeças observed that prices had been frozen since January 1996 and that companies in the sector were working at zero profit margins.

5.1.3. Consequences for Learning

The consequence of these changes appears to be that while expertise in quality and productivity improvement increases, design expertise declines. The local component producers have become better at producing components, but are less involved in designing them. It seems likely that the standardisation of car design at the world level and the globalisation of component sourcing will eventually reduce the design requirements of companies located in Brazil. There are already clear signs of this. Some component manufacturers are cutting back on their design and engineering staff as their work is reduced to adaptations of designs brought from abroad. The only exception to this appears to be with the development of new products which are first produced in Brazil. The most notable example of this is the Fiat Palio, which was designed mainly in Italy, but with the participation of the Brazilian component companies (locally owned and transnational). The companies which are producing the parts in Brazil may become responsible for organising production of parts in other countries. One of the component manufacturers visited, a subsidiary of a German company, stated that it would be responsible for arranging supply of its part in other countries. However, this is tendency is likely to be swamped by the opposing force of design centralisation. As VW, for example, phases out the Gol and Santana, they will be replaced by international models such as the Polo, Golf and Audi A3, which are designed in Germany and based on a small number of platforms (**Erro! Argumento de opção desconhecido.**).

Against this decline, it should be noted that standards of quality and productivity have risen enormously since 1990. As a result firstly of the entry into export markets in the 1980s and secondly the increased pressure from the locally-based assemblers in the 1990s, the production and quality systems of the suppliers have improved. There is no doubt that many quality and productivity initiatives have either failed or not been sustained, and there is evidence that some firms have either adopted programmes without understanding why, or merely followed the instructions of their customers without understanding why they are required to adopt new practices.[21]

Notwithstanding these observations, the progress made by many leading component companies in improving quality and developing flexible and responsive production systems based on team working, cellular manufacture and flexible automation is well documented. This changes the nature of the engineering function. Previously, companies had to be able to design products and systems. Now, the emphasis is increasingly on how to work with existing systems and received designs. This requires a narrower range of engineering skills, and there is some indication from engineering schools in Brazil that more narrowly-trained engineers are in greater demand than in the past. This tendency is reinforced by the liberalisation of imports of equipment and tooling, which has reduced the demand for specialised toolmaking shops.

5.2. The Transformation of the Indian Components Industry

The components industry in India is very small by international standards. In 1996, its turnover was only US$ 3.2 billion, compared to over US$ 17 billion in Brazil. It is divided into two segments. On the one hand, 300-400 larger companies supply the OEM market and the organised replacement market. On the other hand, up to 6,000 small enterprises, most of them unregistered, supply the rest of the replacement market. The replacement market accounts for 50 per cent of components production in India, compared to just 20 per cent in Brazil.

The characteristics of the largest firms in the components sector in 1995 are shown in **Erro! Argumento de opção desconhecido.**. These figures are taken from the ACMA Buyer's Guide (ACMA [1997b]), which is a comprehensive listing of companies in the sector. A number of features stand out. Firstly, there are only seven firms with turnover exceeding US$ 100 million, and a further seven with turnover of US$ 50-100 million. In the case of Brazil, the corresponding numbers are 21 and 13 (Carvalho et al. [1997: 56]). Secondly, these large companies export a small percentage of their production. The 14 largest components companies in India are exporting just 5 per cent of their total turnover in 1996. Thirdly, local ownership remains important. Accurate information on ownership is not available. Clearly, many of the companies listed in the tables were founded through joint ventures with foreign companies. The largest company, MICO, is 51% owned by Bosch, and Lucas-TVS is 51% and by Lucas-Varity. However, Indian companies and industry associations are less forthcoming about ownership than technology agreements and sales. It is not always clear where ownership lies or who is responsible for day-to-day management. Fourthly, most of these large companies supply many different manufacturers. The only company in the two tables dedicated largely to Maruti is Subros Ltd., which supplies air conditioning to Maruti and TELCO. This company was founded through a collaboration with Nippon Denso and Suzuki. Asahi Glass, which was set up to supply Maruti in collaboration with Asahi Glass Company of Japan, now supplies many companies in the auto industry.

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Below this group of 15 leading companies, there are 35 further companies listed in the ACMA directory which had a turnover in the range US$ 20-50 million in 1996. A number of these companies started as units dedicated to Maruti, such as Bharat Seats (seats) and Jay Bharat Maruti (sheet metal parts), Krishna Maruti (seats), Munjal Showa (shock absorbers, struts) and Sona Steering (steering assemblies). Some of them have since diversified their customer base. Of the remainder, a large proportion are in the field of castings, forgings and stamped parts, where the Indian components industry appears to be particularly strong.

5.2.1. The Impact of New Entrants in the Assembly Sector

The components sector in India is changing rapidly. While pressures from the assemblers may the less intense than in Brazil, because of the higher degree of protection offered to both the vehicle and components industries, the sudden and rapid entry of new assemblers into what was a small industry means that the transformation wrought by the entry of new companies is much greater. Many of these new entrants into the components sector have been brought in by the new assemblers, who need a high level of local content in order to become cost competitive. The tendency is likely to be reinforced by the Indian government, which increased tariffs on imported components in 1997 but is likely to reduce tariffs on component sets for companies which achieve 50 per cent local sourcing.

The new assemblers emphasise follow sourcing and joint ventures. According to the head of purchasing at one of them, the first preference would be to have a supplier who supplied the same part in the company's dominant market. The second preference would be to have a joint venture between that company and a local company. The foreign partner would then be responsible for ensuring that the product and production process corresponded to the norms established internationally. Production by a local company under licence would definitely be a third choice, as this would involve much more work in parts homologation and monitoring of quality and processes than in the other two cases.

There are many examples of the new assemblers arranging for their established components suppliers to accompany them into the Indian market. This is particularly evident in the case of critical sub-assemblies and new plants located close to the assembly operations. In many cases, international components companies are setting up joint ventures with local companies. The examples being cited in the industry are too numerous to mention, but some can be given, taken from the plans of Fiat, Ford and Hyundai.

Fiat's new plant near Pune in Maharashtra will be supplied by some of its associated companies. Magneti Marelli (a Fiat subsidiary) is setting up a $50 million component unit in Pune. Another Fiat company, Comao, is setting up a 100%-owned factory to make machine tools and robotics ($50 million). In Goa, another Fiat subsidiary, Texid, is setting up a $30 million foundry in a 76-24: joint venture with the Kalyani group. Altogether, it is expected that

20 Italian suppliers to Fiat's world-wide operations will enter into joint ventures or collaborations with Indian companies for local parts manufacture. Fiat is involved in identifying potential local partners for its existing overseas suppliers.

Ford is bringing a number of key suppliers with it to India. Its glass will come from Pilkington Glass, its preferred international supplier, even though Asahi India has the capacity to meet its needs and has already agreed to supply Daewoo, GM and PAL-Peugeot.[22] Siemens will be setting up plants in Nasik (Maharashtra) and near to Madras (now renamed Chennai) to supply the Escort and Fiesta plants respectively. It is also setting up joint ventures with Indian companies to produce climate control equipment and fuel handling systems. Other component manufacturers will have to follow if Ford is to reach its target of 70 per cent local sourcing for the Fiesta. Ford's Indian partner, Mahindra & Mahindra, is setting up an auto ancillary park near the Mahindra-Ford Madras plant and hopes to attract many leading components manufacturers.

Hyundai is arranging for a number of Korean suppliers to come to the Madras area, either independently or in joint ventures, to supply its new plant. For example:

- Daewha Fuel Pump Industries is joining with the Pentafour group to promote a new company, Pentafour Daewha Auto Components, to make electronic fuel injection pumps, located in Madras. Pentafour already has technology collaborations with Magneti Marelli (carburettors) and Purolator Products (electronic fuel pumps). It supplies a number of the leading automobile companies.
- Hyundai Electronics Industries may join with Tamil Nadu Electronics Corporation to produce automotive electronic parts - engine electronics, air bags, car alarms - near Chennai.
- Iljin Industrial Company (Korea) will set up a joint venture near Chennai for components like axles, rear hubs, suspensions and brakes. It will be dedicated to Hyundai.
- Samplip, a Korean company, will set up a joint venture with Lumax Industries for auto components near Chennai. Lumax already has plants near Delhi (for Maruti), Pune (for TELCO among others) and Aurangabad (for Bajaj Auto, a producer of two- and three-wheelers). The new joint venture will have equity participation from Lumax, Hyundai and from Stanley Electric of Japan, with whom Lumax has had a long-standing association.
- A Bangalore-based company, Dynamatic Technologies has entered an agreement with a Korean company, JKM Dae Rim Automotive, to produce components for Hyundai, initially. A new plant will be built near Madras. Hyundai has an equity stake in JKM Dae Rim Automotive.
- Hyundai is planning to set up a blanking plant near Madras in conjunction with Ford and Mitsubishi, who are also constructing assembly plants in the area.

It seems likely that three clusters of components manufacturers will develop in the three main locations for vehicle assembly - Delhi-Haryana, Bombay-Pune and Madras (**Erro! Argumento de opção desconhecido.**). These will be based around the plants of the new entrants to the assembly sector. Even for components where proximity is not required for logistics purposes, new factories may well be set up close to the main customer. However, they may supply a number of assemblers. Learning by the component manufacturer and economies of scale may be achieved by allowing or even encouraging component companies to find multiple customers.[23] The new assemblers are creating complex demands for the existing components producers. The new auto companies frequently wish to have dedicated plants and/or to bring their preferred suppliers to India, frequently in joint ventures with companies already established in the local market.

The cases of two Indian component manufacturers illustrate the pressures being faced by local companies and the potentially successful responses they can make. Company A was first established in conjunction with MUL, which continues to hold a significant stake. For a long time, Maruti was its only passenger car customer. It manufactures sub-assemblies which are expensive to transport and whose mix depends directly on the customer's model mix. Until recently, most auto companies would have manufacturers these items in-house. This places a considerable premium on dedicated local facilities, although partnership with a global supplier is not necessarily critical.

Now that new assemblers have entered the industry, this components manufacturers is faced with many demands to open new plants. It has set up one plant specifically to supply Honda. Honda is located near to the company's Gorgaon plant, but this plant does not have spare capacity, and Honda prefers not to depend on a plant highly dedicated to Maruti. The company is also setting up a joint venture with Hyundai and one of Hyundai's Korean suppliers in Madras. It also has a plant close to the GM operation in Baroda. It is also setting up a joint venture with a UK company to supply the Ford plant in Madras, and it has plants in Pune to supply TELCO.

These developments can be seen as positive for the company. It is diversifying its customer base and greatly increasing its output. It is also sharing risks through joint ventures with other companies. The new plants have the advantages of state-of-the-art machinery and new labour forces, which are more flexible. However, there is a price to pay for this expansion. Firstly, the company is having to manage and finance simultaneous expansions in widely diversified locations. This must place a strain on the company. In particular, it has to manage different customer and joint venture partner styles and working methods, as well as finding managers capable of starting up new operations. Secondly, there must be an element of risk in setting up dedicated facilities in a market which is still uncertain. Car sales projections are unlikely to materialise fully, and some assemblers may find themselves in financial difficulties. It is possible that some of the new component plants will not realise their expected output.

Company B was also set up as a dedicated supplier to Maruti, which holds a small equity stake. It manufactures parts and sub-assemblies which involve proprietary technology developed by Suzuki's Japanese supplier, which also holds an equity stake in the Indian company. The Japanese associate is one of just three main global competitors in this product line. Until 1995, Maruti was the company's major customer. It has now diversified its operations, capturing contracts with Honda, Hyundai, Toyota, Mitsubishi and TELCO. In the case of Hyundai, this company will set up a joint venture with its Japanese partner and the Korean associate of its Japanese partner. It has also entered into a joint venture with one of the larger Indian vehicle producers to produce a range of products for other car, truck and two-wheeler companies. The company will not supply GM or Ford. Both of these companies have brought their global suppliers for this particular product.

This company shows that there are certain niche markets which can be supplied from India through links with international components manufacturers. In the industrially advanced countries, even family cars now tend to have a more expensive option previously found only on luxury cars. In India, passenger cars are relatively simple, and price competition is important. The old technology remains important. It is likely that the Japanese company's world production of this type of product will be sourced from India. This offers low cost for a product which is directed at price sensitive market segments. When the joint venture was set up between the Japanese company and an Indian company, the relationship was of the type shown in **Erro! Argumento de opção desconhecido.**. The joint venture received to support from the Japanese parent, and it supplied Maruti. Now, however, the pattern of supply for this product is shifting towards that illustrated in **Erro! Argumento de opção desconhecido.**. The Indian joint venture supplies not only to Maruti (and other assemblers in India), but also its Japanese associate, who will sell the product on to other companies, and directly to firms in other countries. Once again, the entry into new markets is dependent upon the relationship with the Japanese associate, which provides both design and market access.

Erro! Argumento de opção desconhecido. ABOUT HERE

For companies making products with a degree of supplier design input, partnerships with transnationals producers are almost certainly necessary for local companies if they are to survive in the OEM market. This means a radical change in strategy for many existing Indian companies. In the past, many of them have remained independent and bought technology from overseas companies. Their own technology efforts have typically been focused on developing alternative materials. This strategy will no longer work. Survival for these companies will depend increasingly on developing strategic alliances with the transnational companies wishing to enter the Indian market. In order to make these alliances viable, the Indian companies must be able to provide finance and management. This may require a reversal of the past tendency to diversify production. It may be time for companies to focus on their core product lines and invest heavily in both the modernisation of production and the development of partnerships. The restructuring at Lumax Industries Ltd., which involves selling off its filters and rear view mirrors activities, focusing on its lighting operations and developing joint ventures with international companies, may be followed by many other companies.[24]

The key question for the future of the industry is whether the transnational companies will be willing to accept anything less than a majority stake in new joint ventures. Brazil may be showing India a somewhat difficult future. The advent of this future seems to depend not so much on the speed of liberalisation as on the expansion of the auto industry. Continuing tariff protection will not prevent restructuring. The threat to Indian component manufacturers is not from imports, but from transnational entrants to the component sector. The larger component companies will probably survive, even though there will be pressure to concede control of joint ventures. The small and medium-scale independent producers will be most hard hit. They will need to seek positions within the second tier of suppliers. This will mean abandoning the production of complete components and being subjected to cost pressures from their powerful customers.

As yet, restructuring is at an early stage. Many Indian component companies are just starting to experience the cost and quality pressures faced by Brazilian companies at the beginning of the 1990s. The response to these pressures may well be to attempt to find sources of new technology on the international market and to improve production and quality systems in-house. This would be a strategic mistake. For product lines where global sourcing networks are critical or where technology is advancing rapidly, the costs of remaining globally competitive and independent are too great. This is the lesson of the restructuring in Brazil.

Clearly, there are strong tendencies towards the entry of the preferred suppliers of the new assemblers in India. However, discussions with component manufacturers' representatives, assemblers and component companies reveal a more complex picture, and one which offers more scope to local producers. Firstly, there is scope for detail-controlled parts. Secondly, assemblers have to consider the question of costs. Thirdly, there are some options for entering global markets.

Important differences remain between different types of components. As in the case of Brazil, the importance of a global sourcing network is greater for critical parts and for parts designed by the component manufacturers. However, detail-controlled parts remain important in the industry. These parts are designed by the assembler and can be sourced from a range of suppliers. Indian producers of castings and forgings will continue to find markets in the auto industry. Many of these companies are competent and they have low cost bases. New, foreign-owned entrants will find it difficult to compete against them. If these firms invest in upgrading their equipment and systems, they will be strong competitors. One of the problems for companies in the area of engine parts was that power train items are among the last to be indigenised. However, the increasing perception that local production is the route to cost reduction in what remains a highly cost-conscious market means that the major assemblers are raising their indigenisation targets.

The question of costs also raises the issue of scale. For many components, scale is critical. It is not economic to produce in small volumes. So far, the new entrants are producing in relatively low volumes, and it seems unlikely that projections for rapid advance to higher volumes will be realised. Sales in the medium segment are rising, but not sufficiently for companies to reach volumes of 50,000 or more. The question of volume is central in the components industry. This has an impact on location, choice of supplier and the degree of indigenisation. Firstly, Laigle [1997] describes how in Europe the tension between centralisation of production to keep costs down and decentralisation to improve logistics and flows of information are in constant tension. The same issue arises with even greater force in India, where plant volumes are lower. Location can only be purchased at a price. Secondly, the second Indian manufacturer described above observed that the new entrants would always make their first approach to their preferred international OEM supplier. However, the contract might well be opened up to competition. Cost and economic sense tend to prevail. For this reason, companies look to imaginative solutions to overcome such problems. Such solutions include tie-ups between competitors. It is well known that because of the small production scales, the Japanese auto companies in ASEAN could not reproduce the supplier networks they had developed in Japan. If each auto producer brought its own preferred supplier, the volumes would have been uneconomically small. Therefore, the assemblers bought components from suppliers linked to networks organised by their competitors - a policy which would have been unthinkable in Japan at that time. For example, a Toyota subsidiary would buy parts from a component company from the Nissan group. Later, this flexibility was transferred back to Japan.[25] In India, co-operation among the three Madras-based suppliers (Hyundai, Ford and Mitsubishi) is already developing. Thirdly, when volumes are very small, the Indian market alone does not justify local production. The options are to continue importing, or to use India to produce for export as well as the local market. This practice will be encouraged if assemblers are allowed to offset the cost of CKD imports with component exports.

5.2.2. Consequences for the Components Industry

The tariff structure currently operating in India offers more protection to companies than the structure introduced in Brazil by the Automotive Regime. Cost pressures and the threat of imports are unlikely to be as severe. However, the major influence on the restructuring of the industry is not the threat of imports but the arrival of global component manufacturers. There are fears in the industry that is will lead to a marginalisation of locally owned component manufacturers as the transnational companies set up wholly-owned joint ventures. Certainly, there is a considerable threat to the smaller Indian companies, which will be forced into the replacement market, or confined to second-tier roles.

At the same time, the larger Indian manufacturers see big opportunities in the global market. They believe that they have important cost advantages through cheap labour and access to raw materials. Therefore, they can become global sources for particular types of components. In India, the most widely cited example is GM's use of Sundaram Fasteners for supply of radiator caps. This pattern of sourcing is illustrated in **Erro! Argumento de opção desconhecido.** (hence its title). In this model, the critical relationship is number 1. The assembler in the core location establishes a direct relationship with a component supplier in a developing country. This relationship may be facilitated by the existence of a local assembler and local supply (relationships 2 and 3 in the figure), but it may also be independent of, or prior to, any operations in that country. This model only applies to detail-controlled parts or supplier proprietary parts. Other examples of sourcing to North America from Indian companies include Caterpillar's purchase of wheels from Wheels India and GM's purchase of engine mounting brackets from Rico Auto Industries.

Erro! Argumento de opção desconhecido. ABOUT HERE

During the import substitution phase, the comparative advantage of Indian companies arising from low wages was neutralised by the small scale of production for the domestic market, inefficient production methods and difficulties in obtaining the latest technology.[26] Now, it may be possible to use this advantage to gain particular market niches within a global auto industry which is still cost sensitive and willing to seek out distant sources for particular component lines. However, these products will not be design or technology intensive. Their contribution to Indian production capabilities will be in the areas of quality and delivery performance rather than design and new technology.

6. CONCLUSIONS

The new entrants into the assembly sector in Brazil and India are encouraging their global suppliers to set up operations. These are the preferred suppliers for the assemblers, and they have privileged access to new contracts. The inflow of FDI into the assembly industries in India, in particular, has attracted many new component companies which are following the FDI of their major customers. This may lead to the acquisition of leading components manufacturers by global companies, the marginalisation of smaller producers, and the fragmentation of the components industry.

The impact of globalisation in the components industry is already apparent. In Brazil, there has been considerable consolidation and restructuring of the industry in the 1990s. This has been accelerated by the tariff policy introduced by the new Automotive Regime. The number of firms in the industry has contracted markedly, and many small firms have exited. The dominance of transnational companies among larger firms has increased. Four of the largest locally-owned component companies have sold out to European component producers in the past two years. In spite of excellence in research and development, and strong records of export performance, these firms were too small to remain competitive in increasingly globalised markets.

In India, there are also signs of a shake-up in the component sector. Many foreign companies are entering the market, frequently in order to accompany their major customers, either setting up as independent companies, or establishing joint ventures with existing companies. The fear of the domestic components producers is that they will be marginalised by these trends. Even when joint ventures between Indian and global components producers have already existed for some time, there are some signs that the global producers will attempt to take majority control of these ventures, or to set up completely new, wholly-owned operations. The space for the domestic industry is diminishing.

These tendencies are undoubtedly strong and important. However, interviews with assemblers and suppliers reveal a more complex picture. The rush to local supply from global supply networks this restrained by economies of scale and costs. The vehicle producers have a preference for dealing with a company with whom they have an established relationship. The supplier is then able to take responsibility for the production, quality and delivery of the component or sub-assembly. This greatly reduces the workload of the assembly company. However, cost remains an important factor, and when overall volumes are small, costs are high. In Brazil, the new entrants into the car industry do not wish to pay more than the international price for components. If the preferred supplier cannot match this price, then the assembler will put the contract out to tender. For many components in Brazil, a number of companies are available to meet international standards of productivity and quality. These companies can spread at their fixed costs over components produced for a range of companies. In India, the market is highly cost sensitive, and this means that companies cannot carry the burden of high-cost production. The Indian component industry is particularly strong in the production of castings and forgings, which can be produced to the assemblers' designs, and export markets may be available.

The contradiction between, on the one and, using the globally preferred supplier and establishing dedicated facilities near to the assembly plant, and on the other seeking low-cost, large-scale production will remain. However, it can be reduced through inter-firm co-operation. This is already evident in both Brazil and India. Component companies which are rivals in global markets will co-operate in markets where production volumes do not justify multiple plants. This may lead to new arrangements being transferred back to the core countries. In both Brazil and India, the components industry is being transformed by the current dynamism of the assembly sector. In Brazil, the transformations have been more rapid and painful because of the more rapid and decisive reduction in tariffs on components. This has subjected local producers to severe cost pressures which they have found difficult to withstand. In India, the process has been less violent. The new entrants are still only just beginning to expand their output, and Maruti remains the dominant producer. However, the large-scale entry of new global producers and the development of many joint ventures between Indian companies and the preferred global suppliers of the new entrants is almost certainly likely to lead to the marginalisation of the smaller Indian producers. These will be unable to meet the technology and quality requirements of the new companies, and they will be forced out of the OEM market.

The globalisation of the components industry will provide opportunities for some Brazilian and Indian companies to enter international supply networks. Two models for such entry were shown in **Erro! Argumento de opção desconhecido.** and **Erro! Argumento de opção desconhecido.**. The relationship in **Erro! Argumento de opção desconhecido.**, which draws on the experience of Company B, offers the possibility of supplying more sophisticated products. The concentration of global production in India might lead to some design activity located there as well. However, the expertise in this area was acquired during the period of import substitution industrialisation. It might not be created afresh now that new companies have entered India. The global niche market for India might the in the low technology products which are sourced along the lines of **Erro! Argumento de opção desconhecido.**. Overall, the development of global supply networks appears to limit the scope for upgrading by local companies. If this is the case, the auto industry might not be the best industry for developing technological capability in the economy as a whole. It no longer offers the “stairway” for upgrading local capabilities.

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Table Erro! Argumento de opção desconhecido.**: Vehicle Production by Type, India, Selected Years 1971-1983 (000's).**

Year	Cars and Jeeps	Buses, Trucks and LCVs	Tractors	2-Wheelers
1971	49.3	41.9	17.1	121.1
1975	31.3	42.9	32.4	207.7
1979	41.5	59.7	60.2	306.9
1983	66.8	87.3	71.5	759.2

Source: ACMA [1997a: 10].

Table Erro! Argumento de opção desconhecido.**: Brazilian and Indian auto assembly industries, 1970s.**

	Brazil	India(a)
Output of cars (000's)		
1970	307	45
1980	933	47
No. of auto assemblers (1975).	4	2
Ownership	transnational	Indian-owned.

Note: (a) Cars and utility vehicles. Excludes small-scale producers.

Table Erro! Argumento de opção desconhecido.**: Sales and Production of Vehicles, Brazil, 1980-1990 (000's)**

Year	Domestic Sales	Production	Sales/Production (%)
1980	980	1,165	84.1
1981	581	781	74.4
1982	691	859	80.4
1983	728	896	81.3
1984	677	865	78.3

1985	763	967	78.9
1986	867	1,056	82.1
1987	580	920	63.0
1988	748	1,069	70.0
1989	762	1,013	75.2
1990	713	914	78.0
Average, 1981-90	711	934	76.1

Source: ANFAVEA.

Table Erro! Argumento de opção desconhecido.**: Exports of Automotive Components, Brazil, 1976-90**

Period	**Exports (US$ million)[(a)]**	**Exports/production (%)**
1976-80, average	574	4.2[(b)]
1981	825	6.2
1982	659	6.7
1983	799	9.2
1984	1,265	15.0
1985	1,397	12.7
1986	1,402	13.4
1987	1,679	16.3
1988	2,081	13.1
1989	2,120	10.2
1990	2,127	11.1

Source: Sindipeças [1994].

Notes: (a) Includes direct and indirect exports.

(b) 1977-80.

Table Erro! Argumento de opção desconhecido.**: Vehicle Production by Type, India, Selected Years 1983-1991 (000's).**

Year	**Cars and Jeeps**	**Buses, Trucks and LCVs**
1983	66.8	87.3
1987	180.9	108.1
1991	209.3	145.7

Source: ACMA [1997a: 10].

Table Erro! Argumento de opção desconhecido.**: Passenger Car Output by Firm: India, 1983-84 to 1991-92 (000s of units)**

Financial Year	**Hindustan Motors (HML)**	**Premier Auto (PAL)**	**Maruti Udyog Ltd (MUL)**	**MUL share (%)[(a)]**
1983-84	22.6	21.5	0.8	1.8
1987-88	26.6	33.6	90.8	59.8
1991-92	16.0	32.6	116.7	70.1

Notes: (a) Includes production of cars and vans, but not Gypsy utility vehicle.

Sources 1983-84, Takahashi [1995]; 1987-88 and 1991-92, ACMA [1997a: 15].

Table Erro! Argumento de opção desconhecido.**: Obligational Contractual Relations.**

	Obligation Contractual Relations (OCR)
Projected length of trading relationship	Long-term commitment desired and real.
Contract allocation	Bidding may not take place, or likely winner known in advance. Prices settled after contract awarded
Transactional dependence	Few customers for supplier and single- or dual-sourcing by customer.
Quality	Little or no inspection on delivery for most parts.
Communication	Multi-channelled, including, engineers, personnel department and top management; frequent and often informal.
Tiers of suppliers	Yes
Price determination	Non-adversarial with "open books". Sharing of risks arising from unforeseen eventualities.

Source: Based closely on Sako [1992] and Lamming [1993].

Table Erro! Argumento de opção desconhecido.**: Brazilian and Indian auto industries.**

	Brazil	**India**(a)
Output of cars (000's) 1980 1990	 933 663	 47 219
No. of auto assemblers (1990).	3(b)	3
Ownership, assemblers (1990)	Transnational	MUL a joint venture with minority foreign ownership. Others Indian-owned.
Car and van exports, 1990 (US$ million)	418	less than 15
Car and van imports, 1990 (US$ million)	11	less than 2(c)
Ownership, component companies, 1980s	Mixed, with transnationals important among largest firms.	Foreign ownership restricted to maximum of 40 per cent. Local companies dominant.
Output of components, 1990 (US$ million)(d)	12,244	1204
Component exports, 1990 (US$ million)	2,127	131

Sources: Brazil, Carvalho et al. [1997] and Sindipeças [1994]. India, ACMA [1997a].

Notes: (a) Cars and utility vehicles.

(b) Ford and VW had merged their Brazilian operations at this time. Companies with very low volumes are excluded.

(c) 1991-92, excluding second-hand cars.

(d) Production figures translated into US dollars at prevailing exchange rates. These figures are subject to distortion arising from fluctuations real exchange rates.

Table Erro! Argumento de opção desconhecido.**: Foreign Production of Cars in Relation to Total Worldwide Production of Cars by Company (%)**

Company	**Foreign Production**
Ford	58.8
GM	47.6
VW	42.9
Chrysler	45.7
Honda	33.0
Nissan	31.2
Renault	23.0
Mazda	20.2
Peugeot	18.9

Source: Vickery [1996: 150].

Table Erro! Argumento de opção desconhecido.**: Platform Strategies**

Automobile group	**Brand**	**Current Platforms**	**Planned Platforms**
VW	VW, Audi, Seat, Skoda	16	4
Ford	Ford North America Ford Europe, Lincoln Mercury, Jaguar	24(a)	16(a) (2004)
General Motors	Chevrolet, Buick, Oldsmobile, Pontiac, Cadillac, Saturn, Opel, Saab	14	7
Renault	Renault	5	3
PSA	Citroën, Peugeot	6	3

Source: Freyssenet and Lung [1996: 52].

Note: (a) World-wide number of platforms of passenger cars and light trucks.

Table Erro! Argumento de opção desconhecido.**: Planned Tariff Reductions, Selected Products, Brazil, 1991-94 (%).**

Sectors	**1991**	**1992**	**1993**	**1994**
Toys	85	65	40	28
Computers	65	60	50	40
Cars	60	50	40	35
Fine Chemicals	35-60	30-50	25-40	20-30
Electrical Goods				
Videoscassettes	65	55	40	30
Liquidisers	55	45	35	20
Shoes	40	30	20	20
Clothing	50	40	30	20
Capital Goods	30-50	20-45	20-35	20-20

Source: Exame, 22 January 1992.

Table Erro! Argumento de opção desconhecido.**: Tariff on Imports of Cars, Trucks and Buses, Brazil.**

Year	**Tariff (%)**
1990	85 (from May)
1991	60 (from February)
1992	50 (from February) 40 (from October)
1993	35 (from July)
1994	20 (from September)

Source: ANFAVEA.

Table Erro! Argumento de opção desconhecido.**: Passenger Car[(a)] Output, Sales and Product Mix, Brazil, 1990-94.**

Year	Production (000's Units)	Sales (000's Units)	Share of "Popular Cars"[(b)] in Vehicle Sales (%)
1990	663	534	4.3
1991	705	583	11.5
1992	816	577	16.0
1993	1,100	850	28.4
1994	1,248	976	45.9
1995	1,297	1,107	-
1996	1,458	1,459	-

Source: ANFAVEA

Notes: (a) Cars and hatchbacks.

(b) Up to 1000cc.

Table Erro! Argumento de opção desconhecido.**: Tariff Reductions and Vehicle Imports, Brazil, 1990-97**

Year	Tariff (%)	Vehicle Imports (units)	Vehicle Imports (US$ million)	Balance of Trade, Vehicles (US$ million)
1990	85	9,358	30	900
1991	60	19,843	196	675
1992	50⌫40	32,200	339	1,300
1993	35	79,900	879	553
1994	20	193,100	1,840	-427
1995	32⌫70	360,000	3,863	-2,788
1996	70	224,000	1,965	-716
1997[(a)]	70	257,300	-	-

Sources: Tariffs, ANFAVEA.. Imports of vehicles;. 1990-92, Fleury and Salerno [1995];. 1993-94, Leite et al. [1996]. 1995-97, ANFAVEA web site. Imports and balance of trade (value), Carvalho et al. [1997: 13 and 18].

Note (a) January-October only.

Table Erro! Argumento de opção desconhecido.**: New Companies and Plants in Brazil**

Company	**Location (State)**	**Investment (US$ Million)**	**Annual Production (000's)**
Mercedes (cars)	Minas Gerais	800	70
Audi (cars)	Paraná	750	60
VW (trucks)	Rio de Janeiro	300	20
Renault (cars)	Paraná	1,000	100
Peugeot (cars)	Rio de Janeiro	600	70
Toyota (cars)	São Paulo	150	15
Mitsubishi (pick-ups)	Goiás	35	8
Honda (cars)	São Paulo	100	15
Chrysler (LCVs)	Paraná	315	12
GM (cars)	Rio Grande do Sul	700	100
Hyundai (vans)	Bahia	280	20

Sources: Ministry of Industry, ANFAVEA

Table Erro! Argumento de opção desconhecido.**: India, Changes in automotive policy**

Policy Area	**Changes in Policy after 1991**
Licencing of production.	Components production de-licensed in 1991. Car production de-licensed from February 1993.
Regulation of Ownership	Pre 1991, foreign ownership of companies in India mainly limited to 40 per cent. After 1991, foreign participation of up to 51 per cent was allowed automatically in the automotive sector. Approvals for higher participation are generally granted on request.
Quantitative Restrictions	Still apply on built-up vehicles. Removed from SKD and CKD kits. The Indian government has proposed to the WTO that QRs be phased out in six years.
Tariffs on CKD and SKD	110% (1996)
Tariffs on components	Were between 80 and 100 per cent. In 1997-98 tariffs on parts such as engines, transmission parts and pumps were 22 per cent; on iron and steel parts, 32 per cent; on locks, starter motors, headlights, etc., 42 per cent.
Local content exports	Target is 50 per cent in first three years, 70 per cent thereafter.
Exports	Should balance imports of components; applicable after third year of operation.

Table Erro! Argumento de opção desconhecido.**: Output and Domestic Sales of Cars and Jeeps, India, 1990-1996 (000's).**

Year	**Cars**		**Jeeps**	
	Output	**Sales**	**Output**	**Sales**
1990	177	-	42	-
1991	179	163	30	32
1992	154	147	38	38
1993	200	184	44	42
1994	237	220	49	45
1995	330	298	64	61
1996	396	346	76	73

Sources: ACMA [1997a: 10, 41 and 43],and AIAM [1997: 25 and 38].

Table Erro! Argumento de opção desconhecido.**: New Ventures in the Indian Motor Industry, 1996**

Companies and stakes (%)	Models	Capacity (000's)	Observations
Government (50) Suzuki (50)	800 Esteem Zen	500	Capacity has been expanded. Suzuki would like to take majority stake. Indian government refuses.
PAL (49) Fiat (51)	Uno	30-50	Originally a wholly locally-owned venture.
PAL-Peugeot	309		Peugeot pulled out of this operation at the end of 1997. The Indian partner has tied up with Fiat.
Daewoo (91)	Cielo Tiko	80 70	Initially a joint venture with an Indian company. In July 1997 announced plans for production of a small car, the Tiko, reaching 70,000 units in 1998-99.
Mahindra (50) Ford (50)	Escort Fiesta	25 100	Ford has tentatively announced plans for a new small car explicitly for India.
TELCO (50) Mercedes (50)	E series	20	Repeated rumours suggest that Mercedes will take full control. The focus will be on export markets
Birla (50) GM (50)	Astra	25	This project may be made viable by plans to quadruple production and use India as a base for exports to South Asia and Pacific Asia.
Hyundai (100)	Atoz (1000cc) Accent	100	
Shriram (40) Honda (60)	City	30	
Fiat (100)	Palio	100	Fiat's Indian partner in the Uno project has an option to buy a minority stake
TELCO (100)	Indica	150	1300cc small car, to be launched in September 1998.
Kirloskar (30) Toyota (70)	Kijang utility vehicle Daihatsu Mira		
HML Mitsubishi	Lancer	30	

Sources: Various.

Table Erro! Argumento de opção desconhecido.**: Auto Industry Structures, Brazil and India.**

	Brazil	**India**
Number of Car producers		
1995	4	3
2000 (estimate)	>10	>10
Car production (millions)		
1995	1.3[(a)]	0.4[(b)]
2000 (estimate)	1.6-2.0	0.6-0.8
Import restrictions cars (1997)	65% tariff	QRs
Imports/production (1996)	8%[(c)]	<0.01%
Component tariffs (1997)	4.8%	20-40%

Notes: (a) Cars and vans.

(b) Cars and jeeps.

(c) Rough estimate, excluding imports from Argentina.

Table Erro! Argumento de opção desconhecido.**: Ownership of Component Companies, Brazil 1994 and 1997 (%)**

Ownership	**1994**	**1997**
100% Local	74.6	71.0
Majority Local	5.2	4.1
50-50 Partnerships	-	1.2
Majority Foreign	4.8	7.6
100% Foreign	15.5	16.1

Source: Sindipeças, [1994; 1997].

Table Erro! Argumento de opção desconhecido.**: Ownership and Turnover of Largest Components Companies in Brazil**

Company	**Turnover 1995 (R$ million)[(a)]**	**Ownership**
Iochpe-Maxion	598	Local
Cofap	412	Local
MWM	296	Foreign
ZF do Brasil	265	Foreign
Microlite	250	Foreign
Tekside do Brasil	214	Unknown
Metal Leve	215	Local
Wapsa	186	Foreign
Equip. Clark	183	Foreign
Freios Varga	188	Local
Albarus	175	Foreign
Cummins Brasil	181	Foreign
Sifco	169	Local
Robert Bosch	157	Foreign
Brasinca	121	Local
ITT Automotive	116	Foreign
Coplatex	115	Local
Plascar	111	Local
AlliedSignal	110	Foreign
Nakata	104	Local
Borlem	104	Foreign

Source: Carvalho et al. [1997: 56].

Note: (a) Joint ventures are counted as local if majority local-owned.

Table Erro! Argumento de opção desconhecido.**: Mercedes A Car Sourcing**

Parts Supplied by Companies Supplying in Germany	Other Parts
heating/cooling system	petrol tank
wheel and tyre assembly	taillghts
wiring harness	wheels
dashboard	aluminium wheels
shock absorbers	starter motor
distributor	headlights
clutch	springs
electric components	seats
mirrors	exhaust
external plastic parts	instrument panel
air bags	plastic parts
trim	steering system
relays	brakes
engine mounting	
engine bulkhead	

Source: Interviews.

Table Erro! Argumento de opção desconhecido.**: Indian Components Companies with Turnover Exceeding US$ 50 million in 1996**

Company	**Turnover ($ mill)**	**Exports ($ mill)**	**Main Products**
MICO	233	25.0	
TI India	207	0	metal sections
Lucas TVS	153	2.8	electrical
Bharat Forge	139	14.0	forgings, wheels
SKF	126	2.8	bearing
Supreme Industries	116	6.0	various
Subros	106	0.03	air conditioning
Brakes India	91	5.1	brakes
Wheels India	85	4.0	wheels
Sundaram Fasteners	78	11.2	fasteners
Tube Products India	74	3.0	steel tubes
Goetze India	62	0.6	pistons, cylinder liners
Asahi India	53	0.2	safety glass
Sundaram Clayton	52	0.8	air brakes
TOTAL	**1575**	**75.53**	

Source: Calculated from ACMA [1997b].

Figure Erro! Argumento de opção desconhecido.**: Auto industry linkages, pre-1980s**

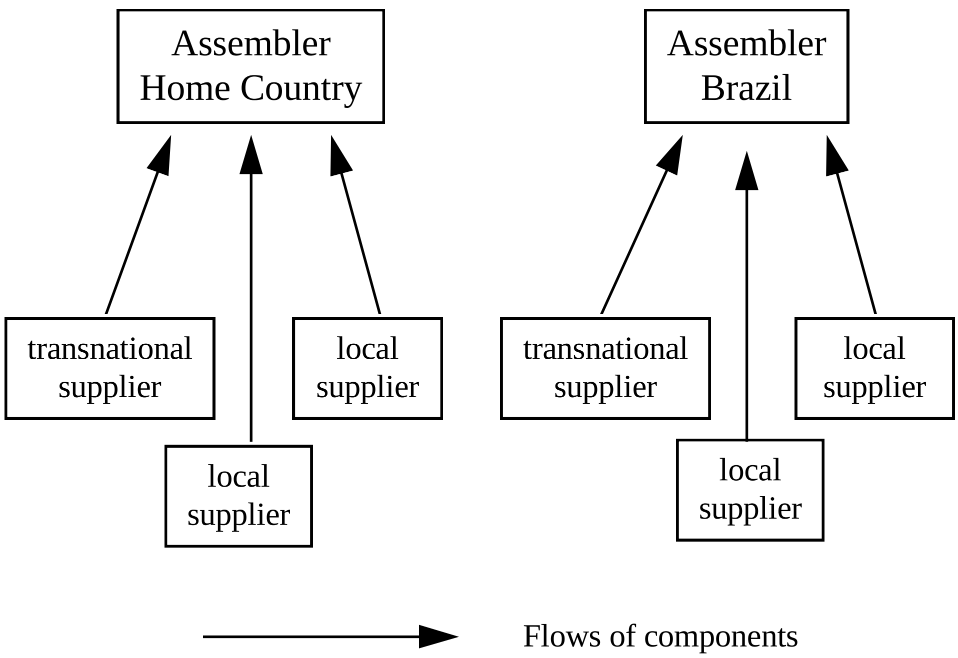


Figure Erro! Argumento de opção desconhecido.**: Assembler-supplier relationships pre-1980s**

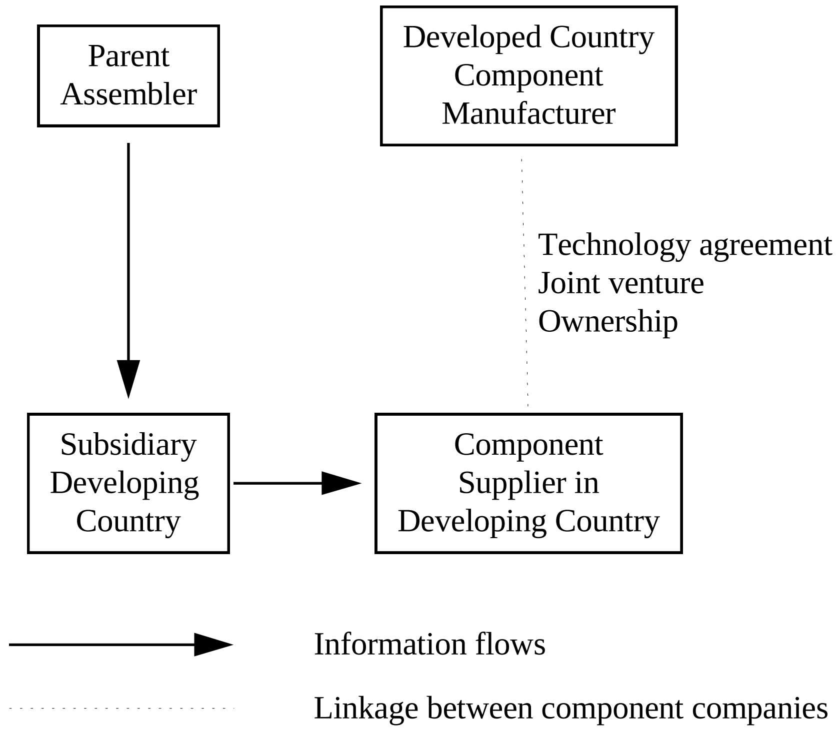


Figure Erro! Argumento de opção desconhecido.**: New patterns of supplier relations: global sourcing**

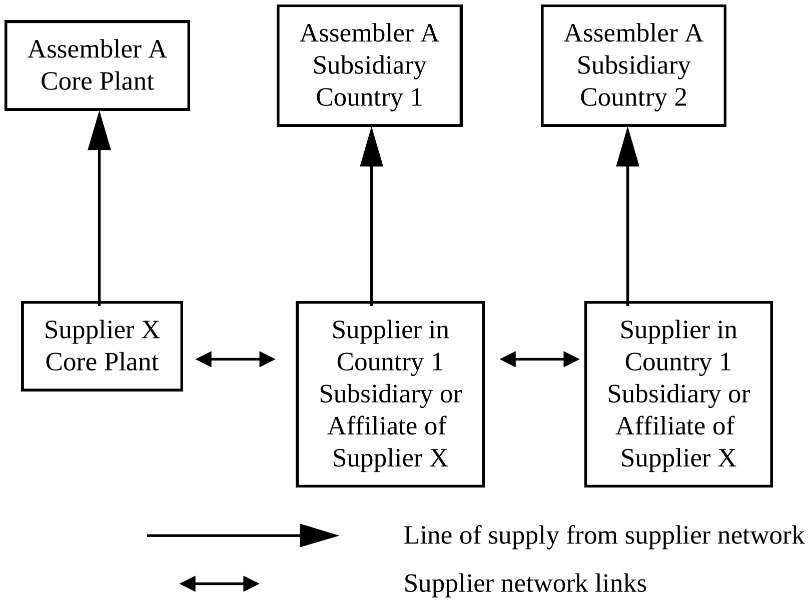


Figure Erro! Argumento de opção desconhecido.**: Inter-firm linkages in the global sourcing model**

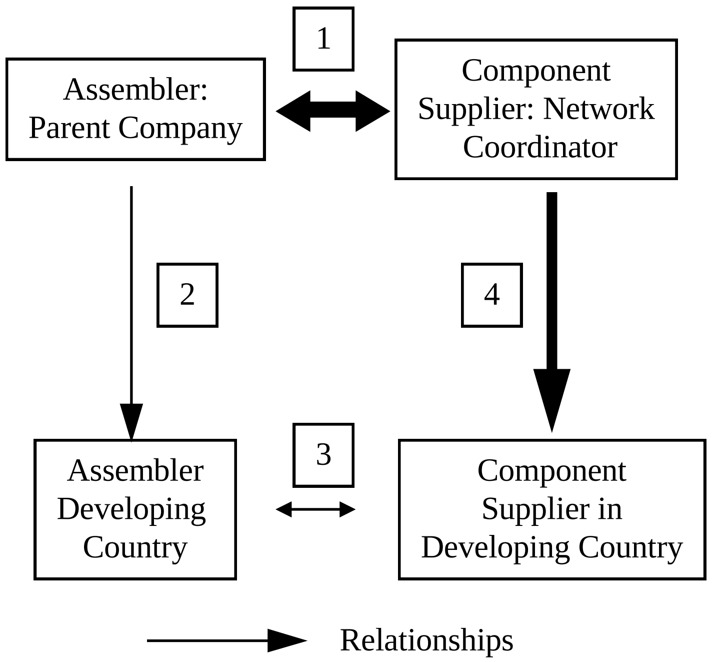


Figure Erro! Argumento de opção desconhecido.**: Global Sourcing from Developing Country Partners**

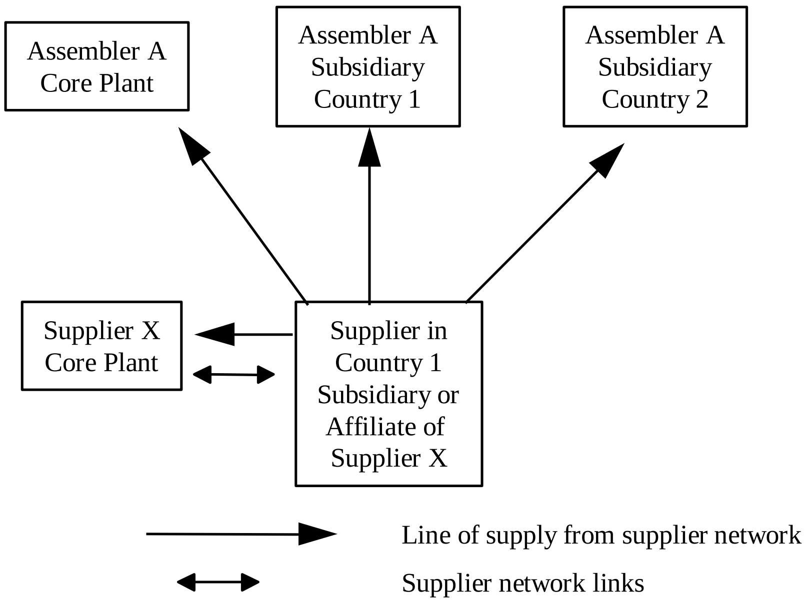
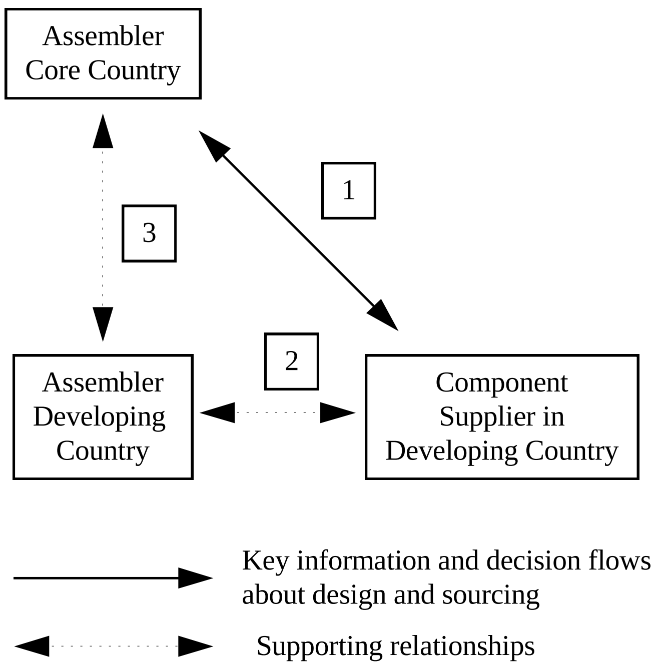
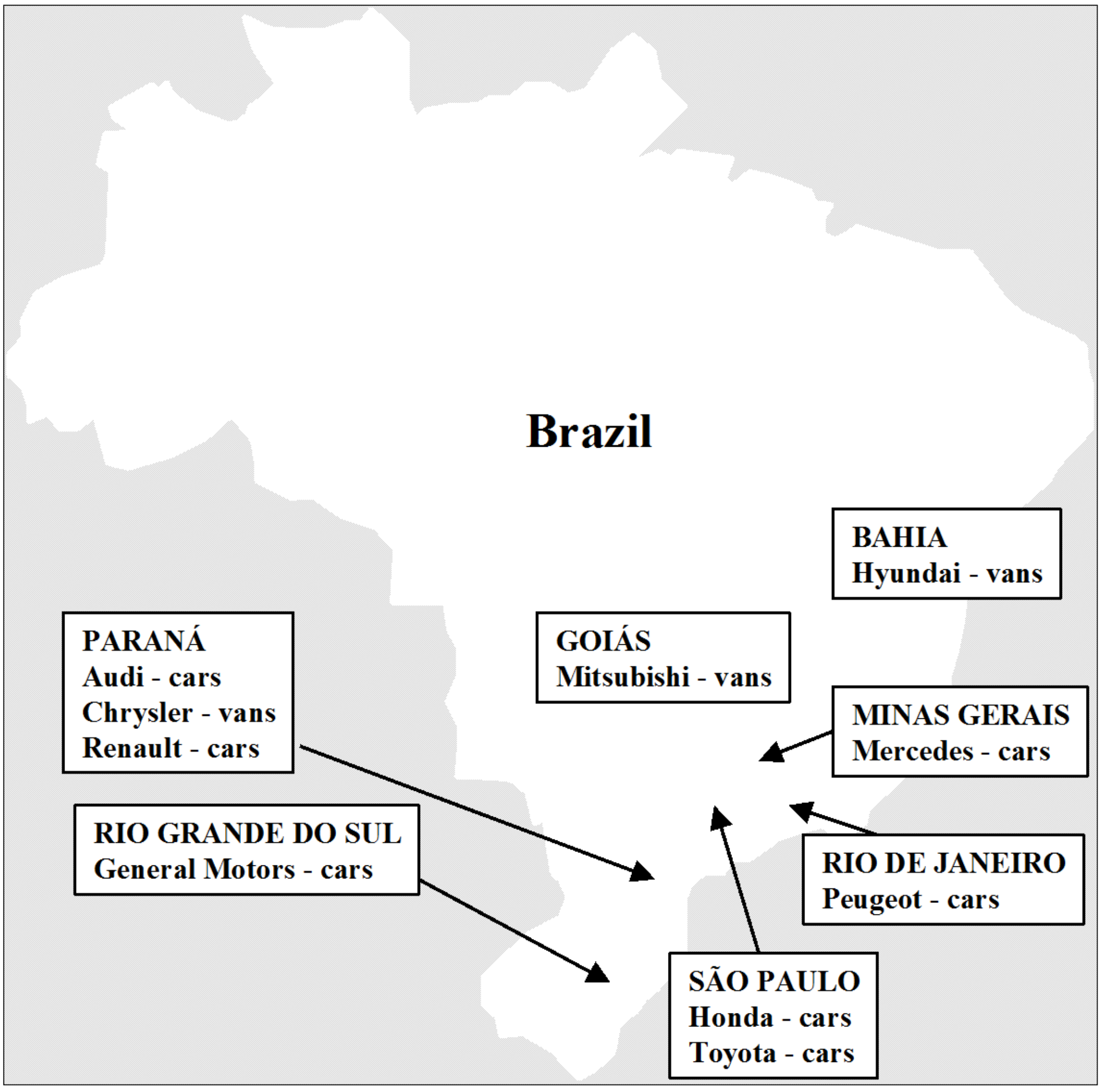


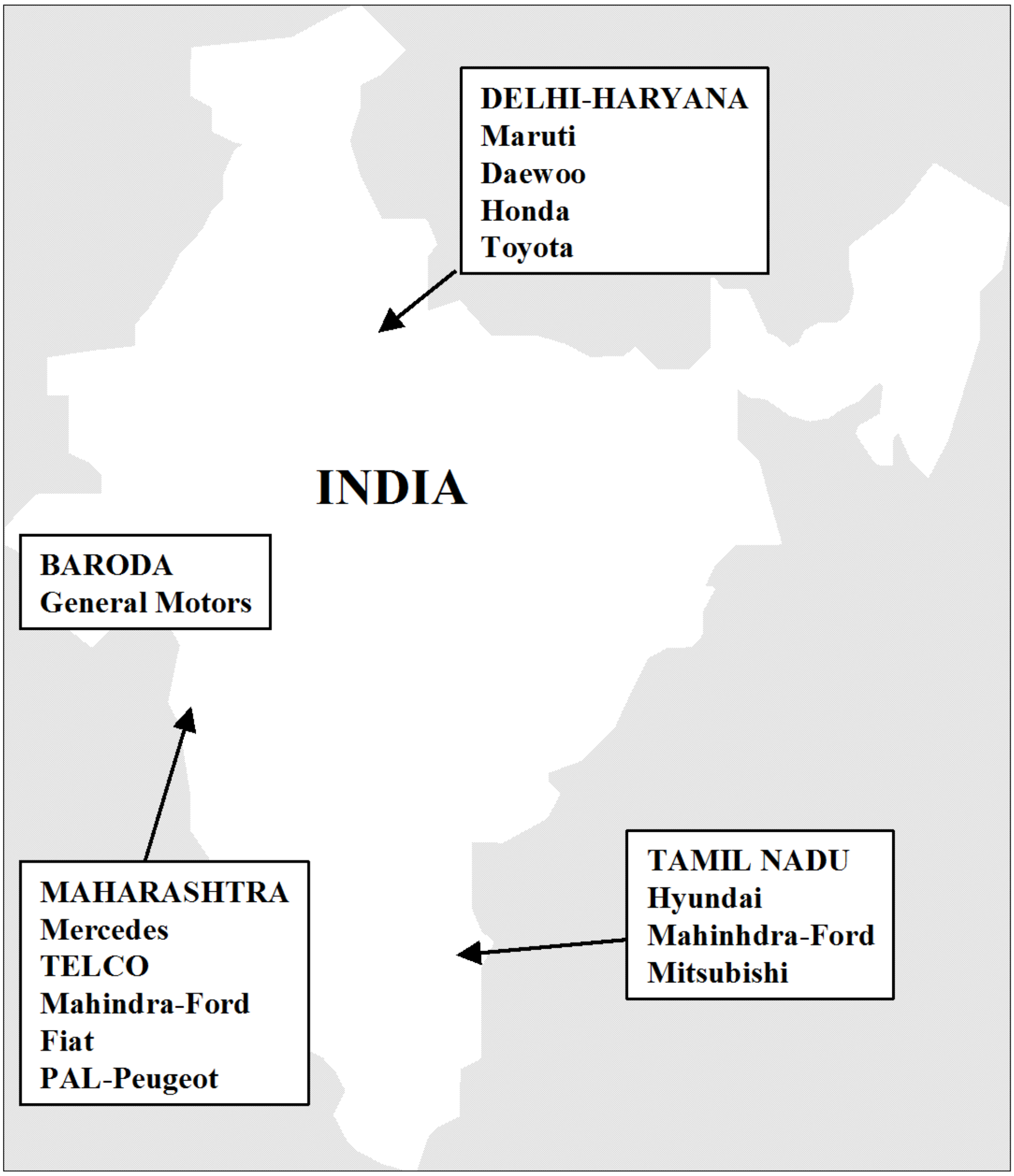
Figure Erro! Argumento de opção desconhecido.**: "Radiator Cap" Sourcing.**



Map Erro! Argumento de opção desconhecido.**: New Firms and Plants in Brazil**



Map Erro! Argumento de opção desconhecido.**: New Firms and Plants in India**



Notes

* This paper was made possible by financial support from the Institute of Developing Economies, Tokyo. Longer-term research on Brazil and India has been made possible by financial support from the Department for International Development of the UK government.

1 This includes not only engineering, but other activities involved in motoring, including banking and finance. For a discussion of the motor industry from the perspective of "motoring" as a broad activity involving the finance and use of cars as well as their construction, see Froud et al. [1997].

2 This account is based largely on Shapiro [1994], Almeida [1972] and Martins [1976].

3 Data from ANFAVEA (Associação Nacional dos Fabricantes de Veículos Automotores), Notícias da ANFAVEA, December 1975.

4 At this time, Chrysler was also producing cars in Brazil, having taken over the operations of Simca, but it withdrew at the end of the 1970s.

5 It should be remembered that in the late 1960s, Ford's British and German operations were largely distinct, producing different models and using separate supplier bases.

6 Mercedes-Benz built a new factory in Campinas, 70 miles north-west of São Paulo. Ford, GM and VW built plants to the East, in Taubaté and São José dos Campos.

7 The development of quality awareness was reinforced by an increased emphasis on quality from the Brazilian-based assemblers.

8 For a discussion of supplier relationships among Japanese companies which recognises the pressures placed upon suppliers, see Koike in this volume.

9 A more detailed discussion of these changes and their implications for the management of risk and inter-firm governance, see Laigle [1995]. Laigle also considers a fourth possibility - the involvement of suppliers in the early stages of the conception of a new model.

10 While it has often been suggested that the shift towards neo-liberal policies was imposed by international financial institutions on unwilling but weak and desperate developing country governments, this view cannot be sustained in the cases of Brazil and India. Brazil managed to resist attempts by the IMF to impose economic orthodoxy for almost a decade. Agreements were made and continually broken. In the case of India, Shastri [1997] argues convincingly that there was a change of perception by Indian policy makers themselves in the course of the 1980s. The 1991 crisis was, in part, an opportunity for reform taken by political leaders.

11 A full account of the emergence and development of the Automobile Industry Sectoral Chamber can be found in Arbix [1996].

12 Inflation peaked in the early 1990s at close to 50 per cent per month.

13 Kia and Asia Motors also announced plans for van production in Brazil, but following the Korean crisis these have been suspended indefinitely.

14 In Brazil, the existing assemblers, who were by far the most politically influential group in the auto industry, pressed for a strong localisation policy in order to reduce competition from new entrants. In India, it is not clear what factors are driving auto industry policy.

15 By 1996 MUL was the largest producer (in unit volume terms) in Asia outside of Japan and Korea. The only other car makers in the region producing more than 100,000 cars in 1995 were Proton in Malaysia and the VW joint venture in Shanghai producing the Santana. The producers of pick-ups in Thailand (Mitsubishi and Toyota) also produced close to 100,000 units in that year.

16 One of the consequences of the increased internationalisation of the auto industry is the attempts by auto companies to take control of companies in which they were content to have a minority stake when markets were more protected and isolated. For example, Peugeot has taken over its Argentine partner, and Toyota has acquired its associate in South Africa. Suzuki openly expressed its desire to take a majority stake in MUL.

17 At the end of 1997, Daewoo's plans were looking uncertain. Even before the Korean crisis, it looked like a company whose multiple commitments to expansion around the world would be difficult if to sustain.

18 A further 13 companies had turnover between US$ 50 million and US$ 100 million, of which nine were locally controlled.

19 In 1994-95 the fortieth largest component company in the world had a turnover of $1.8 billion, more than three times the turnover of Brazil's largest locally-owned component company. Even among the largest global component companies, significant consolidation is occurring.

20 Follow sourcing involves not only questions of cost, but also responsibility. Japanese consumer electronics companies in Malaysia no longer encourage follow sourcing because they do not wish to have dependent suppliers in a volatile and cost-competitive industry.

21 For a discussion of the frequent failure of companies in developing countries to sustain improvements in performance, see Humphrey et al. [1998]. For a discussion of the adoption of SPC practices merely as a routine demanded by the customer, see Posthuma [1991]. A discussion of the diffusion of quality practices through the "bandwagon effect" (if company x does it, perhaps I should too) and the "domino effect" (I am doing this because I have been told to by the customer, but I don't know why I am doing it) can be found in Cole [1989].

22 Saint Gobain of France is also setting up a joint venture with Haryana Sheet Glass Ltd.

23 This seems to be one of the lessons learnt by Japanese companies in the ASEAN countries. See Guiheux [1996].

24 The information on Lumax Industries is taken from the bulletins provided by the Centre for the Monitoring of the Indian Economy.

25 These observations draw on discussions with Yveline Lecler of the Institut d'Asie Orientale in Lyon.

26 For a discussion of low volumes in the Indian engineering industry and a comparison with South Korea, see Jacobsson and Alam [1994]. For a direct comparison of production costs in the operations of Cummins in the United States and India in the 1960s, see Baranson [1967].