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THE GLOBAL AUTOMOTIVE INDUSTRY VALUE CHAIN:

What Prospects for Upgrading by Developing Countries

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THE GLOBAL AUTOMOTIVE INDUSTRY VALUE CHAIN:

What Prospects for Upgrading by Developing Countries

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Abstract

The paper opens by mapping the changes in the global auto industry in the 1990s, showing how the rapid growth in sales and production between 1990 and 1997 came largely from the emerging markets rather than the Triad regions (North America, the European Union and Japan). However, for some of these markets the downturn that followed was substantial and prolonged.

The emergence of regional production systems resulted in regional integration. This created opportunities for industrial upgrading in developing countries with links to one of the Triad regions, where a major part of production still takes place.

The paper then describes how the relationship between assemblers and suppliers has changed. There is a growing preference for using the same suppliers in different locations (follow sourcing), which limits the possibilities for component supplying by local producers in developing countries. However, opportunities in second-tier sourcing, where a global reach is not required, do exist. The paper shows that developing countries can increase the possibility of integration into the global value chains of transnational automotive companies by opening up their domestic markets.

It concludes with emphasizing the importance of fostering networks of small firms in developing countries as a means of entering new markets.

Introduction

This paper discusses industrial development issues for the global auto industry from the perspective of a global value chain analysis. It highlights the way in which the impact of globalization processes on the auto industry of developing countries in the 1990s was influenced not only by changes in trade and investment policies and the globalization strategies of leading companies, but also by changes within auto industry value chains themselves. It is particularly concerned with the following selected countries and regions including China, India, Mexico, four countries of the Association of Southeast Asian Nations (ASEAN) (viz. Indonesia, Malaysia, Thailand and the Philippines), Argentina, Brazil, and countries in Central Europe (Czech Republic, Hungary and Poland).[1]

From the 1950s onwards, various developing countries used import-substitution industrialization policies to promote the development of their domestic auto industries. By the early 1990s, there were substantial self-contained vehicle industries in Latin America, the ASEAN region, India and China, with limited imports of vehicles and components and with few exceptions (most notably Brazil and Mexico), limited exports. Trade liberalization began to change this situation in the 1990s. Quantitative restrictions were phased out and tariffs reduced, while Trade-Related Investment Measures (TRIMs) like local content requirements and foreign exchange balancing were under increasing attack. At the same time, the global production and sales strategies of leading multinational auto companies were also shifting and developing countries were becoming more integral to their plans. This paper argues that while these changes were most evident in the assembly sector, even more significant changes were taking place in components production, driven as much by the alterations in the nature of value chain relationships between assemblers and suppliers as by the industry's globalization.

These changes have had a profound effect on the structure and characteristics of the auto industry in developing countries. This paper analyses the position of the emerging markets in the global auto industry in the 1990s, their rapid expansion in the period of 1997 and stagnation following the East Asian crisis. It considers how the industry changed in this period, what implications are for the policy options open to the governments of developing countries, and what kinds of policies will be adequate to create viable auto industries in the new environment of lower levels of protection and increasingly globalized production systems.

[1] Five countries, Indonesia, Malaysia, the Philippines, Singapore and Thailand, established the Association of Southeast Asian Nations (ASEAN) in Bangkok, in 1967. In 1984, Brunei Darussalam joined as the sixth member, followed by Vietnam in 1995 and by Lao People's of Democratic Republic and Burma/Myanmar in 1997. Cambodia joined in 1999, forming a group of 10 South East Asian Member Countries.

Mapping the global auto industry

The auto industry is often thought of as one of the most global of all industries. Its products have spread around the world, and it is dominated by a small number of companies with worldwide recognition. However, in certain respects the industry is more regional than global, in spite of the globalizing trends evident in the 1990s. This section considers the global spread of vehicle sales and production, ownership in the assembly sector and the transformation of the component sector.

The spread of global vehicle sales and production

The spread of vehicle production in developing countries increased markedly in the boom years of rapid expansion in the emerging markets in the 1990s, as can be seen from Table 1.[2] Global vehicle production rose by nearly 7 million units between 1990 and 1997, although the increase in sales over the same period lagged considerably behind this, at just under 4 million units. Much of this growth was concentrated in developing countries. In the Triad regions (the United States of America and Canada, i.e. North America, Japan and Western Europe), the vehicles industry is mature and has been plagued by overcapacity, cost pressures and low profitability. Of the three Triad economies, only North America was buoyant at the end of the 1990s. This resulted from the long boom of the United States' economy, the substitution of imported Japanese cars by cars built in transplant factories, and the remarkable and profitable shift of consumer demand from passenger cars towards light trucks. In contrast, vehicle sales in both Western Europe and Japan were less in 1997 than they had been in 1990. Overall, vehicle sales in the three Triad regions rose by only 0.6 per cent between 1990 and 1997, and production rose by 4.2 per cent.

The stagnation of production and sales in the Triad regions was in marked contrast with the growth of the industry in the rest of the world. While both production and sales of vehicles remained concentrated in the Triad economies, which still accounted for more than 70 per cent of global vehicle sales in 1997, a remarkable feature of the period 1990-1997 was that in absolute terms the increases in production and sales of vehicles in the rest of the world far outstripped the increases in the Triad regions. In the Triad regions, vehicle sales rose by 230,000 units in this period. In the rest of the world (World total minus Triad countries), sales increased by 3.8 million units. For vehicle production, the respective figures were 1.7 million units and 5.1 million units.

Rapid growth came from a few developing countries

A considerable part of this rapid growth was concentrated in a small number of developing countries. The Republic of Korea continued its rapid growth in vehicle production and exports, but perhaps the most noteworthy feature of the 1990s was the growth of what became known as the emerging markets. These included Latin America (mainly Brazil and Mexico), which emerged from the stagnation of the 1980s, the ASEAN countries, Eastern Europe,

[2] Vehicle production is a heterogeneous category. It includes everything from the smallest passenger cars to the heaviest goods vehicles and buses. An overview of the production of the world's biggest vehicle manufacturers taking this distinction into account can be found on the website of the Organisation Internationale des Constructeurs d'Automobiles (www.oica.net) (International Organization of Motor Vehicle Manufacturers).

China and India. The fast-growing emerging markets (see the definition of this group of countries in Table 1, note c), taken together, increased vehicle sales by 80 per cent and production by 93 per cent. In other words, while vehicle sales in the fast-growing emerging markets grew at a rate of almost 9 per cent per year in the seven years up to 1997, sales in the Triad economies increased at less than 0.1 per cent per year. It is hardly surprising that the attention of the auto industry was focused on the potential of the emerging markets to offset the industry's maturity and stagnation in the Triad economies and, in this way, to achieve increased economies of scale and spread the costs of developing new models.

Table 1 Unit sales and production of motor vehicles by country and region, 1990 and 1997 (thousands)

Country or region	*Unit sales*		*Production*[a]	
	1990	*1997*	*1990*	*1997*
United States/Canada	15 464	16 922	11 704	14 690
Western Europe	15 005	14 829	15 568	16 825
Japan	7 777	6 725	13 487	10 975
Mexico	550	503	821	1 338
South America	1 201	3 270	1 121	2 803
Eastern Europe (excluding Russia)	1 090	1 060	1 266	1 686
Republic of Korea and Taiwan Province of China	1 437	1 995	1 674	3 199
ASEAN	848	1 347	841	1 325
China	704	1 616	509	1 583
India	357	761	364	770
Other[b]	3 367	2 752	3 275	2 407
World Total	47 800	51 780	50 421	57 257
Triad regions	38 246	38 476	40 759	42 490
Fast-growing emerging markets[c]	4 750	8 557	4 922	9 505
Other markets	4 804	4 747	4 740	5 262
Growth, 1990-1997 (%)				
World	8.3		13.6	
Triad	0.6		4.2	
Emerging markets[c]	80.1		93.1	
Other markets	-1.2		11.0	

Source: Fourin (1998).
Notes: [a]The substantial difference between global production and global sales is probably accounted for by sales in countries for which data are not available and by the counting of completely knocked-down kits (CKD) or semi-knocked-down kits (SKD) as production in both country of origin and country of destination.
[b]Russia, the whole of Africa, Oceania and other unspecified producers.
[c]ASEAN, China, Eastern Europe, India, Mexico, South America.

Following the crisis in East Asia, optimism about the prospects for emerging markets dampened considerably. Rising interest rates, recession and collapsing consumer confidence led to a 69 per cent decline in vehicle sales across the ASEAN region between 1997 and 1998. The East Asian crisis also had a direct impact on Brazil, where interest rates were doubled to defend the currency and vehicle sales fell by one-third. Not all emerging markets were affected directly by this international financial instability, but even those markets insulated by exchange and investment controls showed lacklustre performance in 1998 and 1999.

The extent of the downward trend can be seen in Table 2. In 1996, the Economist Intelligence Unit forecast strong sales growth in all of the significant emerging markets. However, actual sales fell in the ASEAN region, Brazil, and India, while in the Central Europe, the actual growth of the sales was only 5 per cent less then the one predicted. The rate of growth of vehicle sales in China was less than half that predicted, while in Argentina and Mexico actual sales were above those predicted. Furthermore, in both Argentina and Mexico, rising vehicle sales were merely recouping losses suffered in 1994-1995. Argentine vehicle sales in 1998 were still below the level recorded in 1994, and in Mexico, domestic sales for 1998 were only 9 per cent above the 1994 level.[3]

Table 2 Forecasts and outcomes of growth in vehicle sales in selected emerging market regions, 1996-1998 (Percentage)

Country or region	*Forecast growth 1996-1998*	*Outcome 1996-1998*
ASEAN[a]	+10	-68.5
Argentina	+10	+21.0
Brazil	+14	-11.4
China	+22	+10.7
India	+38	-25.3
Central Europe[b]	+29	+23.6
Mexico	+75	+93.5

Sources: Forecasts: EIU (1996a, 1996b). Outcomes: Argentina (ADEFA, 2002), Brazil (ANFAVEA, 1999), ASEAN, China and India (ANFAVEA, 2001), Central Europe (Automotive Emerging Markets, 1999) and Mexico (AMIA, 2002).
Notes: [a]Indonesia, Malaysia, Philippines and Thailand.
[b]Czech Republic, Hungary and Poland.

For a number of the emerging markets, the downturn in the domestic market was substantial and prolonged. A comparison of sales in the domestic market in 2001 with sales in the peak years of the 1990s for a small number of the emerging markets for which data are available is presented in Table 3. In the cases of Argentina and Brazil, sales in 2001 were substantially below those in 1997, and in the case of Thailand, they were substantially below those in 1996. In India, sales increased only slightly between 1996-97 and 2001-2002. Mexico is the sole country where 2001 sales were substantially higher than the peak year in the 1990s.

[3]Data on domestic auto sales in Mexico based on retail sales, as presented on the AMIA website.

Table 3 Recovery and stagnation of vehicle sales in selected emerging markets, 1996/1997-2001 (Percentage)

Country	*Base year*	*2001 sales in relation to base year*
Argentina	1997	-58.6
Brazil	1997	-18.2
India	1996-1997	+4.7[a]
Mexico	1994	+55.8
Thailand	1996	-49.4

Sources: Argentina (ADEFA, 2002); Brazil (ANFAVEA, 1998, 2002); India, (ACMA, 1999 and India Infoline, 2002); Mexico (AMIA, 2002); Thailand (*Bangkok Post*, 2002).
Note: [a] Data for financial year April 2001 to March 2002, compared with financial year 1996/1997.

Ownership in the assembly sector

The geographical spread of vehicle output and sales in developing countries has not been accompanied by a spread of ownership in the assembly sector.[4] Globally, the auto industry remains concentrated, with a small number of companies accounting for a significant share of production and sales. While there were some new entrants to the assembly sector in the 20-30 years up to the late 1990s (including firms like Hyundai in the Republic of Korea and Proton in Malaysia), the effect of the East Asian crisis was that the prospects of these challengers to the dominance of the established manufacturers were undermined. Competition between the Triad producers has led to further concentration.

The degree of concentration in the global auto industry in 2001 is shown in Table 4. In 2001, 13 companies produced more than 1 million vehicles each. Taken together, these 13 firms accounted for around 87 per cent of the world's vehicle production. In fact, the figures underestimate the degree of concentration. First, a number of leading companies have significant shareholdings in smaller vehicle producers, and over time this has led to increasing cooperation in both vehicle development and production. For example, GM, has a 49 per cent stake in Isuzu and a holding in Fiat, and Renault owns nearly half of Nissan and further concentration is inevitable. [5]

Investment in the assembly industry in developing countries

One feature of the auto industry in the 1990s was the way in which leading vehicle manufacturers extended their operations in developing countries. In part, this was driven by the sales growth shown in Table 1. For the global producers, rapidly growing markets in developing countries were meant to provide for spreading vehicle development costs; for establishing cheap production sites for the production of selected vehicles and components; and for access to new markets for higher-end vehicles, which would still be produced in the Triad economies. The extent to which leading firms have expanded their production capacity in developing countries is shown in Tables 5 and 6. These provide data on light-vehicle assembly plants owned by the top ten vehicle companies in 11 major developing countries**.** At the beginning of the 1990s, the ten largest vehicle assemblers had 28 light-vehicle assembly plants in the leading emerging markets. The North

[4]The auto industry is divided between the assemblers, firms such as GM and Toyota, and component manufacturers, who supply many of the parts for vehicles.
[5]"Global joint ventures and affiliations for 1999", available on the Automotive Industries website at www.ai-online.com.

American and European manufacturers were strong in Latin America, while most Japanese-owned plants were in Southeast Asia. There were few plants owned by the leading global companies in Eastern Europe, and none in India. As a result of extensive foreign direct investment (FDI) in the developing countries in response to the dynamism of these markets, the situation had altered dramatically by the late 1990s. Table 6 shows that the number of assembly plants had risen to 62, and all the assemblers had increased their global coverage as follows.

(a) Assemblers with plants in emerging markets opened new plants in these same markets in the 1990s.

(b) North American and European manufacturers opened new plants in Eastern Europe. Smaller assemblers such as Suzuki and Daewoo (not shown in Table 6) also invested in Eastern Europe at this time.

(c) There was a massive entry of companies into India.

(d) More companies entered the Chinese market.

(e) The producers from North America had begun to challenge the dominance of those from Japan in the ASEAN markets. There was also a challenge from Korean manufacturers in these markets, which is not shown in the tables.

(f) Japanese firms entered the Latin American market.

Table 4 Vehicle production by company, 2001

Company	*Production (millions of units)*	*Share of global production (percentage)*	*Cumulative share of global production (percentage)*
General Motors	7.6	13.6	13.6
Ford	6.7	12.0	25.6
Toyota	6.0	10.9	36.5
Volkswagen Group	5.1	9.2	45.7
Daimler/Chrysler	4.4	7.8	53.6
PSA Group (Peugeot and Citroen)	3.1	5.6	59.1
Honda	2.7	4.8	63.9
Nissan	2.6	4.6	68.5
Hyundai	2.5	4.5	73.1
Fiat	2.4	4.3	77.4
Renault	2.4	4.3	81.7
Mitsubishi	1.6	3.0	84.6
Suzuki	1.5	2.8	87.4
Other manufacturers	7.0	12.6	100
Total	55.6	100	100

Source: Organisation Internationale des Constructeurs d'Automobiles, (www.oica.net)

In many cases, the investments exceeded the potential of the markets that they were meant to serve, even before the East Asian crisis had undermined growth prospects in the ASEAN region and Latin America (see Box 1). In part, they were driven by oligopolistic competition between global auto companies. This created over-investment so that capacity increases greatly exceeded any realistic short-term sales expectations. Unfettered FDI led to

proliferation of producers and excess capacity. Only China avoided this fate in the 1990s, by maintaining strict control over it.

Table 5 Main light-vehicle assembly plant investment in emerging markets by Triad automakers, early 1990s

Country	*GM*	*Ford*	*VW Group*	*Daimler/ Chrysler*	*Fiat*	*Renault*	*PSA Group*	*Toyota*	*Nissan*	*Honda*
Mexico	X[a]	X	X	X					X	
Argentina		X	X			X	X			
Brazil	X	X	XX		X					
Malaysia								X	X	
Thailand								X	X	X
Indonesia								X		X
Czech/Slovak			X							
Poland	X				X	X				
Hungary										
India										
China			X	X			X			

Source: International Finance Corporation (1994), p. 14, amended with author's own calculations.
Note: [a]X = Plant operational by early 1990s. XX = Two assembly plants.

Table 6 Main light-vehicle assembly plant investment in emerging markets by Triad automakers, late 1990s

Country	*GM*	*Ford*	*Daimler/ Chrysler*	*VW Group*	*Fiat*	*Renault*	*PSA Group*	*Toyota*	*Nissan*	*Honda*
Mexico	X[a]	X	XX[b]	X					X	X
Argentina	X	X	X	X	XX	X	X	X		
Brazil	XX	XX	X	X,XX	X	X	X	X		X
Malaysia							X	X	X	
Thailand	X	X						X	X	X
Indonesia	X							X		X
Czech/Slovak				X		X				
Poland	XX	X			XX					
Hungary	X			X						
India	X	X	X		X			X		X
China	X	X	X	X			X		X	X

Sources: International Finance Corporation (1994), p. 14; Storey (1998); for Brazil, ANFAVEA (1998); for China, Polly (1998); for Central European countries, Havas (2000).
Notes: Tables 5 and 6 should only be taken as a rough guide to global expansion in the vehicle industry. They exclude very small assembly plants. They include some, but not all, assembly plants in which the leading firms only have small minority stakes. Some companies, such as Renault, have expanded significantly in countries not included in the tables. Finally, the tables underestimate expansion in cases where expansion has been achieved predominantly through the enlargement of existing plants.
[a]X = Plant operational by late 1990s. [b]XX = two light-vehicle assembly plants owned by the company in the same country.

The rush to invest in the emerging markets can be illustrated by the cases of Brazil and India. In Brazil, existing vehicle manufacturers invested heavily after 1994-1995 and a number of new entrants announced investment plans. As can be seen in Table 7, a large number of companies were making new investments in light-vehicle assembly capacity at the end of the 1990s. The four established producers, Fiat, Ford, GM and VW, were all building new plants in the late 1990s, and another nine companies had announced plans to

build light-vehicle plants. The total amount of capacity arising from these investments was 800,000 vehicles. While the new plants were coming on stream, light-vehicle sales fell and did not recover, as is shown in Table 3.

A similar pattern of investment was seen in India. With the liberalization of the Indian economy and a relaxation of restrictions on FDI in the auto industry, leading multinational companies entered the market for the first time in the late 1990s. By 1997, ten companies had announced firm plans to begin production in India. The new capacity of these plants was 660,000 passenger cars a year (as can be seen in Table 8), and yet total vehicle sales growth in five years from 1996-1997 to 2001-2002 was only 4.7 per cent (Table 3). Total sales of passenger cars and utility vehicles in the latter year were less than 700,000 units.[6]

Box 1 Over-investment in Viet Nam

The most extreme case of crowding into a small market is probably Viet Nam. At the end of the 1990s, "eleven automakers have recently begun assembling passenger cars, sports-utility vehicles, utility vehicles, passenger vans, and freight trucks. Of these, about 75% were imported, leaving eleven manufacturers to battle for the share of about 5000 locally assembled vehicles."[7] It is worth noting that in Europe popular models such as the VW Polo and Golf, Fiat Punto and GM Corsa were each being produced in volumes exceeding 500,000 units per year in the second half of the 1990s.

Adding the capacity of the country's leading car producer, Maruti, to these figures would bring total installed passenger car capacity to over 1 million units. Not surprisingly, a number of the investment plans in the table had been scaled back by 2000.

Table 7 New companies and factories for light-vehicle production, Brazil, 1996-2001

Company and product	*Annual capacity (units)*	*Opening date*
Honda (Civic)	30 000	1997
Land Rover (Defender)	15 000	1998
Renault (Scénic, Clio II)	80 000	1998
Toyota (Corolla)	30 000	1998
Mitsubishi (light vehicles, CKD)	3 000	1998
Daimler-Chrysler (Dakota)	12 000	1998
Daimler-Chrysler (A Class)	40 000	1999
VW-Audi (A3, Golf)	170 000	1999
PSA-Peugeot (206 and Picasso)	40 000	2000
GM (Celta)	120 000	2000
Iveco and Fiat (LCVs)	10 000	2000
Ford (Amazon small car)	250 000	2001

Sources: Laplane and Sarti (2002), ANFAVEA (2002), Alves Filho (2002).

Note: For CKD see notes on Table 1

[6] India Infoline (2002).
[7] Sturgeon and Florida (1999), p. 49.

The data on global production and sales of vehicles indicate a trend towards increasing global spread, combined with the continuing (and increasing) dominance of the largest companies. However, this does not mean that the industry is truly global. To what extent do global companies still rely upon their home markets for their production and sales, and to what extent are national production and marketing systems being replaced by regional systems rather than truly global ones? This question is relevant not just for understanding the nature of globalization in the auto industry, but also for considering the policy options for developing countries within global auto markets.

Table 8 New ventures in the Indian car industry, late 1990s

Companies	*Models*	*Capacity (thousands)*	*Ownership*
PAL/Fiat	Uno/Palio Family	30	Fiat 76%, PAL 24%
PAL-Peugeot	309		Peugeot pulled out of this venture at the end of 1997
Daewoo	Cielo	80	Daewoo 91%
	Matiz	70	
Mahindra/Ford	Escort	25	Ford 90%, Mahindra & Mahindra, 10%
	Ikon	100	
TELCO/Mercedes	E series	20	50:50
Birla/GM	Astra	25	50:50
	Corsa		
Hyundai	Santro	100	Hyundai 100%.
Shriram/Honda	City	30	Honda 90%. Shriram has an option to buy back 30%
Telco	Indica	150	Wholly-owned by leading Indian conglomerate and truck manufacturer, Tata
Kirloskar/Toyota	Kijang	N/A	Toyota 70%
HML/Mitsubishi	Lancer	30	Information not available
Total new capacity		660	

Sources: Various.

The development of regional production systems

Leading light-vehicle manufacturers have extended their reach, producing and selling vehicles in an increasing number of markets. Nevertheless, their core markets remain important. The global distribution of vehicle production and sales for the leading companies can be seen in Table 9, which shows clearly that for each of the nine firms in the table, light-vehicle production remains heavily concentrated in the home region. Only Honda produced 57 per cent of its global production in its home region in 1997. For the North American and European companies, sales were equally concentrated in the home region. GM, Ford, VW and Fiat sold on average 63 per cent of their vehicles in their home markets in 1997 (63, 64, 59 and 66, respectively). For the two French producers, PSA (the owners of Peugeot and Citroen) and Renault, the concentration is much higher, reflecting the absence of a globalization strategy in the case of Peugeot, and the failure to establish a viable North American presence in the case of Renault**.** Renault's attempt to establish itself in the North American market in the early 1990s effectively prevented it from diversifying its production and sales in other parts of the world, as it had neither the finance nor the managerial resources to develop other global operations. The only companies, which were selling less than 50 per cent of their light vehicles in their home region, were the Japanese producers (viz. Toyota, Nissan and Honda). This reflects their successful

penetration of North American and West European markets. Initially, these markets were served by exports from Japan, but in response to protectionist pressures, the leading Japanese manufacturers have also set up production facilities in these regions. Nevertheless, the table shows clearly that production was still concentrated in Japan. The three leading Japanese companies produced the same proportion of their total global vehicle output in Japan as GM, Ford, VW and Fiat produced in their home regions. This concentration of production in home locations is changing slowly, if at all.

Table 9 Production and sales of light vehicles in home region by company, 1997

Company	*Region*	*Region's share in global production (unit percentage)* 1997	*Region's share in global sales (unit percentage)* 1997
General Motors	North America[a]	69	63
Ford	North America[a]	67	64
Volkswagen Group	Western Europe	62	59
Fiat	Western Europe	60	66
PSA	Western Europe	85	84
Renault	Western Europe	97	93
Toyota	Japan	73	43
Nissan	Japan	62	42
Honda	Japan	57	36

Sources: 1997 production and sales figures, Storey (1998); additional information taken from Automotive Industries (1999), ACMA (1999) and the websites of national auto manufacturers' associations. The author is grateful to Tim Sturgeon for supplying data on China, Justin Barnes for data on South Africa and Yveline Lecler for data on Toyota's production in Southeast Asia.
Note: [a]United States, Canada and Mexico.

Regional markets in the auto industry

The continuing importance of the home region must not obscure the fact that within these regions there have been significant changes. The process of regional integration started in the 1960s in North America with the free flow of vehicles and components between the United States and Canada, while in Europe, Ford and GM began to integrate their operations in the 1970s. In both continents production systems increasingly came to be defined at the regional level. Vehicles and components were designed and produced for the region as a whole, and single plants became responsible for the whole region's production of high-volume items such as engines and gearboxes. In Europe, not only did Ford and GM integrate assembly plants in Spain into their European division of labour, but Volkswagen, too, purchased Seat and integrated it into its European production system, using common components and platforms across the Seat, Volkswagen, Audi and Skoda brands.[8]

North America

In the 1990s, this process took a further, decisive step forward. In North America, Mexico became increasingly integrated into the North American production system. From the early 1980s, Chrysler, Ford and GM had begun to build export-oriented plants in Mexico, producing both vehicles and components for the North American market. However, this created two parallel production systems in Mexico, one oriented towards the protected domestic market, and the other for the United States-Canada production system. The NAFTA Agreement created the basis for much deeper integration. Even prior to the complete phase out of import restrictions and

[8] For a detailed discussion of Spain's integration into the European production systems of global total assemblers see Layan (2000).

tariffs in 2003-2004, the agreement reduced tariffs on vehicles and components imported into Mexico, and allowed companies exporting from it to import products on favourable terms (see more in Box 2). This promoted a division of labour between plants in Mexico and those in the United States and Canada. Mexico has proved an attractive location for vehicle assembly and labour-intensive components production. "Within North America, Mexico is at once an important site for low-skilled, labour-intensive production; has an export capacity in engines; and has emerged as an important source of assembled vehicles".[9]

Box 2 The reorientation of the Mexican auto industry

In 1980, Mexico was not linked to the North American vehicle market. It exported 18,245 vehicles, 3.7 per cent of total vehicle production, but 98 per cent of these vehicles were exported to Latin America and Western Europe. By 1990, the profile of Mexican vehicle exports had completely altered. Total exports had increased to 276,869 units, 33.7 per cent of total vehicle production, and 90 per cent of these vehicles were exported to North America.[10] By 2001, total vehicle exports had risen to 1.8 million units.[11] NAFTA has also opened up vehicle imports into Mexico. Up to 1995, the domestic market was protected. While Mexico exported more than 250,000 vehicles in 1990, it imported only 5,376 vehicles (less than 1 per cent of domestic vehicle sales). With NAFTA, vehicle imports began to increase. Even in the transition period, companies exporting vehicles and components from Mexico can import vehicles and components without duty into Mexico. By the end of 2003, there will be no restrictions on trade in vehicles within NAFTA.

Europe

In many respects, similar processes were taking place in Europe, where the auto industries of Central Europe were transformed and integrated into West European production systems in the course of the 1990s, creating a regional production system characterized by a high degree of regional integration and interdependence.[12] In the early 1990s, following the collapse of their political and trading systems, governments in Central Europe looked to the European Union for FDI and for their long-term political future. They adopted hands-off industrial policies without attempting to develop a common Central European policy. In some respects, it was easier for Central European countries to trade with the EU than with each other. FDI was seen as the means to restructure ailing state-owned industries, and the three main car producers in the region, Skoda in the former Czechoslovakia, and FSM and FSO in Poland, had been sold to foreign buyers by 1995.

Two forms of integration in Europe

As in North America, the key driving force in the restructuring of the Central European auto industry was the creation of production networks integrating it with Western Europe. Some quotas were placed on imports from Western Europe, particularly for second-hand cars, but phased reductions in tariffs were agreed, leading to free trade in cars between the EU and countries of Central Europe by 2001-2002.[13] Trade regulations for imports into the EU were also designed to create a regional market. As long as vehicles in Central

[9] Lynch (1998), p. 21.
[10] Durán et al. (1997), p. 45.
[11] AMIA (2002).
[12] This analysis focuses solely on the countries of Central Europe most integrated with the car industry of the EU: the Czech Republic, Hungary and Poland.
[13] Sljivic (1995), p. 44.

Europe met the European content requirement of 60 per cent, they could be imported duty-free into Western Europe. This favoured those firms from the EU, which sourced components for Central European assembly, and disadvantaged Japanese and Korean firms, which had targeted Central Europe as a base from which to access the EU market.

Integration between the motor industries of Western and Central Europe has taken two forms. First, there was an increasing two-way trade in vehicles. Central Europe offered both growing domestic markets and low-cost production sites to Western European assemblers (including firms from Japan and North America with operations in Western Europe). Putting precise figures on both production and trade of vehicles in the Visegrad countries (that is, Czech Republic, Hungary, Poland and Slovakia) is not easy. A 1999 report by the Economist Intelligence Unit noted the problems caused by wide divergences in local content between different manufacturers and different definitions of cars and commercial vehicles. Misreporting of local content and local production by new entrants to some markets in Central Europe is also a complicating factor.

Nevertheless, the overall picture is clear. Sales of passenger cars in Central Europe grew strongly in the mid-1990s, although growth slowed after 1997. In the early part of the 1990s, significant shares of these sales were supplied by imports from Western Europe, which accounted for 49 per cent of sales in 1996. However, this share has been decreasing. Central Europe has been increasing its exports of passenger cars to the EU. Exports of passenger cars from Central Europe to the EU increased from 197,000 units in 1993 to 559,000 units in 1999 (see Box 3). [14] Many of these cars were small, petrol-engine vehicles (with engines less than 1.5 litres). Although this category of passenger car has become much less important for the Czech Republic in the latter part of the 1990s, it remains dominant for exports from Poland. In 1999, more than 99 per cent of passenger car exports fell into this category.

Box 3 The changing European division of labour

Central Europe began to replace Spain as the continent's preferred location for low-end car production in the 1990s. In the 1980s, Spain was a major market for small cars and a major exporter of these cars to the rest of the European market. In 1989, 88 per cent of Spanish passenger car exports to the rest of the EU had engines of 1.5 litres or less. By 1999, this figure had fallen to 48 per cent.

This resulted from the changing production strategies of leading European manufacturers. Fiat Poland is fully incorporated in Fiat's European division of labour. It concentrates on small-car production, primarily the Fiat Cinquecento, but also the Palio (Fiat's car for emerging markets), for which Poland is Fiat's only European production site.

Second, a number of export-oriented engine and component plants were built in Central Europe in the 1990s. The most notable examples are the Audi and Opel (GM) engine assembly plants in Hungary, which were constructed to assemble parts imported from Germany for re-export back to assembly operations in Western Europe. A further example is Ford's component plant

[14] Eurostat (1998, 2000).

in Hungary. The development of low-end car assembly plants and export-oriented component plants has certain similarities with the development of the Mexican auto industry in the 1990s. Both Volkswagen and Fiat have developed local supplier bases in Central Europe through a mixture of encouraging follow sourcing by major transnational companies in components and the upgrading of existing local suppliers.

The cases of Mexico-North America and Western-Central Europe are not the only examples of regional production systems. Within the emerging markets, there have also been attempts to overcome the problems of the limited size of domestic markets through regional integration strategies. The most notable of these has been the Mercosur agreement, which led to a substantial division of labour in automotive manufacturing between Argentina and Brazil in the latter part of the 1990s.

Division of labour between Argentina and Brazil

The integration of the auto industries of Argentina and Brazil began in 1990 with the signing of the Economic Complementation Agreement in Buenos Aires. This allowed for tariff-free trade in automotive products between Argentina and Brazil, subject to trade balancing and quotas.[15] Regional trade in the industry increased as a result of three factors: the signing of the Mercosur agreement in 1995; the reversal of trade liberalization for vehicles adopted in Brazil in the early 1990s; and, the development of similar auto industry sectoral policies in both Argentina and Brazil. The extent of regional integration can be seen in Table 10. Within six years, the total value of trade in vehicles between the two countries increased from under US$18 million to more then US$1 billion. Over the same period, trading components increased from US$95 million to over US$800 million. Almost all exports of vehicles from Argentina were directed towards Brazil by 1996. While dependence of Brazil on the auto market in Argentina was less marked, it was by far the most important destination for its products.[16]

By the late 1990s, a genuine regional automotive production system was developing in Mercosur, based on a division of labour in vehicle and components production between Argentina and Brazil. The major assemblers, all of whom planned to have assembly plants in both countries by the year 2000, were beginning to rationalize vehicle production and also to source major components from just one site in each country**.** Nevertheless, intra-regional trade remained highly managed, and the auto industry was one of the main exemptions from harmonization and reduction of external tariffs as well as from free trade between Mercosur countries. The external tariff and the effective rate of protection were much higher for vehicles than for any other product.[17]

[15] Roldán (1997).

[16] Data on the Mercosur share of Brazilian automotive exports provided by SECEX and calculated by Ruy Quadros and Sérgio Queiroz at the University of Campinas show lower levels of Brazilian dependence on the Argentine market.

[17] Laird (1997).

Table 10 Automotive trade between Argentina and Brazil, 1990 and 1996

Product	*Year*	*From Brazil to Argentina*		*From Argentina to Brazil*	
		Value (US$ millions)	*Share[a] (percentage)*	*Value (US$ millions)*	*Share[b] (percentage)*
Cars	1990	16.0	3.9	1.8	10.2
	1996	334.1	54.0	766.1	95.3
Parts	1990	43.9	8.2	51.1	40.1
	1996	534.8	41.0	273.5	77.2

Source: Laplane and Sarti (1999), p. 7, cited in Lung (2000), p.22.
Notes: [a] % of total Brazilian automobile exports.
[b] % of total Argentine automobile exports.

A detailed analysis of automotive trade for Brazil shows that the leading vehicle producers are involved in a complex division of labour that stretches far beyond the region. This is shown clearly in Box 4. Vehicles and components are flowing within the region in both directions, and there are important two-way flows of vehicles and components from Brazil to all of the Triad economies. This shows just how complex the international division of labour has become.

Nevertheless, the developing regional division of labour within Mercosur was undermined by exchange rate instability in the latter part of the 1990s. While the Argentine exchange rate was tied to the US$ between 1991 and January 2002, the exchange rate of the Brazilian currency was managed by the Central Bank. A steady devaluation of the Brazilian Real in the latter part of the 1990s was followed by an exchange rate crisis and a sharp devaluation in 1999. This devaluation disrupted the basis of the division of labour within Mercosur, making Argentine components production, in particular, uneconomic. According to Laplane and Sarti, following the devaluation: "The number of cars and light commercial vehicles imported from Argentina decreased 49 per cent, both as a result of the drop in demand and as a result of higher prices in Brazilian currency".[18] While automotive trade between the two countries has been managed by the two governments so as to limit imbalances, plants at the company level for regional integration were severely undermined. The devaluation of the Argentine currency in 2001 did not resolve the problem. While it made Argentine exports to Brazil more competitive, it severely disrupted the domestic economy and led to a sharp decline in automotive production.

Integration in ASEAN

A further example of regional integration is provided by the case of ASEAN. However, here a series of regional agreements for the auto industry, beginning with the ASEAN Industrial Co-operation (AIC) scheme in 1981, followed by the Brand-to-Brand Complementation (BBC) scheme in 1988 and the AICO (ASEAN Industrial Co-operation Organization) scheme in 1996, largely failed to promote a regional division of labour.[19]

[18] Laplane and Sarti (1999), p. 5.
[19] Based largely on Guiheux and Lecler (2000).

Box 4 Brazilian vehicle manufacturers and international division of labour

Ford's main export products from Brazil are not cars but electronic components (radios) sold mainly to the United States. Passenger cars and commercial vehicles are exported mostly to Argentina. It imports parts (mainly from Europe and the United States), electronic components and systems (mainly from the United States and Japan), cars (mainly from Argentina and Europe) and commercial vehicles (mostly from Argentina).

In 1997, more than 50 per cent of Ford's exports value and 4.6 per cent of its imports value were related to trade with Argentina. Actually, official data underestimate car imports by Ford from Mercosur. In 1997, Ford imported 75,000 vehicles from Argentina (mostly Escort cars). Due to conflicting views between government agencies and Ford about how to register those imports, official foreign trade data do not include such figures yet. Ford's strong dependence on foreign trade is the result of the highly specialized nature of its output in Brazil, where its plants produce only two models of small cars (Ka and Fiesta). All other car models sold in the Brazilian market have to be imported, either from Argentina (60,000 Escort units in 1997) or from Europe (Mondeo).

Fiat plants produce several car models (Uno, Palio and Marea), beside commercial vehicles. It exports parts and CKD Palio cars to subsidiaries in other developing countries, as well as light commercial vehicles and the station-wagon version of the Palio to Italy. It imports cars from Argentina (Uno and Siena, the sedan version of the Palio) as well as larger models from outside the region (Italy). In spite of having increased its local output of parts, Fiat still strongly depends on imported parts (from Italy) and engines (from Argentina).

GM is heavily dependent on imports of parts, engines and electronic components from Canada, France, Germany, Japan, Spain, the United States and the UK. Imports of vehicles are small and mostly from Argentina (light commercial vehicles). Unlike the other leading constructors, GM produces not only small cars but also medium-size models (Astra and Vectra) in Brazil.

On the export side, GM's main market is Argentina and its main export product is passenger cars and commercial vehicles. It operates two plants in Argentina: one assembles CKD pick-ups imported from Brazil and the other produces small cars (Corsa). GM's Brazilian subsidiary also exports engines to Europe (Belgium, Germany and the UK) and the United States.

Volkswagen is not as engaged in foreign trade as the other leading constructors. It has low export/sales and import/sales ratios. Around 74 per cent of its exports and 27 per cent of its imports are related to the regional market. Its main export products are passenger cars (43 per cent), parts (22 per cent), commercial vehicles (16 per cent) and engines (9 per cent). The low import/sales ratio is related to the fact that Volkswagen's leading car model in sales (the Gol, not to be confused with the Golf) is built largely using locally produced parts. Imports come mainly from Germany (42 per cent, mostly parts and Passat car models), Mercosur (26 per cent, mostly parts, engines, and Gol and Polo car models), Spain and Mexico.

Source: This box is an edited extract from Laplane and Sarti (1999), pp. 9-11.

Regional integration in ASEAN remained limited for two important reasons. First, the four main vehicle producers in the region continued to promote their own national industries. Malaysia and Indonesia, in particular, adopted policies of promoting their national auto industries with some degree of local ownership. Second, national preferences for vehicle types remained significantly different among the ASEAN countries, which prevented an effective division of labour.

The consequences are evident in Table 11. For each of the ASEAN-4 countries, only a small share of total component exports were directed towards the other ASEAN vehicle producing countries, except for Singapore.

The high level of exports to Singapore might be re-exported. A similar picture emerges when vehicle and component import data are analysed. For example, in 1996, 85 per cent of vehicles and components imported into Thailand came from Japan and Germany.[20] Data at the company level provided by Guiheux and Lecler support these findings. Japanese companies made little use of the BBC scheme, and Guiheux and Lecler did not expect the introduction of the AICO scheme to change this situation in the short term. While it is true that the 1997 Asian crisis put regional auto industry integration back on the agenda in ASEAN, it is just as likely to lead to the integration of Thailand, in particular, into broader regional and global divisions of labour. One of the responses of assemblers in Thailand to the continuing sluggishness of the domestic market (see Table 3) was to increase exports of vehicles, particularly pick-ups, to markets outside the ASEAN region, using Thailand as a global source of pick-up trucks.

Table 11 Components trade between the ASEAN-4 countries by destination, 1995
(Percentage total component exports)

Exports to:	*Exports from:*			
	Thailand	*Indonesia*	*Malaysia*[a]	*Philippines*
Thailand	-	1.2	2.9	9.2
Indonesia	1.1	-	1.9	1.8
Malaysia	3.5	2.1	-	0.7
Philippines	1.4	3.0	1.9	-
Singapore	19.5	31.2	17.4	0.4
Viet Nam	0.9	0.8	0.1	0.2
Japan	15.7	11.7	8.4	31.8
Others	57.9	50.1	67.5	55.9
Total	100	100	100	100

Source: Guiheux and Lecler (2000), p. 213.
Note: [a] Data refer to 1994.

The data on regional integration sustain three important conclusions. First, the extension of the North American and West European production systems to include their immediate peripheries has created substantial new divisions of labour and drastically restructured the auto industries in Mexico and Central Europe. Second, in the case of Mercosur an undoubted process of regional integration and division of labour exists alongside complex and increasing trade in vehicles and components between Mercosur and the Triad economies. Here, the option is not to develop regional trade or enter into a wider global division of labour. Both processes are taking place simultaneously. Third, for those countries which are not included in effective regional groupings (either because the countries in the region cannot agree to integrate, or because there is no obvious regional group), the tendency towards the increased division of labour with the non-regional world, seen even in the case of Mercosur, is likely to be even stronger.

[20] Bank of Thailand (1998).

The limits of globalization in the auto assembly industry

For the global auto manufacturers, the full benefits of globalization depend upon increasing the standardization of models across markets. Even though the "world car" remains far from reality, companies would like to extend the process of standardization to that which took place in Western Europe from the 1970s to the emerging markets.

In the modern auto industry economies of scale are no longer to be found predominantly in assembly, even though inefficient low-volume assembly continued in many emerging markets in the late 1990s.[21] However, the search for economies of scale is still important in the areas of components production and vehicle design. For some components, economic production scales reach millions of units per year. As passenger vehicles become more complex, components such as engines, gearboxes and electronic systems become more sophisticated and complicated to produce. With trade liberalization in developing countries and the introduction of duty drawback schemes, the sourcing of more sophisticated components, particularly electronic products, for passenger vehicles assembled in developing countries has switched from domestic production to imports. For some items, production may be concentrated in just a few locations around the world.

The advantages of common models

In design, the pursuit of achieving economies of scale has increased in importance for global vehicle companies as vehicle models are replaced more frequently and have become more complex and sophisticated. The engineering costs of designing new vehicles are substantial. Increasing safety requirements and customer sophistication in the areas of handling and ride have meant particular emphasis is put on the design of the platform, the floorplan of the vehicle and the suspension, steering, etc. In order to contain design costs, firms have been using common platforms for a variety of vehicles with the same market and extending platform commonality across markets. As is well known, companies such as VW and PSA use the same platform for different brand names within the company. Following their tie-up, Nissan and Renault moved in the same direction. Ford and GM have also been developing common platforms for vehicles produced not only by their long established brands, but also for more recently acquired brands, such as Jaguar and Saab. Spreading platform design across various models significantly reduces costs, which are further reduced by maximizing the number of common components between models. The logical extension of this process is to maximize the number of common models across all markets, including developing countries. This not only reduces design costs, but also increases the speed with which new models can be introduced in non-core markets.

Developing common models across markets has one further advantage. It reduces exposure to the volatility of demand in any particular market. This was a principal aim behind Ford's strategy of developing a small car replacement that would be almost identical for the markets of Europe and Mercosur. Not only would design and component manufacturing costs be reduced, but also flexible sourcing from plants in both regions would allow a more efficient response to demand fluctuations. For example, if demand increased more rapidly than expected in Mercosur, vehicles could be imported from Europe. This integration of developed- and developing-country markets would address two key problems facing emerging markets:

[21] Humphrey and Oeter (2000), pp. 60-64.

volatility of demand and inefficient scale**.** In the ideal scenario, the emerging markets would be integrated into a global division of labour, which would in turn provide overall scale to spread vehicle development costs, open up cheap production sites for the production of selected vehicles and components, and provide new markets for higher-end vehicles, which would still be produced in the Triad economies.

In practice, this objective has proved elusive. Ford, probably the most aggressive proponent of the "global" car, was forced to abandon the objective of producing a single small car for the European and Mercosur markets. The safety, ride and handling characteristics required for success in Europe could only be achieved at a price which was too high for the requirements of the Brazilian market. There are a number of reasons why passenger vehicles still have to be adapted to meet the needs of different markets, as follows.

(a) Income. Customer requirements vary with levels of income. Consumers in high-income countries are willing to pay for more sophisticated vehicles. Even small vehicles in advanced-country markets have structural characteristics and add-on features frequently not found in developing countries, and also not usual on such vehicles even 10-20 years ago in the advanced markets.

(b) Standards and regulations. Countries differ with regard to regulatory matters such as safety, emission standards and recycling, even though developing countries are tending to raise their own standards.[22] Compliance with such regulations has a big impact on price and performance.

(c) Driving conditions. In developing countries roads and fuel are frequently of poorer quality than in developed countries. This requires vehicles to be adapted to local conditions, particularly with regard to strengthening the body, suspension, steering, etc.

(d) Consumer preferences. These arise partly in response to the characteristics of particular societies (see Box 5) and also as a result of path dependence. For example, Brazilian consumers bought United States-style cars assembled from CKD kits until the mid-1950s. When Ford and GM refused to develop local car production with high local content, the market became dominated by European producers making typically European cars. By far the best-selling vehicle in the 1960s and 1970s was the VW Beetle. This created a persisting preference for European-style cars.

(e) Taxation. Taxation policies can have a significant impact on vehicle demand. This was seen clearly in Brazil in the 1990s. Tax concessions on "popular" cars shifted demand towards small and cheaper vehicles. Similarly, in Thailand favourable taxation for pick-ups created a market in which demand was overwhelmingly oriented towards light pick-up trucks. In 1996, passenger cars accounted for only 30 per cent of all vehicle sales in Thailand, compared with 76 per cent in neighbouring Malaysia. As a result, Thailand is one of the world's leading producers of light pick-ups.

[22] See Madhavan (2000) for a discussion of vehicles and environmental issues in Asia.

Box 5 Adapting passenger cars to the Indian market

Because of the widespread use of chauffeurs in cars of all sizes in India, passenger car manufacturers have to pay particular attention to rear passenger space and roof height. The design brief for the Indica small car, produced by India's leading vehicle manufacturer, Telco, specified that the rear seat space should match that in the Hindustan Motors Ambassador model, used by the government and big companies. Thus, the Indica is substantially wider and longer than small cars in Europe. Similarly, when Ford redesigned the Fiesta for the Indian market, it stretched the floor-plan design by 40mm in order to increase rear seat space (the model is sold as the Ikon in India).

As a result of these factors, the "world" car remains an elusive goal. The situation can be summarized as follows:

"Corporate strategies in regard to globalization vary depending on the starting point of individual firms, but there seems to be a large measure of convergence toward 1) building vehicles where they are sold, 2) designing vehicles with common 'global' under-body platforms while retaining the ability to adapt bodies, trim levels and ride characteristics to a wide range of local conditions." [23]

The pursuit of global design combined with the need for local adaptation has led global auto companies to adopt particular strategies for emerging markets. In the following subsection, strategies for follow design and follow sourcing and their consequences for the auto components industry in developing countries will be discussed. In the section "Strategies for developing countries' auto industries", the implications of these strategies for national (or regional) trade and industry policies for developing the auto industry within the context of globalization will be considered.

The restructuring of value chains in the global auto industry

The impact of change on the components industry

How do changes in the nature of the global assembly sector influence the nature of the components industry? This question is particularly important for developing countries. For many of these countries, one of the key reasons for promoting the auto industry was to encourage the development of domestic components industries. These would not only create jobs and reduce the effect on the balance of payments of imports of vehicle parts, but also stimulate domestic technological capability more generally through spillover effects. These might be further enhanced if at least part of the domestic components industry was locally owned or took the form of joint ventures between local companies and transnational companies. Many countries regarded the introduction of local assembly plants as the first step in the development of the domestic auto industry. Local content requirements were imposed in order to increase local production, even though this frequently involved uneconomic levels of production and high-priced vehicles. In Mexico for example, the early stages of the development of domestic auto

[23] Sturgeon and Florida (1999), p. 53.

production were also characterized by restrictions on foreign ownership in the components sector.

The changing nature of the global assembly industry in the 1990s was likely to significantly affect the components industries in developing countries. However, the full extent of this change cannot be understood without reference to more general changes in auto industry value chains. In the 1980s and 1990s, relationships between assemblers and suppliers changed considerably, as Western firms struggled to match the competitiveness of manufacturers from Japan and emulate their production and supplier strategies.[24] Vehicle manufacturers in North America and Western Europe reduced their in-house production levels and began to transfer design functions to their leading suppliers. The impact of the increasing global reach of assembly companies on the components industries of developing countries can only be understood fully in the context of these changes in assembler-supplier relationships.

Assembler-supplier relationships in the global auto industry

The components industries in the Triad economies were considerably restructured during the 1990s, as a result of a combination of changes in the relationships between suppliers and assemblers, and the increasing global reach of the assemblers. Three significant changes took place. First, there was a shift in design activities from assemblers to suppliers, together with increasing dialogue around design between the two parties. The suppliers, who had previously provided ready-designed parts (for example, batteries) for many different companies in the period of mass production, moved towards greater customization, tailoring their products to the needs of specific companies. Similarly, many of the subcontracting companies that had formerly worked to the assemblers' designs moved towards offering their own design solutions.[25] In both cases, the assembler provides the overall performance specifications and information about the interface with the rest of the car, and the supplier then designs a solution using its own technology.

Second, there was a shift towards the supply of complete functions (systems, sub-assemblies or modules) rather than individual components.[26] A first-tier supplier becomes responsible not only for the assembly of parts into complete units (dashboards, brake-axle-suspension, seats, cockpit assemblies and so on), but also for the management of second-tier suppliers. The assembler would previously have put these modules or systems in-house, using parts supplied by many different component companies. In the past, an assembler might design a seat, make detailed drawings of 20-30 separate elements, find suppliers for each, take in the parts and assemble them into seats in-house. Now, the assemblers look for firms that will design and supply the whole seat, or even a seating system, including headrest, seat belts and pre-tensioners. This has become part of the process of the increasing outsourcing to suppliers.

[24] For early discussions of these changes in the Western auto industry see Womack et al. (1990) and Hoffman and Kaplinsky (1988). For a discussion of the consequences of these changes for component manufacturers see Helper (1993).

[25] Laigle (1995).

[26] The language of modules, systems and sub-assemblies is sometimes vague. However, Sturgeon and Florida (1999) observe that "Some automakers refer to contiguous sub-assemblies as 'modules' and functionally related non-contiguous parts as 'systems'".

Third, the assemblers became more involved in the specification of the production and quality systems of their suppliers. With the increasing importance of just-in-time (JIT) production systems and the imposition of quality-at-source, even simple tasks became more critical for the overall efficiency of the operations. The assembler had to invest in its relationships with suppliers. Accordingly, it made sense to have longer-term relationships with fewer suppliers.

These changes took place at the same time as the assemblers were standardizing platforms and models across their constituent companies and divisions (see above) in order to reduce development costs, obtain economies of scale and facilitate trade between regions. This meant that developing countries were increasingly considered less as isolated national markets and more as potential parts of global production systems. This was a major change in strategy. Auto companies had previously kept developing countries out of phase with their core markets, producing models which were specifically developed for local markets (for example, the best-selling VW and Ford models in Brazil in the 1970s), or delaying the introduction of new models until well after they had been produced in Europe and North America.[27] As a result of increasing competition in emerging markets, the assemblers updated their model ranges. Consumers in Brazil and India can now buy models that are similar, if not identical, to those sold elsewhere. Even so-called third-world cars, such as the Fiat Palio and Honda City, are based on established platforms and assembled in various countries.[28]

Restructuring in the components industry

The global auto industry at the beginning of the 21st century is composed of a number of different parts, as outlined in Box 6. The requirements of these different sections are quite distinct. Assemblers and global mega-suppliers need global reach, innovation and design capabilities, as well as considerable financial resources. In the second tier, global reach is not required, even though there are some tendencies towards internationalization in this sector. The competences needed in the third-tier are much less, but the returns are much lower. Finally, the aftermarket section offers a completely different route to customers. The business is much more fragmented and access is easier. However, this section is very price-competitive.

[27] See Sugiyama and Fujimoto (2000).

[28] See Volpato (1998); See also UNIDO paper on Integrating Local Industries into Global Value Chains: What Prospects for Developing Countries, forthcoming 2003.

Box 6 Capability requirements in the global auto industry

Assemblers. Increasing scale required to spread costs of vehicle design and branding. Innovation and design capabilities remain critical as first movers in new markets sections can gain important rents while other companies catch up. Some companies, such as Ford, appear to believe that core competences lie more in branding and finance, and they are outsourcing parts of manufacturing. Others, such as Toyota, maintain an emphasis on manufacturing excellence and competence.

Global mega-suppliers. These firms supply major systems to the assemblers. They are sometimes referred to as "Tier 0.5" suppliers, because they are closer to the assemblers than the first-tier suppliers (see below). These companies need to have global coverage, in order to follow their customers to various locations around the world. They need design and innovation capabilities in order to provide "black-box" solutions for the requirements of their customers. Black-box solutions are solutions created by the suppliers using their own technology to meet the performance and interface requirements set by assemblers.

First-tier suppliers. These are firms, which supply direct to the assemblers. Some of these suppliers have evolved into global mega-suppliers. First-tier suppliers require design and innovation capabilities, but their global reach may be more limited.

Second-tier suppliers. These firms will often work to designs provided by assemblers or global mega-suppliers. They require process-engineering skills in order to meet cost and flexibility requirements. In addition, the ability to meet quality requirements and obtain quality certification (ISO9000 and increasingly QS9000) is essential for remaining in the market.[29] These firms may supply just one market, but there is some evidence of increasing internationalization.

Third-tier suppliers. These firms supply basic products. In most cases, only rudimentary engineering skills are required. A study by Leite (1997) of skills and training at different parts of the automotive value chain in Brazil showed that in the third-tier of the component chain, skill levels and investments in training were limited. At this point in the chain, firms compete predominantly on price.

Aftermarket. A further important segment of the automotive value chain is the market for replacement parts. This is the sector that many firms in developing countries first moved into, even before local assembly sectors were developed. Nowadays, there is an international trade in aftermarket products. Firms in this section compete predominantly on price. Access to cheaper raw materials and process engineering skills is important. Innovation is not required because designs are copied from the existing components, but reverse engineering capability and competence to translate designs into detailed drawings are important.

The changes in the components industry just described, taken together, have led to considerable restructuring in the components industry. In the 1990s, mergers and acquisitions created global mega-suppliers. They became responsible for designing systems for vehicles and delivering them to widely dispersed locations. They also assumed responsibility for organizing the rest of the value chain, managing the second-tier suppliers and developing supply systems in many different locations. The components industry is now increasingly concentrated in companies that can design and provide systems and sub-assemblies across different markets. The main trends can be summarized as follows.

(a) The in-house component activities of the major assemblers were given separate identities and encouraged to compete for business not only with other assemblers but also for the business of their parent companies. The most high profile of these cases was Delphi, created out of GM's

[29] Quadros (2002).

component activities, but Visteon (formerly part of Ford), Magneti Marelli (Fiat) and ECIA (formerly owned by Peugeot-Citroen and now fused with Bertrand Faure) moved in the same direction.

(b) A wave of takeovers and mergers affected even the largest component manufacturers. Between January 1996 and March 1997, there were seven mergers and acquisitions in the components industry involving assets of more than $1 billion.[30] Among the top 35 component manufacturers in 1995, Lucas and Varity merged in 1996 and the new company was taken over by TRW in 1999; T&N was taken over by Allied Signal; Bertrand Faure was acquired by ECIA; UTA was bought by Lear and ITT; and Automotive divested large parts of its automotive businesses.[31] Other companies such as Dana, Eaton, AlliedSignal and GKN sold or exchanged parts of their business with other market leaders. In areas such as seating and braking systems, the industry was consolidated in a few manufacturers.

(c) New global companies were created through the fusion of smaller manufacturers. The case of Autoliv Inc., formed by the merger of the Swedish company, Autoliv AB, and the Automotive Safety Products Group of the United States company Morton International, is one example of a merger of two smaller companies forming a new company with global aspirations.

The new first-tier component companies then began to expand their reach. As the assemblers began to invest heavily in the emerging markets (see Table 6), they increasingly expected their suppliers to follow them. This meant that the component manufacturers with pretensions to be the lead suppliers in the industry had to extend their operations rapidly, through a mixture of acquisitions and FDI. The rapid increase in global reach of one first-tier supplier, Valeo, is illustrated in Box 7 below.

The penalty for not following the assembler to new markets could be severe. For an assembler starting up production or introducing a new model in an emerging market, the clearly preferred option for locally produced parts was to use the same supplier as in the core location for the production of that model. This should guarantee that the component would be identical to that used in other markets. Further, the follow source (see below) will be responsible for ensuring that the rest of the supply chain meets the assembler's standards. Instead of dealing with a large number of local suppliers whose designs and prototypes have to be homologated (tested and approved for use), and whose production and quality systems have to be audited and improved, the assembler deals with a limited number (certainly less than 100) of follow sources providing parts or sub-assemblies. When the globally preferred supplier is unable or unwilling to establish a local production facility, the assembler's second preference is to use another of its global suppliers (United States and European assemblers will use a number of suppliers for each particular part or system over the entire model range, even if one supplier is selected for each model). This supplier will either make the part under licence from the globally preferred supplier or provide its own design. This company will have experience in supplying parts to the

[30] EIU (1997), p.22.

[31] Based on 1994-1995 sales, and excluding tyre manufacturers.

assembler, and it should have the required level of management and quality expertise. The least preferred option is for a local company to produce the part, either under licence or using its own design. In this case, the assembler has much more work to do in monitoring the production processes and quality systems of the local supplier.

This preference for using the same suppliers in many different locations is known as follow sourcing. The supplier "follows" the assembler to new locations. It is a logical consequence of the supplier taking more responsibility for design and for the increasing commonality of models between markets. The strong preference for minimizing model differentiation between markets is known as follow design. It has had quite radical consequences for the structure of local components industries. These are discussed in the following section.

Box 7 Valeo's global expansion

In 1986, half of Valeo's factories were in France and a further 30 per cent were in the rest of Europe, as can be seen below. By 1997, the company had greatly extended its coverage in Europe, acquired 26 new plants in the Americas and developed manufacturing capability in Asia. By 1997, only one-quarter of its plants was in France. In the clutch division, for example, Valeo had plants in Algeria, Argentina, Republic of Korea, Turkey, the United States and Western Europe. In 1997, it was in the process of setting up clutch operations in Brazil, China, India and Poland.

Valeo's global expansion, 1986 and 1997

	Number of plants	
Location	*1986*	*1997*
France	21	27
Europe, excluding France	12	34
Asia	0	10
North America	4	12
South America	3	21
Total	40	104

Source: Presentation by Philippe Faure of Valeo, at the Sixth GERPISA auto industry colloquium, Paris, June 1998.

Follow design and follow sourcing in the components industry

When auto assemblers began to set up production operations in Argentina and Brazil in the 1950s and 1960s, they created new supplier networks in the host country. Within the context of import-substitution industrialization, auto assemblers were obliged to source a large part of their inputs from within the domestic economy. They were able to do this because they were used to providing sub-contractors with designs for simple, easy-to-make parts (as illustrated by the example of the seats presented above). For simple components, the local component manufacturer could work from an assembler's drawings and meet its requirements. In the case of more technically demanding components, the local suppliers might require links with a developing country component manufacturer in order to acquire process technology.

Even though transnational companies began to play a significant role in the components industry in various Latin American countries from the early 1970s, the auto industry provided many opportunities for local companies, and as long as they could compete on price and meet minimum quality standards they were in a position to win contracts. Developing-country subsidiaries had some freedom to introduce design changes, and in some cases country-specific models (for example, the VW Brasília and Ford Corcel models in Brazil in the 1970s) were developed, usually but not exclusively derivatives of existing platforms. They had ample margin to develop local supplier strategies. Some significant locally owned suppliers emerged in countries such as Brazil and Mexico. With the increasing internationalization of components production in the 1980s, some of these companies began exporting to Europe and North America, demonstrating that they had acquired extensive competences.

As a result of increasing competition in markets such as Brazil and India, the major auto companies have updated their model ranges, introducing the same designs as seen in industrialized countries. Although it was argued earlier that there are important limits to the standardization of models across markets, there was a significant advance in standardization in the 1990s. Developing-country consumers are presented with models that are much more similar, if not identical, to those sold in the Triad economies. Furthermore, the strategy of developing so-called third-world cars means that although models are not completely standardized across markets, design becomes more centralized, with fewer local variations permitted and stricter, centralized control over those which are allowed. The greater the extent to which design is standardized, the more design costs are reduced and the more quickly new models can be brought into production.

It was argued above that assemblers would like to have the same parts, with the same technology, the same quality system and the same underlying basis for inter-firm communication wherever they are making cars. In a fully globalized auto industry, there might be a case for centralizing component production at a limited number of sites. For more complex and technologically advanced components, this tendency is already apparent. Engines and gearboxes are not only being produced at limited numbers of locations within regions and being shipped to larger numbers of assembly plants, but they are also being shipped outside regions. Similarly, production of electronic components appears to be increasingly centralized. Nevertheless, logistics, cost and protectionism make local or regional production of many items a necessity. In these cases, new entrants to the

emerging auto markets are likely to encourage follow sourcing by their preferred suppliers. In the 1990s, when the assemblers invested in the emerging markets of Mercosur (Argentina and Brazil only), China, ASEAN and India, the major component suppliers were both pressured to follow their major customers and were attracted by the growth potential of these markets.

Growing importance of global supply networks

These developments suggest that global supply networks are becoming increasingly important in the auto industry. Assemblers and suppliers develop parallel networks across the world. These changes are represented in Figure 1, which presents a model of how relationships would develop if follow design and follow sourcing were applied extensively. For simplicity, this shows just a single product being supplied to one assembler operating in three different countries: the country of the assembler's core operations, and operations in two other locations. Value chain relationships typical of the 1960s are contrasted to those developing as a result of follow design and follow sourcing.

The top box of the figure shows how design relationships change. In the 1960s, the assembler would have been responsible for designing a large part of the car. Detailed drawings would have been provided to suppliers in the different locations. The subsidiaries would have received these drawings from the parent company and then have chosen a local supplier. As Helper has noted, it was common practice for assemblers in North America at this time to provide detailed drawings for relatively simple components, and this created a large pool of potential suppliers.[32] The provisions of designs and the breaking up of components into easily made parts also facilitated access for domestic component manufacturers to auto industry value chains. The vertical dotted arrows in the middle box of Figure 1 represents this ease of access. Contracts are allocated separately by the parent company and its subsidiaries. Local companies would be able to compete for contracts from the subsidiary.

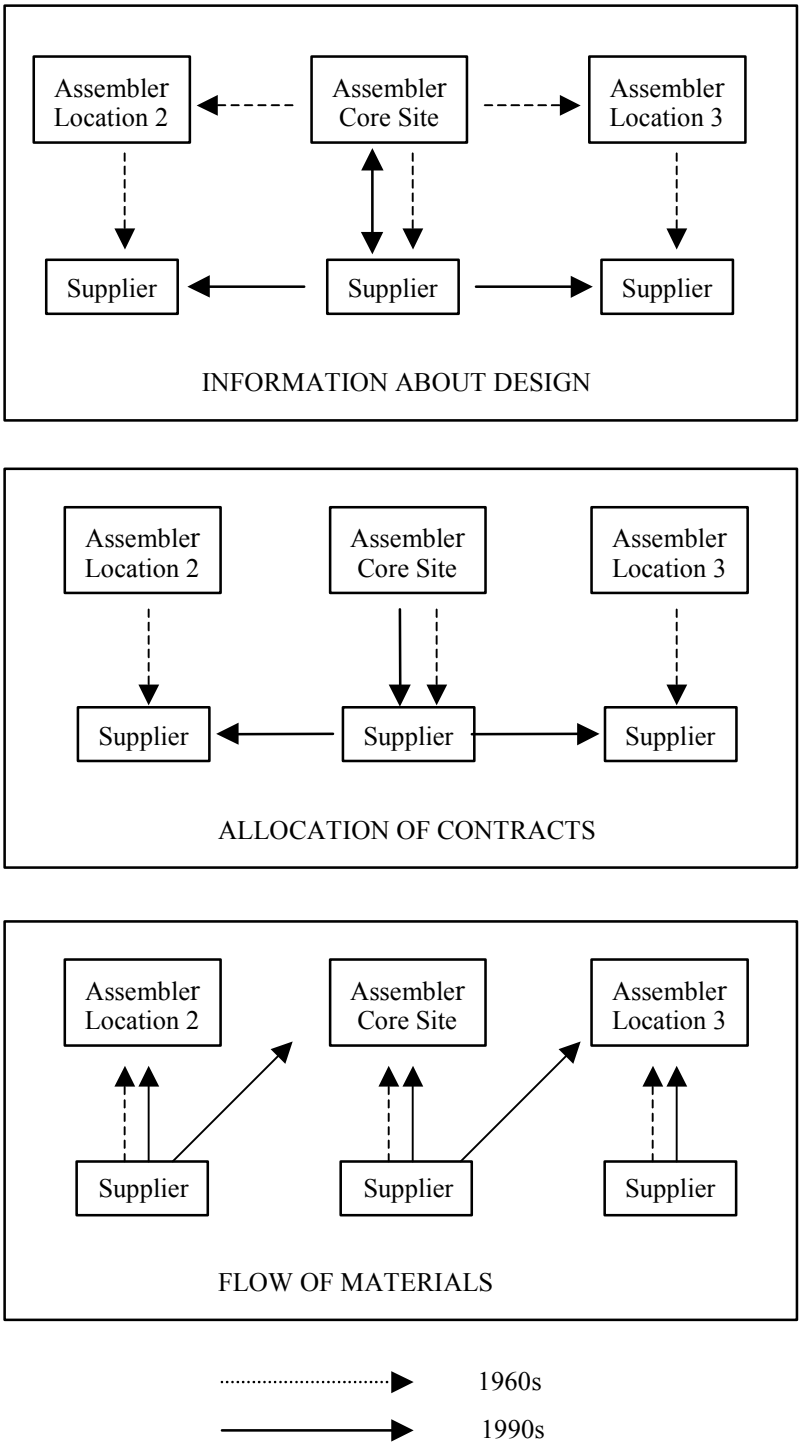
This pattern of design and contract allocation changes significantly with follows design and follow sourcing. First, the component manufacturer in the core location plays a much more important role. It designs the part or system in conjunction with the assembler (hence the double-headed arrow indicating their relationship). In many cases, the design belongs to the component manufacturer, and it becomes responsible for transferring its design to a partner (subsidiary, affiliate or licensee) in other locations. The horizontal arrows in the top box of Figure 1 indicate this. This has clear consequences for supplier selection, as shown in the middle box. The preferred option for the assembler becomes follow supply. As a result, inclusion in the global supply network becomes essential for survival as a first-tier supplier. Without this, developing country firms cannot obtain designs or the contracts that go with them. The assembler's first preference is to use the follow design provided by the follow source.

The bottom box of the figure shows the flow of materials. For the 1960s, the dotted arrows represent these. In each location, the assembler is supplied locally. For the 1990s, lines of supply are similar. The centralization of design and supplier selection does not preclude decentralized production. However, flows of components between countries are likely to be more common. In

[32] Helper (1993).

other words, the major changes in the value chain involve the conditions of access to the value chain and the division of labour between component manufacturers and assemblers. Trade in components will change, but not nearly as dramatically.

Figure 1 The changing nature of the auto industry value chain



The limits to follow sourcing

It is important to recognize that there are limitations to follow sourcing. The company whose Indian sourcing strategy is shown in Table 12 had attempted to develop a complete follow sourcing strategy for its operations in Brazil in the late 1990s. So intent was it on using follow sources for its new model, that any deviation from use of the follow source had to be approved by senior management in company headquarters. Nevertheless, it was not possible to use only follow sources, even though almost all of the leading European and North American component manufacturers had operations in Brazil; Some of the follow sources did not have operations in Brazil, others could not be persuaded to offer the product at a price acceptable to the assembler. The development of follow sourcing in markets like India, where companies from many different regions have set up operations, is particularly problematic. If they were all to attract their respective follow sources, there would be further proliferation of component manufacturing in what remains a very small market. For example, in the case of brakes, the pursuit of a follow sourcing strategy by assemblers currently in the market would lead to at least six passenger car brake manufacturers setting up operations, even though passenger car sales are unlikely to exceed 1 million units before 2003. In comparison, most brake production in Europe, where passenger car production reached 14 million units per year at the end of the 1990s, was provided by just three global component manufacturers, giving significantly greater economies of scale.[33]

Table 12 Sourcing in India by a transnational new entrant to the industry

Nature of source[a]	*Components supplied*
Imported	Engine, gearbox, engine management system, constant velocity joints
Follow source	Steering gear, steering wheel, rear axle, rear brake, paint, starter motor, wiring harness, front and rear seat-belts, instrument panel, seats, headliner, exhaust
Other transnational company	Clutch, steering column, brake actuation, front brake, rear suspension, fuel tank, alternator, headlamp, tail-light, radio/CD, door boards, wheels
Locally-owned company	Shock absorbers, glass

Source: Interviews by author with the company.
Note: [a]Joint ventures between original source and local company counted as follow sources.

The attractions of follow sourcing have also been eroded by the volatility of demand in emerging markets.[34] One of follow sourcing's advantages for the assemblers is that it helps to sustain supplier parts containing dedicated component plants close to the assembly operation. This makes the outsourcing of sub-systems and the development of JIT supply more viable. However, the volatility of demand and the continuing small scale of developing-country operations have undermined the profitability of such plants. Component manufacturers may well become more resistant to "following" their customers if the experience of these plants proves disappointing**.**

[33]EIU (1996b).
[34]See Lung (2000) for a discussion of the sources of demand volatility in emerging markets that gives particular emphasis to interest rate fluctuations.

Strategies for developing countries' auto industries

Both assemblers and component manufacturers increased their global reach in the 1990s. At the same time, the range of policy instruments available to developing country governments for the promotion of particular industries had become more and more limited as a result of international trade agreements. In the 1990s, quantitative restrictions were largely phased out, and tariffs on both vehicles and components were reduced significantly in many emerging markets. The Uruguay Round trade reforms should lead to the phasing out of TRIMs, which include policies such as local content requirements and the balancing of imports by equivalent exports. Local content and trade balancing requirements were deemed to be inconsistent with GATT provisions on national treatment, and trade and foreign-exchange balancing requirements were held to constitute quantitative restrictions. World Trade Organization (WTO) member countries were required to notify the WTO of GATT-inconsistent TRIMs, to phase them out within a set period (initially by 2000 for most emerging markets, although progress has been slow) and not to introduce new TRIMs in the interim.[35, 36]

Developing countries need to consider strategies for the auto industry within the context of trends in global markets. This does not mean that a single strategy is appropriate across all developing countries. On the contrary, the scope for promoting the auto industry and the developmental impacts of current restructuring processes vary considerably according to the nature of the insertion of national automotive industries into the global economy. The one exception to this view on the continuing heterogeneity of experience for developing countries concerns ownership in the components industry, where there is a large body of evidence, which suggests that there is a widespread process of denationalization. This issue will be considered first, followed by trends in the auto industry in the peripheral regions (Mexico and Central Europe), and then for other developing country vehicle markets.

Ownership structures in the components industry

The dynamics of denationalization in the components industry are well illustrated by the case of one Brazilian-owned manufacturer, Freios Varga. In many respects the trajectory of this firm exemplifies the fate of leading auto components firms. As can be seen in Box 8, the firm began as a supplier for the replacement market in the 1950s, and then began producing for the new assemblers in Brazil, working from their drawings. It later linked up to a leading transnational component manufacturer. This gave it access to the latest designs and the basis from which to begin exporting to North America. However, at the end of the 1990s it was taken over by its transnational partner.

[35] Low and Subramanian (1998), p. 416.

[36] The GATT-inconsistent TRIMs already violated GATT agreements, but they could only be challenged through the disputes procedure. The Uruguay Round agreement on TRIMs allowed them to continue for a limited period but set up a general mechanism for their elimination.

Box 8 The rise and decline of Freios Varga

The story of one leading Brazilian component manufacturer, Freios Varga, illustrates the cycle of development of the Brazilian auto components manufacturing industry as a whole. The company started producing brake parts for the replacement market in the 1950s, copying parts supplied by other companies to the domestic market. At this time, import restrictions allowed many locally-owned companies to enter the market for replacement parts. At the end of the 1950s, Freios Varga began original equipment production, working to designs supplied by Volkswagen.

In 1971, it negotiated a technology tie-up with Lucas, which took a minority stake in the company. Varga began to design new products to meet the needs of the assemblers as they introduced models targeted specifically for the Brazilian market, such as the Ford Corcel II and VW Gol. The company relied on Lucas for basic technology but retained its own engineering capability in order to adapt designs for the local market and to develop brakes for locally-designed models. Lucas held only a 34 per cent stake in the Brazilian company. The joint venture was a success. Not only did it enjoy a dominant position within the domestic market, but following the general trend for increased export orientation in the 1970s and 1980s, it managed to export increasing amounts of its production to the North American market. By the mid-1990s it had received many prestigious quality awards from the Big Three North American assemblers, including GM's Supplier of the Year award. The tie-up with Lucas was very successful. However, when Lucas merged with Varity Corporation, Freios Varga was competing in the North American market directly (and successfully) against plants owned by Varity. As a result, Lucas-Varity bought the remaining 66 per cent of shares in Freios Varga. The family, which had built up the company over more than 40 years relinquished its control.

The case of Freios Varga might be considered exceptional. In fact, it is not. This can be seen by an examination of the denationalization of the Brazilian auto components industry in the latter part of the 1990s.[37] The sale of leading Brazilian companies to transnationals was clearly evident. In 1995, ten of the 20 largest component manufacturers in Brazil (by value of sales) were wholly or majority locally-owned. By 1998, seven of these ten firms had been taken over by transnational companies.[38]

The denationalization of the auto components industry is not confined to Brazil. Similar tendencies, although to a lesser degree, were evident in India. The extent of the problem can be illustrated by an analysis of the sourcing decisions made by a leading transnational company establishing operations in India at the end of the 1990s. Table 11 above provides information on 31 components. It can be seen that a considerable proportion of these components were either imported or supplied by the follow sources. The consequences of this pattern of sourcing for the structure of value chains in India were already clearly visible at the end of the 1990s. Nationally-owned companies complained that minority foreign partners in long-established joint ventures were eager to take control, even when the Indian partner was

[37]This process is not confined to developing countries. Half of the Spanish-owned components firms existing in 1972 were either taken over by foreign companies or went out of business by the late 1980s. There were also clear tendencies for minority foreign-owned joint ventures created during the period of restrictions on the ownership of foreign capital to be taken over by the foreign partner and for new wholly-owned subsidiaries to enter the industry (Lagendijk, 1995, p. 385).
[38]Costa (1998), p. 94.

reluctant. New joint ventures were much more likely to have majority foreign ownership than earlier ones, and in some cases foreign firms were setting up wholly-owned subsidiaries. It was apparent that many Indian suppliers were looking for niches outside the car sector, tie-ups with smaller transnational companies (which have technology but not the resources to produce internationally), or comfortable niches in the second tier. It was becoming increasingly difficult, even for the largest Indian companies in the components sector, to sustain wholly-owned operations or even majority stakes in joint ventures.

Havas and Dörr and Kessel describe similar processes in Central Europe. The two largest car manufacturers in the region, VW and Fiat, have both developed local supplier bases in Central Europe through a mixture of encouraging follow sourcing by major transnational component companies and upgrading existing local suppliers.[39] According to Havas, 80 per cent of Skoda's bought-in components were sourced within Czechoslovakia in the early 1990s, but an increasing proportion of these components came to be sourced from the wholly owned or joint-venture companies set up by Western component manufacturers.[40] Similarly, Fiat Auto Poland was increasing its sourcing within Poland, but switching from locally-owned suppliers to transnational companies. Finally, there is evidence of a similar trend in South Africa. Studies of assemblers in component manufacturers indicated a similar marginalization of local producers and a strong preference by the assemblers for using transnational suppliers.[41]

It is particularly important to note that the limitations of the follow sourcing strategy do not appear to create opportunities for locally owned firms in developing countries. This is evident from Table 11. In most of the cases where the follow source was not used, the assembler chose another transnational firm to supply the part. In many cases, these firms would already be supplying similar parts to the assembler for a different model. Therefore, the assembler knew the supplier and had confidence (sometimes misplaced) that the local plant would meet international standards. The way in which negotiations take place is illustrated in Table 13. This shows sourcing patterns for one particular component, which cannot be identified for reasons of confidentiality. Sourcing in Brazil and India for this part in nine different passenger car models is compared with sourcing for the same part for the same model in Europe. Seven of these models were produced in Brazil, and the main European suppliers of the component all had plants in Brazil. Consequently, follow sourcing was adopted in six of the seven models. Even in the seventh case, two-thirds of the component system was supplied by the follow sources. According to one of the suppliers of the part, open bidding for contracts was quite normal, but it was basically a "game with marked cards", designed to drive down the price.

In India, the follow sourcing was less extensive. Again, seven of the nine models were in production, all produced by new entrants to the Indian market, including companies from Europe, Japan and the Republic of Korea. Table 12 shows that it was not always possible or cost-effective to rely on the follow source, and this led to complex negotiations. While the assemblers

[39] Havas (2000), Dörr and Kessel (1999).
[40] Havas (1997), pp. 217-218.
[41] Barnes and Kaplinsky (2000).

tried to negotiate licensing agreements in order to keep the same design, in most cases this proved impossible and the non-follow source provided its own design. Once again, however, the alternative to the follow source was in all cases a transnational firm or a joint venture between a transnational producer and a local company.

Table 13 Use of follow sourcing for a particular component system in Brazil and India

Company	*Brazil*	*India*
Model 1	Not produced in Brazil	Currently imported. Future local production will be split between follow source (80%), which is in the process of setting up operations in India, and one other long-established producer in India (20%)
Model 2	Follow sourcing.	Partly imported, partly produced by a transnational non-follow source
Model 3	System produced by two of the three companies producing in Europe. Partial follow sourcing	One of the two companies making this part in Brazil did not have a factory in India. The other company refused to use a design supplied by a competitor, and now designs and supplies the whole system
Model 4	Follow sourcing	Produced by a transnational non-follow source.
Model 5	Follow sourcing	Not produced in India
Model 6	Follow sourcing	Produced by follow source
Model 7	Follow sourcing	Not produced in India
Model 8	Not produced in Brazil	Assembler tried to negotiate a joint venture between follow source and Indian company, but failing this, used a transnational non-follow source
Model 9	Follow sourcing	After failing to persuade another transnational company in India to use follow source's licensed design, the assembler accepts a part made to this second component supplier's own design.

Source: Interviews with component manufacturers in both countries.

The tendency to use transnational component suppliers is not limited to transnational assemblers. In India, a major local industrial company, Telco, entered the passenger car market with its own brand and design, the Tata Indica. However, the list of suppliers for the Tata Indica model includes many of the world's leading component manufacturers, some as independent firms and some in joint ventures either with Tata or with other Indian companies. One major exception to the dominance of global component manufacturers is China, where ownership restrictions in both the assembly and component sectors have ensured that local companies still play an important role.

This restructuring of supply chains means that opportunities for locally-owned component manufacturers are largely confined to the second tier of component manufacturers. For the first-tier global suppliers there would be some advantages in developing follow sourcing even for the second tier. They are now required to develop local supply systems and they might prefer to use their own second-tier follow sources in preference to this. However, the limited financial and managerial resources of many second-tier suppliers greatly reduce the possibility that they will follow their customers to developing country markets.

Box 9 Meeting complex testing requirements in India

One of the difficulties facing local component manufacturers when they try to enter the supply chains of transnational companies concerns the testing of components. The case of one locally-owned component manufacturer in India illustrates the point.

Firm X supplies switches for the passenger car sector. To meet the demands of existing Indian manufacturers, it tests the resistance of switches to changes in temperature. This involves placing switches in a temperature-controlled chamber, lowering the temperature to -30°C and then raising the temperature in the chamber to +150°C. Changing the temperature in the chamber takes 20 minutes to achieve. One of the new multinational entrants into the passenger car assembly sector was looking to source switches locally, but it insisted that the thermal shock test had to be the same as that used at its home base. This meant not only achieving a lower minimum temperature, down to -40°C, but also transferring the switches immediately to a second chamber with the +150°C temperature. For the local component manufacturer, installing new testing equipment to meet these requirements would have meant an investment equivalent to three years' projected sales to the client. The testing requirements made it completely uneconomic to accept the order.

This opens up the possibility of locally-owned firms in developing countries occupying the second tier of component manufacturing. In some cases, this involves the production of unsophisticated parts with low-skilled labour. But this is not always the case. Precisely because the first-tier global suppliers have become providers of modules and systems, the second-tier companies may produce more sophisticated parts than previously. Within the second tier there are niches for relatively sophisticated component suppliers. The most advantageous positions involve the possession of competences which are important to the first-tier companies, but which they have chosen not to possess. Therefore, access to such positions will depend upon local companies being able to develop specific technical expertise and provide a competitive service. This means that there may well be a need to provide technical, financial and managerial support to these firms. If such support is not provided, then the first-tier suppliers will either have to source from other transnational companies, or import the necessary parts.

Integration into Triad production systems

Mexico and Central Europe have both adopted a strategy of integrating their auto industries into the production systems of their Triad neighbours. In the case of Mexico, the NAFTA agreement recognized and reinforced the integration of the Mexican auto industry with the United States and Canada. In the case of Europe, the countries of Central Europe (the Czech Republic, Poland and Hungary) have attracted most investment in the auto industry.[42] The auto industry has been restructured and integrated with the EU following the collapse of the Soviet bloc. In both Mexico and Central Europe, the late 1990s was a transition period towards complete integration into the production and sales spaces of their Triad partners. As was indicated above, barriers to intra-regional trade were significantly reduced and the nature of the value chain substantially altered.

[42] Dörr and Kessel (1999), p. 5.

There is no doubt that the initial attraction for reducing trade barriers and extending production networks from North America and Western Europe to the peripheral regions was a combination of access to growing markets and reducing costs through the development of low-cost production sites. The latter factor is likely to favour the growth of labour-intensive activities such as vehicle assembly and the production of components with low technological content. In the early period of the development of the auto industry in northern Mexico within the framework of the *maquiladora* policy, it was undoubtedly the case that low-wage, labour-intensive activities were moved from the United States to Mexico. The Mexican part of the North American industry has specialized in particular product ranges where, generally speaking, labour costs are more important. They include small cars (compact and subcompact models), 4- and 6-cylinder engines, and components such as wiring harnesses, upholstery, silencers and exhausts.[43] A similar process took place in Spain in the 1970s.[44] This specialization is driven not only by the greater importance of wage costs, but also by the types of products demanded in the local market.

From a value chain perspective, the disadvantage of this type of development is that management and design functions are limited. Nevertheless, there are signs that Mexico is moving beyond the disarticulated, externally-oriented industrial structure typical of the *maquiladora* period. Even the labour-intensive plants have been the sites of experimentation in work organization and production systems. In fact, it is frequently the case that auto companies test out innovations at some distance from their core locations. Such innovations not only include radically new production systems (for example, modular production introduced by Volkswagen in both its Brazilian truck plant at Resende and in the Czech Republic), but also new strategic alliances, as have been evident in the people carrier plants of Portugal and in Eastern Europe. In the case of Mexico, in addition to well-established production systems based on JIT and total quality, companies have also introduced job rotation, cellular manufacture, etc. These systems require more sophisticated production control systems and more labour training. Generally speaking, trade liberalization and the substitution of national-level value chains based on import-substitution industrialization by value chains that integrate developing country production into international production systems are associated with both specialization and upgrading competences.

There has been product innovation

There has also been some development of product innovation in Mexico. Volkswagen used Mexico as the base for developing its New Beetle model, which involved cooperation between engineers and designers in Mexico, Germany and California. The fact that the model was launched in Mexico meant that the Mexican plant was involved in much of the problem-solving associated with such launches.[45] In addition, Delphi relocated one of its research and development centres to Ciudad Juarez. This may be an indication that the increased specialization of Mexican plants within the North American division of labour will eventually lead to product development being located closer to the factories specializing in making these products.

[43] Carrillo (2000), p. 60.
[44] Layan (2000).
[45] Pries (1999), p. 85. The Chrysler PT Cruiser is another example of a niche model produced solely in Mexico but exported to many countries.

Similar tendencies can be seen in Central Europe. Following the collapse of Communism, the auto industry was in such a parlous state that the newly elected governments could not see any strategy other than selling leading companies to Western manufacturers. As in the case of Mexico, this seemed likely to lead to the development of production strategies based on seeking low wages. Initially, the prospects for Central Europe did not look very attractive. In particular, there was clear evidence of labour-intensive production using imported components. Assembly and engine plants were registered as having low local content. Nevertheless, the picture appears to be changing. The major assemblers in the region, the VW Group and Fiat, have developed local supply networks, and major investments in capacity were made at the end of the 1990s. Local content appears to be increasing rapidly.

The skill level of the local labour force is critical, although clearly wage differentials are also important: "German wages, for example, are still seven or eight times higher than Czech or Hungarian ones, and the productivity gap has almost been closed".[46] However, low-wage workers have to be combined with skilled workers, engineers and managers, and in this respect Central Europe has a considerable advantage. It is the supply of skilled workers, engineers and managers that makes possible not only the siting of more complex plants in the region, but also experimentation with new production systems, such as the development of modular production at Skoda. This has also been a factor in Brazil, where transnational companies, but most notably VW at its truck plant in Resende, have been experimenting with new production systems in a weakly unionized environment.

Insertion into global value chains

Mexico and Central Europe enjoy the advantages of privileged access to Triad markets through trade preferences for intra-regional trade and proximity to these markets. Integration into the production and sales systems of the Triad economies also solves the problem of low volumes of production that has plagued automotive manufacture in developing countries. In both regions, passenger cars are being produced in volumes that easily reach the minimum level required for assembly plants. But what are the prospects for other developing countries, which do not have a Triad market close by? The biggest challenge for these countries is how to create sustainable national or regional production systems within the context of a more liberalized global auto industry. An examination of auto industry policies in a range of countries indicates that one key policy choice concerns the extent to which countries are willing (and able) to liberalize access to their domestic market in order to create greater possibilities of integration into global value chains. There follows the consideration of a number of different policy choices in this respect, together with examples of new global value chains.

Australia

One approach to this problem is to radically liberalize trade in automotive products. This should either create a domestic auto industry with a viable role in global production systems, or lead to the decline of an industry, which can only be sustained by expensive protectionist policies. This strategy was adopted in Australia. Until the late 1980s, Australia protected its auto industry through tariffs on vehicle imports (set at 57.5 per cent in the mid-1980s), an import quota limiting vehicle imports to 20 per cent of domestic sales and a local content requirement of 85 per cent (with the remaining 15 per cent of content importable duty-free). The Australian value-added content of exports

[46] Havas (2000), p. 241.

(vehicles, components, design, productive services and so on) generated further rights to import equivalent values of auto industry products duty-free.

At the end of the 1980s, the Australian Passenger Motor Vehicle Manufacturing Plan, also known as the Button Plan, drastically altered auto industry policy.[47] It aimed to rationalize the industry and improve its efficiency through increasing international competitive pressures. Import quotas and local content requirements were abolished, and tariffs cut to 35 per cent by 1992, and to 15 per cent by 2000. As a result, the number of auto plants fell from eight to four, and the number of models produced from 13 in 1984 to five in 1994.[48] Overall, auto production declined from 358,000 passenger cars in 1987 to 274,000 cars in 1992, recovering to 326,000 in 1997.[49] In the early 1990s, import penetration in the passenger cars sector exceeded 40 per cent.[50]

It seems clear that, given the small size of the market in Australia, the domestic industry can only survive without protection if local subsidiaries develop a role within the broader international division of labour of their parent companies. Therefore, the future of the auto industry is shaped largely by the production and sales strategies of transnational companies. Up to the mid-1990s, the results were mixed. Fujimoto shows that Nissan left the market, and Ford and GM adopted defensive strategies, merely rationalizing production in order to survive. In contrast, Toyota began to develop a role for its Australian operations as "one of the mid-sized hubs in Toyota's global manufacturing network".[51] Toyota imported vehicles and parts into Australia from Southeast Asia and the United States (as well as Japan) and exported parts to Turkey, South Africa and Southeast Asia. However, the success of this policy partly depends upon policies adopted by other countries and by broader changes in the global auto industry. To what extent, for example, might the Asian crisis and the greater outward orientation of the ASEAN region lead to the substitution of Australian production by production in countries such as Thailand? Similarly, Toyota's response to government incentives in South Africa (see below) has been to step up export-oriented production, including exports to Australia.

South Africa

In some respects South Africa has moved in the same direction as Australia, although a greater measure of protection has been retained.[52] The South African vehicle industry was built up from the 1960s through protectionist policies. However, in the 1980s and 1990s demand stagnated, and total vehicle sales of less than 250,000 units per year were fragmented across seven different assemblers. In 1995 a new policy, the Motor Industry Development Programme (MIDP), shifted the industry towards increasing integration into the global value chains of the transnational auto companies. This was further refined for the period 2002-2007. The main elements of this shift in policy are summarized in Table 14. Tariffs on imports of vehicles and components were substantially reduced, a duty-free allowance of 27 per cent of the wholesale value of vehicles was granted to assemblers, the minimum

[47] See Industry Commission (1996), a draft report on how auto industry policy should be developed up to 2004.
[48] Fujimoto (1999), p. 45.
[49] Fourin (1998).
[50] Fujimoto (1999), p. 39.
[51] Fujimoto (1999), p. 47.
[52] The discussion of South Africa is largely based on Barnes (1999) and Barnes and Kaplinsky (2000).

local content provision was scrapped and an import-export complementation scheme was introduced to allow both vehicle and component manufacturers to offset import duties against exports. The aim was to force the local auto industry to become more competitive and to encourage global auto companies to export from South Africa in order to gain duty-free access to the domestic market. The new policy was specifically designed to encourage the incorporation of South African assembly and components production into global value chains. In particular, the abolition of local content requirements and the introduction of duty drawback arrangements encouraged firms to develop a division of labour between South Africa and other areas and to develop two-way flows between them.

It should be noted that in this context the denationalization of the local components industry might be a positive step in so far as transnational companies are more likely to trade between subsidiaries, but the South African experience shows that such trade need not be limited to the intra-company trade of transnational companies, as is indicated by Box 10. Because it is possible to trade export credits and to gain credits from exporting products made by other companies, German assemblers have an incentive to buy products from domestic component manufacturers and export them to their plants in Germany. These, too, generate credits that can be offset against import duty liabilities.[53] Barnes and Kaplinsky described the potential positive impact (see Box 10). Further, they note:

> "BMW has decided to closely integrate South African operations into its global activities. A new paint-shop has been built in South Africa (at a cost of R200 million), since poor paint quality was the major quality weakness in local assembly, and production has ceased of the larger models. Instead, BMW will source an important share of its global needs for right-hand drive 3-series vehicles from South Africa and will raise production to 200 cars p.d. [three times the previous level of production], of which three-quarters will be exported."[54]

This policy depends heavily, however, on assembler strategies and the position of the local assemblers in the global operations of the leading global assembly firms. Initially, the policy penalized the most successful and efficient of the South African vehicle assemblers, Toyota SA. Toyota in Japan had only a minority stake in this company and would not, therefore, find it profitable to allow it to compete against wholly owned or majority-owned Toyota subsidiaries in export markets. Therefore, Toyota SA was unable to offset the duty on imported components by equivalent vehicle and component exports and faced a competitive disadvantage in the domestic market. However, Toyota Japan did take a 75 per cent share in Toyota SA in July 2002. In line with this shift, Toyota SA was designated as the source of Corolla exports for the Australasian market with a new light commercial vehicle also due for export into Europe in 2004.[55] This indicates the extent to which the MIDP has leveraged additional investment and access to export markets.

[53] One policy issue for developing countries is whether they allow import credits to be traded between companies.
[54] Barnes and Kaplinsky (2000), p. 224.
[55] Barnes (1999), p. 15, and personal communication with regard to situation in 2002.

Table 14 Major elements of the Motor Industry Development Programme in South Africa

Policy area	*Pre-1995*	*1995-2002*	*2002-2007*
Quantitative restrictions	Yes	No	No
Tariffs:	115% (100% + 15% surcharge)	40% by 2002	30% by 2007
CKD	Not known	30% by 2002	5% by 2007
Components for assembled vehicles	50% (1 Sept. 1994)	30% by 2002 - first 27% of components imported without tariffs	27% duty free allowance remains
Local content regulations	Yes, 50% minimum local content required (excluding exports), but excise duty on vehicles phased down as target of 75% (including exports) reached	Abolished	None
Export-import balancing	Exports counted as local content, once minimum local content of 50% achieved	Exports option, but can be used to offset tariffs on imports. For CBUs, $1 of exports (calculated on South African value-added) buys $1 duty of duty-free imports. For components, $1 exports buys $0.75 of duty-free imports. As duties reduce, so does the magnitude of the duty credit	Duty credits earned through exporting reducing in value as duties reduce and value of exports reduced on sliding scale (6% per year from 2003, i.e. to 70% in 2007)
Export obligations	None	None	None
Restrictions on foreign ownership	None	None. Local licensees being bought out by foreign partners (Toyota, Ford, GM, etc)	None. All assemblers majority owned by MNCs
Restrictions on number of entrants	None	None	None
Export promotion policies	Pressure via excise duty structure – was quite successful see export figures for 1990 to 1995.	Duty drawback scheme as above	Duty drawback scheme as above
Other incentives		Reduced duty on small cars, less than approx. US$6,500 ex factory (removed 2001)	Productive Asset Allowance equal to a 20% duty drawback on the value of a productive capital investment

Source: Barnes (1999), p. 9, and personal communications with Justin Barnes, University of Natal, who has provided much of the information on which this table and the accompanying text are based.

Box 10 Integration of South African production into the global value chains of German assemblers

"The German-owned OEMs (due in part to their continued link into the domestic industry through the sanctions era, and their direct vested interests in the local economy) are, for example, beginning to export significant volumes of vehicles from South Africa. This is evident from the BMW 3-series and the Volkswagen Golf 4 export contracts. Importantly, they are also playing a critical role in acting as conduits for automotive component exports from South Africa. Both passenger vehicle and automotive component export figures clearly support this contention…

"Automotive component exports are largely been directed towards Germany with completely built up (CBU) vehicle exports being largely driven by BMW and Volkswagen."[56]

Large national and regional markets

Australia and South Africa are both small markets with no clear opportunities for greatly increasing scale through regional integration. For larger national markets and for regional markets, there is greater scope for persisting with protection and using the leverage of access to the domestic and regional markets to attract FDI to both the assembly and component sectors. This was the reason for the large inflows of FDI to the assembly sectors of Brazil and India were made. While auto industry trade policies in both countries were substantially less protectionist in the latter part of the 1990s than previously, both countries continued to use tariffs and local content requirements to promote investment.

The challenge for these big countries is to promote linkages to the global economy that would survive, or even prosper, in a context where tariffs might be further reduced and TRIMs phased out. There are signs that these countries can also manage insertion into global value chains. As discussed above, trade in vehicles and components was quite complex in Brazil. The 1995 Automotive Regime allowed a local (including Mercosur) content level of 60 per cent, far lower than in the peak period of import substitution industrialization, but assemblers were required to balance imports against exports. Furthermore, if they exported more than they imported, they could import components at reduced tariff rates. Once again, the phasing out of quantitative restrictions and high tariffs, combined with foreign-exchange balancing requirements, provides an incentive for these countries to be included within emerging global value chains.

One further element increases the possibility of such specialization and division of labour. It was argued above that there were limitations to the standardization of models across markets. One consequence of this is that it opens up the possibility of certain developing countries becoming global specialists in the production of both vehicles and components. In the case of vehicles, for example, the fact that vehicle sales in Thailand are heavily skewed towards light (1-tonne) pick-ups may mean that it becomes a producer of light pick-ups for Asia, Europe and Oceania. By the mid-1990s, both expertise and scale had been secured in the production of pick-ups, for which Thailand was the second largest global market in 1990. Isuzu, Mitsubishi, Nissan and Toyota all produced more than 50,000 units of their

[56] Barnes (1999), pp. 12-13.

leading light pick-up models in 1995.[57] These volumes, which are high for this type of vehicle, reflected both local vehicle use and local vehicle taxation, which exempted pick-ups from the 35-40 per cent sales tax levied on passenger cars. Mitsubishi had already made Thailand its global centre for light pick-up production.

A further possibility in this respect relates to the development of so-called third-world cars. These cars are specifically designed for conditions markets in developing countries, with regard to both cost and durability. The Fiat Palio was first launched in Brazil, and although much of the design work was carried out in Italy, designers from both Fiat and first-tier component companies in Brazil were involved. If a group of developing countries constitutes a market with distinctive characteristics, and if the tariff and logistics barriers to trade between them can be reduced, then particular countries within the group may become specialists in the production of certain types of vehicle. A further development of this process is the location of production centres for particular component options in developing countries. For example, sales of light trucks have increased across many markets. In North America, these trucks are predominantly supplied with automatic gearboxes. In Latin America and South East Asia, customers prefer manual gearboxes. This opens up the possibility that a global first-tier gearbox supplier will choose to concentrate the production of manual gearboxes in one or other of these regions.

Component manufacturing in India

There are many other examples of the insertion of developing country component manufacturing into global value chains as providers of particular product lines. The process is illustrated by the case of some firms in India, as shown in Box 11. In the first of these cases, the basis for the global role of the Indian company lies in the specific characteristics of the domestic market. The Indian market still prefers a variant of the component in question, which has been largely superseded in the Triad economies as well as in Latin America. Therefore, the joint-venture partner of the Indian producer has concentrated this production in India. This leads to the type of sourcing arrangements presented in Figure 2**.** The partner will supply the more sophisticated component to those assemblers in India that require it. The Indian joint venture supplies the component not only to assemblers in India, but also directly to certain export markets, and indirectly to other customers through the marketing operations of the joint-venture partner.

In the second case presented in Box 11, the basis for specialization is the labour-intensive production process. The same product can be produced in different ways. India has clear cost advantages in labour-intensive production processes, and the parent company has chosen India as one of its global sites for production of this component. Clearly, auto industry policy in India, including local content requirements, created the initial rationale for the construction of the Indian plant. Now, this plant is being inserted into a broader global division of labour.

[57] Automotive Industries (1999).

Figure 2 Global sourcing from developing-country partners

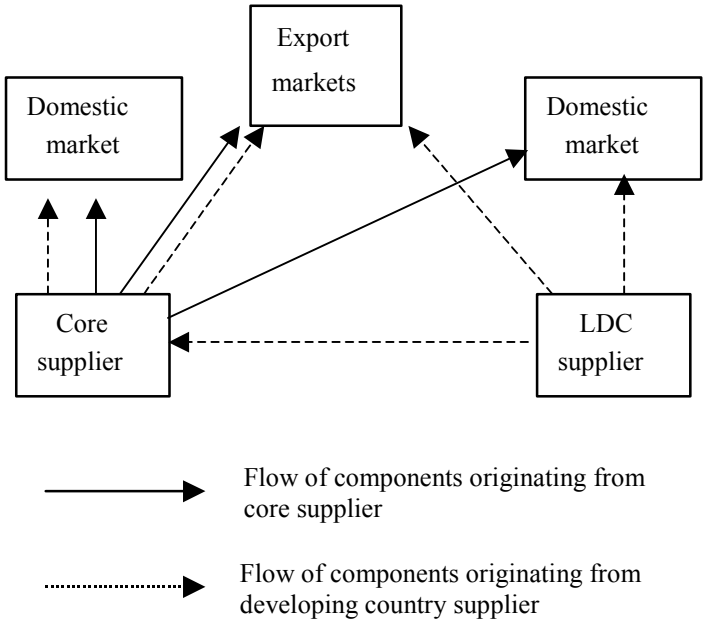
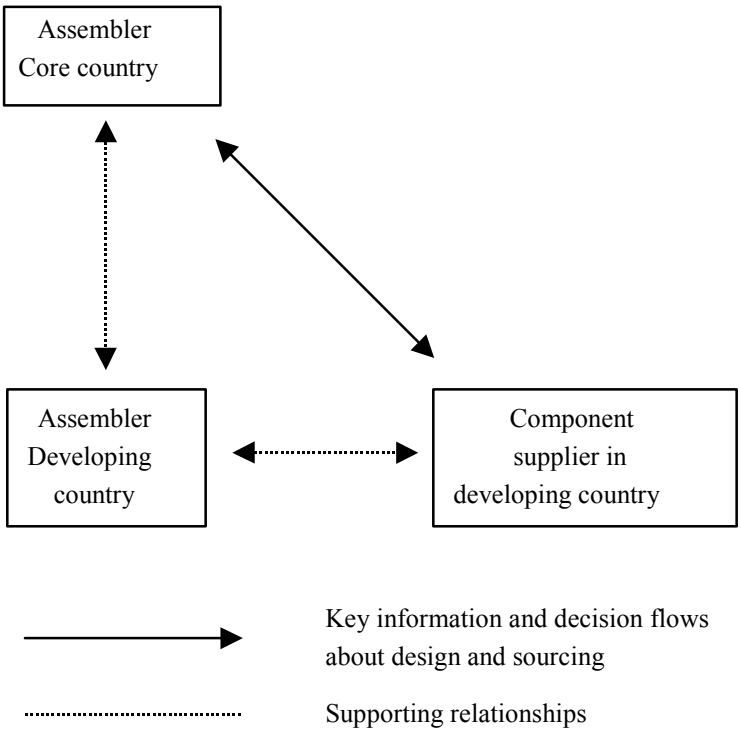


Figure 3 Radiator cap sourcing



Box 11 Export producers in India

Case 1. Company Y was set up as a dedicated supplier to Maruti, which holds a small equity stake. It uses a proprietary technology developed by Suzuki's Japanese supplier, which also holds an equity stake in the Indian company. The Japanese associate is one of three main global competitors in this product line. Until 1995, Maruti was the company's major customer. This company is beginning to provide specialized products to its Japanese associate. In the industrially advanced countries, the product has evolved and only the most basic cars use the old technology. In India, the older product remains widely used. The Japanese company is beginning to source its world production of this product from India, selling it on to other assemblers and component manufacturers in Japan and elsewhere. If trade regulations allow, this division of labour is likely to develop further.

Case 2. Company X is a joint venture with a majority stake and day-to-day management control in the hands of the foreign partner. Like Company Y, the company was originally set up to supply Maruti. Its main product can be made in two ways. Company X specializes in the labour-intensive form of production. Its parent company intends to concentrate this production process at three sites around the world, all in developing countries. Company X may, therefore, acquire a niche role within its parent company's global supply strategy.

Case 3. Sundaram Fasteners is part of the TVS group of companies. This group is one of the largest Indian companies and has developed joint-venture operations with a number of leading global component manufacturers. In the 1980s, GM decided to sell its Liverpool radiator cap factory. Sundaram Fasteners successfully bid for the factory and moved it to Chennai (Madras). This factory now supplies all of GM's plants in the United States and it received the coveted Supplier of the Year award in 1997. Given India's clear cost advantages in the areas of castings, forgings and machined parts, leading companies could become global suppliers for certain parts.

The third case presented in Box 11 and Figure 3 is rather different. It involves the direct transformation of production facilities from the assembler's in-house operations in Europe to an independent company in India. In this case, the Indian market was not the direct starting point, even though it is clear that the capability of Sundaram Fasteners to meet the requirements of its major client was developed within the context of the firm's (and of its parent group, the TVS group) position as a major component manufacturer for the domestic market. The cost advantages to GM were clear, and the Indian company has been successful in meeting the requirements of the North American market. Once again, the construction of global value chains makes India's cost advantages effective in global markets.

Competence formation for competitiveness in the global auto industry

How locally-owned firms might prosper

There are three areas in which locally-owned firms might prosper within the global auto components industry:

(a) as second-tier component manufacturers operating within value chains supplying assemblers in the domestic market;

(b) allied with transnational companies and supplying specialized products for global markets;

(c) as suppliers to both domestic and international aftermarkets. The ability of locally-owned firms to compete in each of these markets can be influenced by support provided by local and national institutions. Four key areas of potential support are outlined here, and the results are summarized in Box 12.

The first crucial area of support relates to standards. For firms linked into supply chains for the original equipment manufacturing, where the buying enterprise gives all specifications to contracting firms (supplying assemblers and certified replacement parts), quality system certification is essential. Initially, ISO9000 was sufficient, but increasingly firms are expected to meet the more demanding QS9000 standard. It is to be expected that greater emphasis will be placed in future on environmental standards, such as ISO14000. In well-established markets, much of the process of certification and also the provision of consultancy services for firms preparing to meet these standards can be supplied through market mechanisms. There is a booming global standards business, led by international consultancy firms such as SGS and BVQI.

Nevertheless, there are three areas in which local and national institutions can provide support. First, private-sector provision of certification services tends to follow the market. When standards requirements are first developed, both governments and business associations can support their diffusion. For example, in the case of Brazil in the early 1990s, the Brazilian Programme for Quality and Productivity (PBQP) was critical for raising quality awareness in industry. In a quite different situation, the case of the surgical instruments cluster in Sialkot in Pakistan, the local business association played a critical role in raising awareness of the need for quality systems to meet the requirements of overseas markets.[58] Second, markets for consultancy services are notoriously imperfect. Firms frequently do not have a clear idea of the services that they need, and they have difficulty in assessing the suitability of both the services and those offering to provide them. Business associations and governments can provide independent assessment of needs and some appraisal of service providers. Third, if the certification process is to include locally-owned certifiers, then it is critical that the accreditation process for certifying firms is credible. There have been difficulties in Brazil

[58] Nadvi (1999).

with respect to the credibility of certification agencies, and similar problems have been registered in the case of Sialkot in Pakistan.[59]

The second main area for support for local firms relates to education and training systems. Increasingly, buyers in global industries impose exacting standards, but they do not wish to be involved in helping their suppliers to meet them. Firms wishing to maintain their involvement in auto industry value chains must invest in engineering skills. These are particularly important in the area of process engineering, so that technical and quality standards can be met, but in certain segments of the components industry there is also increasing emphasis on materials science and the use of new materials. Therefore, provision of skilled labour in these areas is vital.

Testing and measurement facilities are also important. It was shown above (see Box 9) that a concern for quality and for safety could extend to simple and cheap components. The designs for these products need to be tested to exacting standards, and continued control over their production requires that measuring equipment need to be calibrated. The provision of testing, measurement and calibration facilities plays an important role in enabling firms to meet market requirements.

Box 12 The role of local institutions in facilitating the access of domestic producers to auto industry value chains

1. Standards. Entry into the auto industry supply chain increasingly depends upon certification. For second-tier component manufacturers, ISO9000 certification and, increasingly, QS9000 certification are essential. While markets in both the certification process itself and the preparation of firms for certification will tend to emerge, governments can play an important role in developing and ordering these markets.

2. Skilled labour. Firms at all points in the chain need skilled labour able to enhance process-engineering capabilities. The education and training systems need to supply this labour. In some sectors, specialist skills in the area of materials will also be required.

3. Testing and measurement facilities. For small firms, in particular, the cost of testing and measurement facilities can be high. Local and national governments can supply specialist laboratory services and create a sound national framework for metrology.

4. Market intelligence is important. Market intelligence services and support for participation in trade fairs can help domestic firms to open up new markets. This is particularly important for firms catering for the aftermarket, although it may also open up new markets for second-tier manufacturers.

Fourth, the long-term survival of small firms in the global auto industry will depend upon proactive market strategies, seeking out new customers and new markets. It is well known that this activity is costly for small and medium-sized enterprises (SMEs), and there is a case to be made for collective provision of market intelligence and promotion of an industry presence at trade fairs. These activities are particularly important for firms selling to the replacement market.

[59] Quadros (2002) for Brazil and Nadvi (1999) for Pakistan.

It is also possible that local institutions can facilitate the entry of SMEs into the supply chains of assemblers and first-tier suppliers. (Humphrey and Schmitz have discussed the promotion of networks of SMEs and the ways in which these can enable them to open up new markets supplying larger customers).[60] It is a valuable industrial promotion tool in developing countries. In the auto industry, there have been some successful experiences in this area, as can be seen in Box 13. Nevertheless, as Addis herself notes (1999), these networks did not develop very far in the auto industry. In fact, they appear to have been an early response to the pressures induced by trade liberalization in Brazil. A later response was to rely increasingly on global component suppliers to organize the value chain and to resort to increasingly important components. Changes to automotive policy in 1995 in Brazil facilitated this process by substantially reducing tariffs on component imports. Recent research on medium-sized locally-owned component manufacturers in Brazil points to a decline in the level of support from assemblers for medium-sized suppliers. While the requirements of these customers are ever more exacting, the suppliers have to look elsewhere for support.[61]

Box 13 Local support for small firms in auto industry value chains

"A novel programme by the Brazilian Support Service for Small Firms, SEBRAE, shows that with mentoring, small firms dramatically improve their performance. Curiously, although one of the first experiments with this program was in the motor vehicle industry itself, it has not gone very far in this sector. In response to competition from imports, the now defunct Autolatina (a short-lived fusion of the assets of Ford and VW in Brazil), in conjunction with a Brazilian subsidiary of a Big Eight consulting firm, Andersen Consulting, the state-level SEBRAE in São Paulo (SEBRAE/SP), and a group of small suppliers devised a programme that cut consulting costs while teaching small firms how to restructure. Most of these small family firms have become ISO9000 certified. Since much of the consulting was done in groups, costs were lower. Simultaneously, the group dynamic encouraged firms to undertake painful restructuring and also created an often informal, but constant process of benchmarking among the small firms where each encouraged and helped the other. Regardless of the exact format, the SEBRAE experiences show that when a large firm accompanies the progress of its suppliers and when they learn collectively, restructuring, productivity improvements, and the like are quite successful."[62]

Conclusion

In the course of the 1990s, auto industries in emerging markets were substantially transformed as a result of trade liberalization, globalization trends within the industry and the restructuring of assembler-supplier relationships. The massive inflows of FDI into the assembly industries in emerging markets also attracted many new component companies that are

[60] Humphrey and Schmitz (1996).
[61] Quadros (2002).
[62] Addis (1999), p. 223.

following the FDI of their major customers. The impact of this FDI has been affected by the changing governance structures of the auto industry value chain. Global networks have replaced local supply linkages. Even when production remains local, design and contract allocation is increasingly global. This has led to considerable consolidation and restructuring of the components industry in countries such as Brazil, the Czech Republic, India, Poland and South Africa. Local first-tier producers have been marginalized.

Nevertheless, there are opportunities for assembly and component plants in developing countries to enter into international supply networks. The new value chains may link these plants to Triad markets or specifically to developing country markets. For government, the most important question is how to develop a policy mix, which maximizes the potential for insertion into global value chains. In this respect, the transition from qualitative restrictions and local content requirements towards import-export balancing requirements has played an important role. However, it is unclear to what extent these new sourcing arrangements would survive the abolition of TRIMs. Clearly, trade policies must be complemented by policies aimed at skill development if transnational companies are to be attracted not only towards the construction of low-cost production facilities, but also the development of design and engineering skills in their operations in developing countries.

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