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***THE MOTOR INDUSTRY IN
DEVELOPED AND DEVELOPING COUNTRIES***

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THE MOTOR INDUSTRY IN DEVELOPED AND DEVELOPING COUNTRIES

This paper analyses the major trends in the world automotive industry not just in the traditional vehicle making centres and markets in the developed countries but also with relevance to the developing world. The world motor industry and market is still centred on the developed economies, and the American, Japanese and European producers, but new centres of manufacture with some new corporate players are emerging. Hence, the links between the developed and less developed countries are in a state of flux where the motor industry is concerned. These developments are examined as are the possibilities for links between developing countries themselves.

A. MAJOR TRENDS IN THE WORLD AUTOMOTIVE INDUSTRY

(i) Size Structure and Content of Production Output

The volume of vehicle production and sales continues to grow. Output is concentrated in the hands of a relatively few car and truck makers who often have operations in many countries across continents, and whose products are also assembled by many independent licensees and assemblers. Although there are many more brands, there are only some 24 stand-alone vertically integrated car groups, and 28 truck, van and bus makers responsible for designing and making their own products. In contrast, there are over 10,000 materials and component suppliers and a similar number of non-component suppliers. The motor industry consists of car, commercial vehicle and component manufacturers. The component firms supply original equipment used in the manufacture of vehicles and sub-assemblies, but also the huge replacement parts and accessories market where items are used in the service and repair of vehicles, and by vehicle customers wanting to add items to their vehicle. The sale of vehicles and

components supports a vast retail sales and service sector, and the other activities of repair, finance, body-building, machine tool and systems manufacture and development.

The distribution and size of vehicle manufacture and sales is as shown in tables one and three.

Table 1

New Sales of Cars and C.V.s by Region. Actual and Forecast ('000)

<u>Cars</u>	<u>1990</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1999</u>	<u>2000</u>
W. Europe	13,233	11,904	12,303	12,903	12,530	12,558
E. Europe	1,995	1,456	1,498	1,598	1,834	1,914
NAFTA	10,532	10,155	10,705	11,410	11,970	12,030
S. America	750	1,598	1,718	1,889	2,376	2,464
Japan	5,103	4,210	4,500	4,650	4,600	4,500
Rest of Asia	1,994	3,058	3,249	3,417	4,053	4,409
Others	980	968	990	1,012	1,092	1,118
<u>Total World</u>	<u>34,587</u>	<u>33,349</u>	<u>34,963</u>	<u>36,879</u>	<u>38,455</u>	<u>38,993</u>

Sources:

<u>CVs</u>	<u>1990</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1999</u>	<u>2,000</u>
W. Europe	1,800	1,500	1,575	1,658	1,690	1,650
E. Europe	1,106	755	770	800	920	950
NAFTA	5,467	7,092	6,800	6,480	5,380	5,580
S. America	314	562	600	680	838	845
Japan	2,675	2,317	2,540	2,600	2,680	2,550
Rest of Asia	1,749	2,453	2,650	2,825	3,250	3,400
Others	247	128	150	182	692	770
<u>Total World</u>	<u>13,358</u>	<u>14,807</u>	<u>15,085</u>	<u>15,225</u>	<u>15,450</u>	<u>15,750</u>

Source: Economist Intelligence Unit. NAFTA is the North American Free Trade Area of the USA, Canada and Mexico.

Actual, and forecast sales to 2,000, show that the centre of the world car market remains in W. Europe, NAFTA and Japan. However, the fastest growth is outside these areas although even by 2,000 total sales in South America, Eastern Europe, the Rest of Asia outside Japan and Others (Oceania and Africa) will be relatively modest. However, as commercial vehicles are investment goods and needed as 'tools' to help economic development the newer and developing markets are relatively more important for CVs than for cars.

The 'Other' category covers Oceania and Africa. An estimated breakdown for cars is shown in table two:-

Table 2

Sales in Oceania and Africa: Actual and Forecast ('000)

<u>Cars</u>	<u>1990</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1999</u>	<u>2000</u>
Australia	467	491	523	538	543	540
New Zealand	59	66	75	81	91	87
<u>Total</u>	<u>536</u>	<u>557</u>	<u>598</u>	<u>619</u>	<u>634</u>	<u>627</u>
<u>Others total</u>	<u>980</u>	<u>968</u>	<u>990</u>	<u>1,012</u>	<u>1,092</u>	<u>1,118</u>
(South Africa) (Cars)	210	191	236	240	280	290)

The largest car market in the 'Others' category is Australia with South Africa second. Sales in Oceania in total are some 40,000 in excess of the Australian and New Zealand total. An Oceania total including the other Pacific territories plus South Africa indicates the limited size of the remaining African market. From the consultants' reports annual sales of new cars in Egypt, Zimbabwe, Kenya, Ethiopia, Morocco, Zambia, Nigeria and Tunisia are less than 100,000 a year in total. Due to data problems it is possible that the 'Others' total is underestimated, but even so the modest size of the African market is evident. In terms of vehicles in use Oceania has 10 million cars and Africa 10.6 million. However, there are 5.5 million commercial vehicles in Africa compared with 2.7 million in Oceania.

The distribution of vehicle sales is largely mirrored by production with some differences of detail:-

Table 3

Production of Cars and C.Vs by Region. Actual and Forecast ('000)

<u>Cars</u>	<u>1990</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1999</u>	<u>2000</u>
W. Europe	13,584	12,482	12,940	13,365	12,866	12,774
E. Europe	1,848	1,779	1,839	1,929	2,140	2,204
NAFTA	7,752	8,659	8,935	9,689	10,216	9,951
S. America	744	1,556	1,508	1,717	2,113	2,185
Japan	9,948	7,800	8,000	8,150	7,600	7,500
Rest of Asia	2,028	3,164	3,422	3,667	4,536	4,941
Others	403	320	291	294	320	403
<u>Total World</u>	<u>36,307</u>	<u>35,760</u>	<u>37,026</u>	<u>38,965</u>	<u>39,871</u>	<u>40,061</u>
<u>CVs</u>	<u>1990</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1999</u>	<u>2,000</u>
W. Europe	1,823	1,500	1,640	1,720	1,680	1,650
E. Europe	973	605	610	630	680	710
NAFTA	4,876	7,112	6,465	6,100	5,200	5,250
S. America	270	404	456	491	565	575
Japan	3,539	2,753	2,970	3,050	3,000	2,800
Rest of Asia	1,549	2,250	2,445	2,718	3,482	3,750
Others	307	352	364	381	368	390
<u>Total World</u>	<u>13,336</u>	<u>14,975</u>	<u>14,950</u>	<u>15,090</u>	<u>14,975</u>	<u>15,125</u>

Cars are only included in the "production" of a country if the value added in that country exceeds 50%. Hence a car assembled in, say, Malaysia with a 60% Japanese

content is included in Japanese production figures. To add Malaysian "production" of this car to the Japanese figure would involve double-counting. Undoubtedly there is an element of this in the world production statistics. However, the figures in table three are a good representation of the distribution of production of cars and C.Vs.

Most of the "Others" figure for production of cars covers Australian manufacture.

(Table 4).

Table 4

Australian Car Production. Actual and Forecast ('000)

1990	377
1994	298
1995	260
1996	265
1999	280
2000	350

The remainder is accounted for by South African production as distinct from assembly. That is, although South Africa assembled 240,000 cars in 1994, and 140,000 CVs, the local content of most were below 50%. This is confirmed by the consultant in his paper on South Africa. This means that table 3 underestimates the motor industry activity in Africa as regards vehicle assembly. The sales data may be a better proxy for vehicle 'manufacture' even though many vehicles are made from almost complete kits

imported from abroad and others have more local input but a major foreign content nonetheless.

(ii) Domestic Demand and Foreign Trade

The 'triad' of NAFTA, Western Europe and Japan is not only at the heart of vehicle production and sales, but is also the engine that propels world trade in automotive products. Trade within Western Europe and between Western Europe and the USA and Canada is free. Trade between Japan on the one hand and the USA and Western Europe on the other is huge, but there are agreed constraints on the volume of cars that Japan can ship to these two markets. Trade between the developed world and Eastern Europe is being liberalised. As a result 40% of Japanese vehicle production is exported and over 50% of domestic production in Germany, France, Spain and Italy. However most West European "exports" are sold in the region. That is, within the European Union and EFTA. The USA substituted direct exports by overseas investment in local production especially in the post second world war period. Now, however, the Japanese companies located in the USA are revitalising direct exporting from North America.

World trade between the regions of the world as identified in tables one and three is dominated by Japan increasingly supported by Japanese plants around the world, but especially in North America and Europe. By 2000 the US plants will have a capacity of 2.8 million units a year and the Japanese plants in Europe 1.2 million units.

A comparison of tables one and three reveals not only domestic demand and production but also the net trade flows.

In the main, car production in Western Europe is just ahead of car demand. Hence, exports are just ahead of imports to the region. However, in value terms the region has a massive surplus. Overall CV trade is almost in balance, but as Western Europe is the largest centre of heavy truck manufacture there is a comfortable financial surplus. Similarly for component trade. NAFTA's car demand is ahead of production. This indicates a trade deficit which is a mirror image of Japan's large net exports in vehicles. By 2000 Asia excluding Japan expects to have a net export of 500,000 cars a year with the other regions and also a surplus in commercial vehicles. Eastern Europe may be a net exporter of cars but a net importer of CVs. South America will be a net importer in both categories, although Brazil will be a powerful net exporter. 'Others' will be a considerable importer. This reflects the position in Africa more than that in Oceania. It must be remembered that many of the net imports will be locally assembled vehicles from imported kits and components.

(iii) Specialisation and Location

Tables 1 and 3 show that most vehicle demand and production is in Japan, Western Europe and NAFTA. Vehicle production has been long established in South America. However only Argentina and Brazil have major manufacturing facilities, the other operations being small scale and fragmented assembly operations.

Around 50% of production in Asia outside Japan is accounted for by Korea and this will fall only slightly in the period up to 2000. So of the 4.9 million cars made in the region 2.3 million will be made in Korea. China will see output increase from 37,000

in 1990 to one million in 2000, and India will grow from 218,000 to 600,000. Other major centres of production will be Malaysia and Taiwan. In the next ten years major developments will occur in Indonesia and possibly Thailand and the Philippines.

Australia and South Africa have well established vehicle making facilities and in Australia the component base is significant as well. Australia will maintain its, albeit severely rationalised, motor industry. This rationalisation policy will have to be duplicated by South Africa if it is to realise its automotive industry potential.

The other major area joining the modern motor industry is Eastern Europe. Here, output is being integrated into the activities of West European and Japanese producers. In addition, Korean makers like Daewoo are busily engaged in establishing a manufacturing base to attack the local and West European market. The East European part of the global motor industry is moving away from making obsolete products, to making modern products which are part of the multinational motor manufacturers model programme. As yet developments in Russia are slow but elsewhere, including Uzbekistan, rapid changes are occurring.

The West European and Japanese motor industries make a full range of cars from small to large. The bulk of production in Europe is of Superminis (e.g. Ford Fiesta), light medium (e.g. VW Golf) and upper medium (e.g. Opel Vectra) cars. These cover about 85% of the West European market. As yet there are only a few examples of the mini car class which is particularly large in Japan because of local demand conditions. The large cars made in Europe and Japan are executive and luxury models which are

relatively expensive. In the USA, Canada and Australia the large cars are made for a much wider local market and are relatively inexpensive. There has been a convergence in size of vehicle but the average size of vehicle made in the USA, Canada and Australia is larger than elsewhere. This is explained by low costs of production and usage, and local demand conditions.

Europe is still the home of strong brands such as Mercedes, BMW and Land Rover, and of products which have high performance and good road-holding. Japan is the home of excellent build quality, and clever manufacturing techniques. The USA produces individual models in huge numbers, enjoying economies of scale, and giving the customer excellent value for money. In recent years the motor industry has developed major markets for off-road vehicles, mini-vans and pick up trucks. These are used for leisure and not commercial purposes. As a result in the USA huge new market segments have appeared which absorb 6.5 million units of such vehicles in aggregate. The markets are much smaller in Europe but Japanese makers have explained these segments around the world. As a result Japanese and US makers dominate the production of pick up trucks and off road vehicles, and outstrip Europe in mini van production as well.

Europe has a major comparative advantage in heavy truck manufacture, especially over 16 tonnes gross weight, and in bus and coach making. The European firms own many of the US producers and have 48% of the US market for heavy trucks. Japanese manufacturers although a major force in light and medium commercial vehicles are not

a threat to the European makers at the heavy end of the market. In addition European makers are at the forefront of developments in bus and coach manufacture.

The new centres of production are entering the industry with products that are the most appropriate to their needs. This usually means cheaper vehicles at the lower ends of the market. However, as we see in the case of Korea, as developments in India and China, this also involves examples of most categories of car and commercial vehicle.

Clearly economic factors would indicate that the developing countries should make smaller cars in keeping with local purchasing power, and this tends to be the case.

However, some countries are playing host to new investment which will produce larger and more expensive vehicles (e.g. BMW in Vietnam). Equally, the Fiat Palio which is a new car for the developing world is based upon supermini designs. Poor infrastructure will sometimes call for robust designs be they ordinary cars or off road and pick up vehicles. This could allow some unique local adaptations of a standardised design.

(iv) Alliances

The motor industry is almost a new infant industry with great changes in the way vehicles are being designed and built, and with changes in the products themselves. In addition environmental concerns are forcing the industry to respond to legislative needs. At the same time as these factors impinge upon resources and costs, the greater homogeneity of product quality and design is increasing competitive pressures. In order to minimise costs and to make profits in a world where product differentiation is

being eroded and prices are increasingly determined by the market, firms are seeking partnerships and strategic alliances at both the national and international level.

Partnership is increasing between vehicle makers and suppliers both as a need to forge alliances but also to gain the advantages of the new work practices encapsulated by the philosophy of lean production. Partnership means that vehicle firm and supplier establish long term relationships, and where each helps the other to bring down costs so that prices can be reduced without threatening profits and therefore long term viability. This is aimed at replacing the adversarial position where there is little trust between vehicle firm and supplier and where the former seeks price reductions first, which if cost reductions cannot be made will cause financial pain for the supplier.

In addition partnership means that the supplier will be responsible for more value added. This means that there will be fewer and large suppliers dealing with the vehicle makers. In turn these suppliers will deal with a second tier of suppliers and so on. These suppliers will have a key market presence in serving the needs of the vehicle firms. All will be based on world class manufacturing. In fifteen years there could be no more than 200 global "tier one" and suppliers world-wide. Companies will have to achieve world scale through either strategic alliance or merger. This will be driven by mutual needs for technology, customer or geographic access. The shape of alliances will be driven by customer technology or product access as well as the need to increase scale to maximise efficiency.

Likewise alliances will continue to spread costs of (i) research and development, (ii) manufacture and (iii) marketing. These can be between vehicle firm and supplier or between one vehicle firm and another. This applies to all size of firm, even the largest, and on a national and international basis. Within Japan, Honda and Isuzu have established complementary supply links with Honda supplying Isuzu with cars and Isuzu supplying Honda with off-road vehicles. In the area of niche vehicles firms form alliances to justify entry to the sector. Hence in Europe, Ford and Volkswagen jointly produce a people-carrier or mini van, whilst Peugeot and Fiat have combined to do the same. In developing countries various marques are produced in the same plant in a way that would be unthinkable at home. In Australia, General Motors and Toyota sell products to each other to complete their ranges in a least cost way and to strengthen each others marketing.

Some alliances are short lived and are for a particular purpose, others stand the test of time and become long term. The smaller the producer the more important is an alliance so as to increase the effective scale of operations to nearer optimum size. However, such are the cost pressures and demands on scarce resources that even the biggest truck and car firms find it advantageous to enter an alliance. Similarly for component makers with their customers.

(v) *Government Intervention*

Government involvement in terms of owning vehicle manufacturers is in general retreat. This is so in Eastern as well as Western Europe. However, examples still

remain as in the case of Renault. However, government intervention is mainly seen elsewhere:-

- (I) Environmental and Safety Legislation
- (ii) Competition Policy
- (iii) Trade Policy
- (iv) Industrial policy including attracting inward investment and influencing the structure of the industry.
- (v) Dealing with International Agencies

Governments in all parts of the world are ready to intervene to support their motor industry. The US Government was prepared to countenance a trade war with Japan to force easier access to the Japanese market for components as well as cars. The European Commission insisted that Japanese imports to the European Union be limited until 2000 to allow local firms a chance to improve efficiency to world class levels. In Australia, Government encouraged the rationalisation of local production so that costs could be reduced, reinforced by a policy of reduced protection to encourage the process along. Similar reductions in protectionism is in train in South Africa, Brazil and ASEAN countries. Countries offer inducements to attract inward investments to increase local automotive activity. This is an area where the UK authorities have been successful.

Governments have been active in promoting regional alliances to help economic development in general and often the automotive sector in particular. The Canadian-

US Trade pact and then NAFTA saw the automotive industry at the centre of the emerging trade area. Similarly for the ASEAN Free Trade Area (AFTA), European Union and South American developments. To obtain a “quick fix” for the balance of payments, economic developments or whatever, governments often single out the motor industry. The prohibition of the import of finished vehicles, high local content requirements, export targets, are still extant and directed at the motor industry. Equally governments that have found that these measures create severe long term problems are moving towards greater liberalism. This is especially so in South America, Oceania and China. In the case of India the picture is less clear. However, many governments now see that rationalised production without linking the local industry with the global market and motor industry will not produce a viable industry. Hence the attempt to attract inward investment with no local content requirements but with export targets. Such activities can also attract new component plants not only to the local firms but a wider clientele as well. This is superior to a restricted industry based upon imported completely knocked down kits for local assembly. The combination of regional scale and efficient production can be a powerful stimulus to growth. Governments are learning this lesson.

Countries that have motor industries seek government intervention to try to ensure that such a dynamic part of the economy is maintained. Countries without motor industries see the industry as a way of creating employment and boosting economic development. Unfortunately, the process of achieving the latter can see the motor industry putting a strain on the economy via the balance of payments. This can

provoke government action that postpones or prevents the emergence of a viable industry.

B. AUTOMOTIVE MANUFACTURING IN DEVELOPING COUNTRIES

(i) Production Costs

To be internationally competitive motor manufacturers must (a) approach optimum levels of operation and (b) be as efficient as possible at any scale of operation. The former means reaping economies of scale, the latter means eliminating any X-inefficiencies - which in many ways is what lean production is all about.

The optimum levels of production for the various processes involved in car manufacture and truck manufacture are shown in table 5:-

Table 5
Optimum volumes

	<u>Cars</u>	<u>Heavy CVs</u>
Final Assembly	250,000	100,00+
Paint Shop	250,000	-
Casting of Various parts	100,000 to 750,000	-
Casting of engine blocks	1,000,000	-
Power train manufacture	600,000	200,000+
Axle manufacture	500,000	40,000+
Pressing of various body panels	1,000,000 to 2,000,000	200,000+
Chassis frames	-	40,000

Source: Author

The cost of establishing such facilities is huge. For instance new car engine plant will cost £900 million, a final assembly plant £300 million and a research and development centre £40 million. Huge volumes are needed to spread these costs thinly and competitively. The volume to cost relationship for cars and CVs is shown in table 6:-

Table 6

Volume to Average Unit Cost Relationship

	<u>Cars</u>	<u>CVs</u>
1,000	-	150
10,000	220	132
25,000	151	120
50,000	128	110
100,000	100	100
200,000	-	85
250,000	83	-
500,000	74	-
1,000,000	70	-
2,000,000	66	-
3,000,000	65	-

Source: Author

In the case of components many parts reach efficient scales of production relatively quickly. Whereas transmission and power train components need unit volumes of around 350,000 units a year for minimum cost and below 150,000 the cost penalty increases rapidly, items like glass, batteries and exterior trim exhaust economies of scale at 150,000 units a year and the cost penalty at 50,000 units is under 20%.

It must be remembered that the cost profile shown in table 6 is for an integrated operation. However, joint ventures, buying in major items like engines and pressings, and purchasing a higher content of the vehicle from independent component makers spreads costs, gains external economies of scale, and reduces the penalty of sub optimum operation. Lean production has some impact here but in the main it lowers the entire long run cost curve but leaves the actual optimum scale untouched.

Although new production techniques can increase the variety of products, efficient manufacture depends on the use of common parts which can be assembled into different products. That is, lean production does not replace mass production, instead the nature of mass production has changed. In short, the viable firms of the future are the lean mass producers. Large volumes are still needed for economies of scale

The existence of relatively low and protected domestic volumes with a high local content made for high cost production and high prices. In the mid 1970s Brazilian cars cost 60% more than similar products in the USA and Europe despite lower wages. In 1980 the Korean Hyundai Pony cost \$3,927 to make compared with \$2,300 for a competitive Toyota Corolla. One study revealed ex-factory costs averaging between 60% and 150% higher among the car makers of Brazil, Argentina and Mexico than in the USA. Indian cars made in low volume and with 85% domestic content cost 120% more to make than comparable European high volume cars. In addition, high domestic content of 60 to 90% made up of components and parts made in relatively low volumes in small-scale plants, contributes further to high cost.

The cost breakdown of a volume produced car shows how the huge absolute costs are spread thinly at near optimum volumes (Table 6):

Table 6

	<u>Breakdown of Average Costs per car at large volumes</u>
<u>Variable costs</u>	
Direct Production Material (i.e. components and materials)	62
Warranty Costs (i.e. repair costs)	4
Variable Overhead	10
<u>Fixed Costs</u>	
Direct and Indirect Labour	8
Fixed Overhead (i.e. capital equipment, R and D, marketing costs, etc.)	16
<u>Total</u>	<u>100</u>

Source: Author

A breakdown of the Direct Production Costs gives an idea of the detailed cost profile of a volume made car. The raw materials used are fairly clear-cut. Nearly 70% of the weight of a car is composed of steel and iron. Plastics, aluminium, rubber and glass comprise another 20%, and the remainder is composed of items such as cloth or leather. As table 7 shows production costs are fairly evenly distributed across different areas, with no one part accounting for more than 20% of the total value of direct production costs:-

Table 7

Production Cost Breakdown of Volume Made Upper Medium Car (e.g. Toyota Carina, Ford Mondeo)

	<u>US \$</u>
Body	1,500
Engine	1,200
Comfort and Convenience Items	900
Suspension and Steering	700
Engine, fuel, ignition and exhaust system	650
Transmission	600
Interior Trim	525
Brakes, wheels, tyres	500
Glass	400
All other	1,000
<u>Total</u>	<u>\$8,000</u>

Source: McKinsey Consultants

The other categories in table 6 would add about \$5,000 to the production costs at high volumes. Low volume production with high local content would push up unit fixed costs and also unit production costs. Low volume items bought at least cost penalty would be glass, trim and batteries. Engine and transmission items need the greatest volume.

(ii) Quality Aspects

The term 'quality' has many dimensions where the motor industry is concerned.

Quality can be a function of performance, status, specifications and so on. A most crucial aspect of quality refers to reliability and quality of manufacture.

The Japanese brought new standards into play where quality of manufacture and reliability were concerned. This reduced the number of product faults faced by the customer. This has forced the American and European manufacturers to take note. The process of lean production including as it does design for manufacturer sees the production of quality products as one of its main attributes. Hence, all vehicle firms have been attempting to reach world class standards of quality in order to compete. The result is that in the developed countries the quality of cars is now universally good. To compete in such an industry automotive products be they vehicles or components must approach world class standards of quality.

The first major export drive by the Korean motor industry was to the USA in 1986-90. Initial success turned to ashes partly because of the poor build quality. This lesson has been learned and quality has improved rapidly. In the late 1980s the quality levels in Australia were far off the standard set by Japanese and US producers. However by 1994 there was a 40% improvement in owner-detected faults in locally made cars. International surveys placed the quality of some Australian models within two or three faults per car of the world's best.

Links with multinational motor manufacturers allied to a recognition that local standards are not good enough but can be brought up to world best, can spread the quality message to the developing markets. Even entry level cars aimed at the cheaper end of the market must be of good quality. There is no point in the developed countries making low quality low-price products if they want to establish a motor industry which can grow to a scale to be viable. This means linking with the regional, and perhaps global, market. This can only be done with good quality products. The Korean and Australian examples show that improved quality can be achieved by automotive activities outside the main centres. Malaysian cars have done well in quality audits.

(iii) **Technology Transfer**

Different parts of the world have different factor endowments and comparative advantages. It is not always appropriate to have capital intensive techniques with the 'best' technology, if labour is the abundant factor of production. Indeed in the world motor industry there is not a strong correlation between capital intensity and labour productivity. Hence, there is no supposition that it is necessarily the case that every aspect of vehicle manufacturing in the developed countries must be transferred to the underdeveloped for the latter to be successful. However, the economic advantages stemming from new technology are many. The development of new products, processes and organisational methods is costly, and often beyond the reach of developing countries. This applies to the motor industry. The technology must be imported via the products, licenses or foreign direct investment. In the case of direct investment by the multinational vehicle or component firm the transfer of technology is

likely to be carried out more thoroughly than through licensing arrangements. Also, the affiliate has continuing access to the flow of new developments made by the group. In this lies much of the competitive advantage of foreign affiliates over local rivals owned by nationals.

In the motor industry the transfer of technology is almost as old as the motor industry itself. To a greater or lesser extent the developing countries are dependent on the developed nations for motor industry technology. What is at issue is the method by which technology is transferred and the suitability of that technology.

As regards 'method' the choice is between acquiring the technology through incoming foreign direct investment or through the market. The former brings a package containing capital, technology, managerial and marketing expertise, perhaps even market outlets. The latter may avoid, or reduce, foreign ownership and control. Each must be looked at on its merits, and individual countries must evaluate which is the realistic course for them.

In general terms experience in the motor industry suggest that technology transfer within a multinational, even to a less than wholly owned subsidiary, is superior to transfers through other channels such as licenses, or the hiring of managers and engineers in world markets. The multinational will also help local suppliers and dealers to improve their performance.

It is possible to follow the alternative route. Domestic firms borrow foreign capital, licence foreign technology and hire experienced key technical and managerial

personnel from abroad. To succeed this needs large indigenous firms ready to enter the vehicle industry plus, or alternatively, substantial government support. This approach finds examples in Japan, Korea and Malaysia, and possible additions will appear in China and India. In other word this is a feasible option but expensive and high risk and which needs particular conditions. For instance, access to capital, protected and significant local markets and a government able to help materially.

So the transplant of automotive operations from developed to developing economies is achievable and viable. However, to reach internationally acceptable products and standards of operation needs much assistance.. In the main the most feasible route appears to be the multinational vehicle and component firm.

Although as indicated above different parts of the world has different factor endowments, it does seem in the motor industry that economies of scale are of such overriding importance that the level of output largely determines the techniques used, with differences in wage rates having relatively little to do with choice. The need to achieve world class quality seems to reinforce this. Of course, the problem for most developing countries is not one of choosing the most appropriate technology for the mass production of automobiles, but rather of adopting techniques capable of turning out much smaller volumes for restricted markets, without increasing costs too much. Sometimes multinationals found it difficult to successfully scale down. However, for the developing country the crucial question is how far scaling down can go before local production becomes totally uneconomic.

Although competition by vehicle firms may speed up the transfer of technology to ensure that their products are the best in the local market, if local manufacture is fragmented or made up mainly of imported kits then the opportunities for transfer are limited. In such circumstances it is unlikely that local producers will become independent of licensed technology or the support of multinationals. Where production is less than large scale foreign sources will be the only viable way to achieve the latest technology. This can involve royalty costs and restrictions on exports. If Governments encourage more local activity which expands into areas where higher value added and technology is required, this may be at the cost of imposing high local content rules and the problems for efficient production that this presents. Attempts to overcome this by limiting local variety by insisting on a limited product range behind protection can lead to problems of monopoly. The better strategy would be to encourage firms to establish optimum size facilities linked to the wider market. These would have to be competitive, and as a result would encourage technology transfer in terms of production and information technology.

Investment

In 1980 less than 5% of automotive industry investment went to developing countries. If present plans are realised then the next five years will see this percentage reach 42%. This reflects the largest net expansion in capacity by the world motor industry, which as shown in the production figures in Table 3 is in South America and Asia outside Japan.

The multinational manufacturers are putting together financial packages, including state finance. Due to the size and strength these companies are able to put together financial packages more cheaply than outside consortia or independent operators and investors.

The majority of investment is being made in Argentina, Brazil, Mexico, China, India, and ASEAN. In addition new facilities are being established in Hungary and Poland. The Korean motor industry continues to expand and is spending over \$10 million outside Korea alone. These companies are raising funds in Europe, Asia and North America as well as in Korea itself.

Although Japanese investment denominates Asia and the net inflows to the USA and Europe, the American companies are maintaining and increasing their world investment. In addition, European companies are beginning to return with capital projects to Asia and South America. Major vehicle assembly investments are attracting further investment by component producers.

The increasing competitiveness of the world's vehicle market means that every manufacturer is keen to consolidate its position, and to ensure that none of its rivals steal a march on them. This is provoking many firms to invest on a 'follow-the-leader' basis. If one car, CV, or component company moves into a market others soon follow.

Manufacturers are looking to produce vehicles more suited to local needs albeit based upon existing products so as to reap economies of scale. The Fiat Palio goes into

production in Brazil in 1996 and in 1997 in Argentina . Subsequently it will be built in Columbia, Turkey, Poland, South Africa, Morocco, Venezuela, India and probably China. It will be sold in over 20 countries, but not in the developed ones, at an annual rate of 900,000. To consolidate their hold of the east Asian markets Japanese manufacturers have launched various Asian car projects. These will be built in East Asia outside Japan, and be exported to regional markets and South America. Component makers will expand their activities to supply these ventures. In East Asia regional initiatives will help companies attain economies of scale with various items being made in different countries and then sold to the others. Such specialisation and division of labour will help viability and thereby encourage investment.

C GROWTH FACTORS

The aim of developing countries where the motor industry is concerned is to establish a viable and competitive industry. Various factors are at work here.

(i) Protection

The development of automotive industries under systems of protection and attempts at self-sufficiency has had a number of adverse effects:-

1. The relative costs of production have been high by international standards. In the late 1980s it was found that it took fifty hours to assemble a car in Brazil compared with thirteen hours in a best practice plant, and this was in a plant in one of the largest developing countries with a relatively unfragmented industry. Any net gains from upgrading industrial skills may be more that offset by the

net losses of inefficient plant operation and scale. The creation of backward linkages may give rise to a high-cost supply structure that is difficult to phase out at subsequent stages of industrialisation.

2. As the production and consumption of automotive products have been allowed to expand, the foreign exchange burden has risen almost proportionally to the rate of sector expansion even with the offsetting effect of progressive increases in domestic content. Import substitution is rarely enough and exports are difficult to make because of inefficient production. Even if price is competitive quality shortcomings will undermine exports as Brazilian and Korean experience in the 1980s showed.
3. Industries existing under protection can represent a "technology gap". As the market is closed to modern products older designs with little commercial future in export markets are made, and over a long period of time. The East European, Argentinean and Indian motor industries are prime examples. As a result developing countries can end up with product proliferation associated with transplanted technology which is not economic for domestic production, and obsolete products and techniques which cannot compete in world markets.
4. Once protection is built into the system it is difficult to remove because of vested interests. The short term profits generated by systems of protection and import substitution encourage the mushroom growth of small-scale, inefficient plants until markets become saturated. The higher the tariff wall and the more

restricted the import quotas the more extensive the inefficient growth. In Chile in 1966, 7,800 vehicles were made by 22 firms, but also in 1994 as many as 28 firms made 217,000 vehicles in Malaysia, and 22 firms made 324,000 vehicles in Indonesia. As domestic markets are saturated and competition intensifies, survival becomes increasingly difficult. Protectionist interests hinder the development of regional markets.

These problems still exist but they are being addressed. Industries are being rationalised, liberalisation is seeing the transfer of newer technology, and regional markets are appearing. An example of the latter is within ASEAN where import duties between member states will be reduced to 20% by 1998, on vehicles with a local content of 50% or over and to 5% by 2003.

Government Incentives

The competition for automotive investment means that Governments have to provide a good operating environment. This can mean a commitment to trade and financial liberalisation as well as specific incentives.

Countries offer incentives in the form of financial grants, tax breaks, subsidised supplies and so on. Multinational companies are able to determine investment priorities on a global basis and to concentrate on markets that offer the best return.

Tariffs can be adapted to help local manufacturers against imports in maximising effective protection. This can involve tariff free imports of components, against an

export commitment by the local manufacturer. Local official help geared to help training, research and development, the diffusion of information technology and no restrictions on profit remittance improve the operating climate and attractiveness of a location. Commitment to regional integration is becoming increasingly important. A policy of no imports and high local content is seen as one of possible short-term success but ultimate failure because of uncompetitiveness. What is preferred is reduced local content, greater imports of built up vehicles to complete a marketing range and off-setting export growth. In this way the local industry becomes part of a wider industry. Government policy must recognise this.

Developing countries, and to a certain extent developed countries, seek to establish a growing and viable industry by:-

1. Fiscal incentives: affecting corporation and income tax, exemptions and subsidies.
2. Tariff policy: protection for local assembly, incentives for the import of components and capital goods
3. Direct help: price of land, support activities, repatriated capital, Government purchase of locally made products, ownership structure.

De-regulation of Industry

The history of the motor industry shows that the industry prospers in a private enterprise and free market environment. Such is the wide availability of locations that now follow this philosophy, that developing countries are having to liberalise the conditions under which the industry operates.

Lower tariffs, reduced domestic content regulation, less control of local product and investment policies, is the present trend. Many countries and regions are reducing the regulation of production and purchase of vehicles. Regulation still exists but the trend to greater liberalisation is unmistakable. The sourcing of components, the range of vehicles, the ability to exit an industry means that efficiency receives a boost. In the modern motor industry where there is nowhere for the inefficient to hide a liberalised environment is a prior condition for a survival policy.

So that firms can develop on the basis of comparative advantage competition is being increased. Imports are being liberalised, industries rationalised, access to foreign exchange made easier, and ownership rules eased. If large scale investment is to be attracted then the large motor manufacturers must find a location attractive. That is, it must easily be fitted into the companies' global operation. Local attempts to duplicate this, as with domestic makers in Korea and Malaysia, must also operate in a liberalised environment. Otherwise products will be uncompetitive. The position in Mexico summarises the need and the trend. In 1962 the Mexican government prohibited the import of finished vehicles and imposed high local-content requirements on the five foreign firms making cars in Mexico. The policy was initially a success but ultimately a dire failure. The industry was uncompetitive in cost and quality. Now, Mexico has reduced domestic content regulations, relaxed the rules on imports, but requires that companies balance their trade by exporting. Restriction has been replaced by liberalisation and growth.

International Integration

Those countries with substantial motor industries such as Brazil and Australia, those with major industries such as Argentina, Malaysia and South Africa, and those with substantial aspirations such as India and China just look to their own regions to underpin growth for eventual break-out to world markets. If this is so for these countries then it is even more so for the newer centres if they are to have any hope of being host to a viable motor sector.

By setting in motion a policy of international integration a country can rationalise the industry through competition and free trade, and develop larger operations which can bring down costs through economies of scale. Regional trade can grow without being dependent on favourable trade policies and currencies in the other great regions. Some parts of the world are further down this part than others. Oceania, the Indian subcontinent, northern and southern Africa are lagging behind being South America and South East Asia. The combination of regional scale and modern production techniques can be a powerful stimulus to growth if integration policies of the right sort are pursued. That is, policy must be based upon competitiveness and economic rationale rather than fair shares for all. Otherwise fragmentation will persist.

International integration can be on a wider canvas than a region. Fiat will be making its world car for regional and inter regional business. Components can be transported over long distance at competitive prices. The developing countries must pursue policies that allow them to be the source of such activities and trade, rather than solely the recipient.

International integration is the norm in the world motor industry. The magnitude of capital requirements and the need to obtain optimum volumes provides a bias towards inter-firm, inter-country, inter-regional integration. The pursuit of 100% self sufficiency is no longer an option. Indeed the trend is to 80% domestic content even in developed countries. As regional activities increase even this will fall.

Environment Protection

Although the demand for cars and commercial vehicles will continue to grow for the foreseeable future, nevertheless environmental concerns will grow. Therefore, if countries expect to sell their products in developed markets then they must meet strict environmental standards. Hence, cars and Cvs made in developing countries aimed at a wider market must meet the demand for improved fuel efficiency, less emissions, greater safety, ultimate recyclability and so on. Therefore, a viable and competitive industry must be able to meet some or all of these demands.

If sales are restricted to a particular region then those regional operating standards will determine the environmental needs that must be met. The pollution in major cities in developing countries will see policy makers and environmental lobbies wanting measures that clean up the cities. These could involve tax concessions that would make the use of, say, electric vehicles viable. The economics of making such vehicles could be totally different to that for standard products. Consequently optimum volumes could be much lower. This could encourage local manufacture and even provide a comparative advantage. Countries such as Thailand are very interested in such possibilities.

This all indicates that the motor industry in developing countries cannot really make products of a lower environmental standard than those in developed markets and expect to prosper. The environmental concerns of developed countries will spread, and thereby drive a commonality of requirements.

D. FRAMEWORK FOR CO-OPERATION

The modern motor industry is less and less autarchic. Co-operation is an increasingly common phenomenon. This can occur between developing countries and between developing and developed countries.

Exchange of Experience

The manufacture of vehicles and components is complex and involves a number of different processes, themselves applied to a variety of products. Even if the processes exist in a country, which often they do not, they are not completely mastered. This calls for an exchange of experience and indeed the transfer of knowledge and technology. The transfer of technology is the transfer of embodied experience in a 'capitalised' form.

Working with accrediting institutions can facilitate the exchange of experience.

Membership of the International Standards Organisation helps the application of international standards, especially quality, to the automotive industry. This facilitates

the manufacture of vehicles and components of a proper quality and specification, and competitive with those made in developed countries.

The role of local educational and research organisations can contribute to the exchange of experience. They can also contribute to training courses and schemes. The exchange of ideas can help the development of local product adaptations and differentiation. If advanced technology is to be licensed then the indigenous firms in a developing country must be able to make use of this. This requires a prior exchange of experience.

Experience can move from developed to developing country via investment by multinationals. There can also be a transfer from affiliates in one developing country to another. The production of Fiat's "developing world" car and the Japanese Asian cars will involve such a process horizontally across developing markets. Licensed arrangements can involve a similar exchange although on a more project-by-project and 'ad hoc' basis. Most of what is transferred within a multinational enterprise is derived from knowledge and experience in one part of the system, hence the additional cost of using it is modest. Foreign direct investment can bring a package of factors. An alternative is to break open the package by borrowing capital, licensing technology and hiring key personnel from abroad. All provides an exchange of experience.

The appearance of regional markets, and automotive policies based upon them, such as between Brazil and Argentina and within ASEAN is seeing product and manufacture co-operation and co-ordination. This will help the motor industry in developing

countries to make a breakthrough in production systems and products beyond low wages and simpler products. Only if they add a creative dynamism to low wages will the automotive industry in developed countries shift the balance of world production.

Strategic Alliances

The motor industry in developing countries can also enjoy the benefits of co-operation via buyer-supplier partnerships. This can involve sourcing particular types of component in particular countries or particular types of vehicle for a regional or world market. Foreign owned firms can be quickly included into the global sourcing arrangements of the parent company. However, licensees can face the problem of restrictions on exports which are included in the terms of the licence.

The Japanese motor industry has established a system of partnership and close co-operation between manufacturers and first tier suppliers. The industries in the USA and Europe are trying to emulate this. Also the whole panoply of lean production is being introduced. All of this with varying degrees of success. However these developments are seen as vital ingredients in the pursuit of cost control, product improvement, and general competitiveness. As yet these systems are rare in the developed world. To meet growing international competitiveness such strategic alliances across the market must be developed. Clearly there are difficulties. The use of CKD kits for local assembly avoids the penalty of small production runs for sub-assemblies and components, but as the kits are imported and contain stocks of components they are not conducive to just-in-time systems. However, strategic alliances which see local assembly plants being built for a regional and global market,

as in Mexico, has seen subsequent investment by component firms. This can bring new buyer-supplier relations to the local industry.

Although global companies can locate the manufacture of particular vehicles in certain developing countries for export elsewhere this will be of limited coverage in the immediate future. However, developments are occurring especially on a regional basis. In addition the manufacture of major components and sub-assemblies is being sourced in single locations for use more generally. The Thai component sector is increasing exports out of the region, whilst Toyota has established a system of division of labour amongst its facilities in South-east Asia. It makes diesel engines in Thailand, steering systems in Malaysia, engines in Indonesia and transmissions in the Philippines. This allows Toyota to take advantage of volume production and lower cost.

Throughout the world strategic alliances are being forged between vehicle firms for the joint development and manufacture of vehicles, and new types of link are being forged with suppliers. This is to control costs to remain viable in an ever more competitive environment. This is even more relevant in the developing world where policies aimed at self sufficiency in a world of small production runs are not tenable

Licence Agreements

Only in a minority of cases will local R and D either exist or be sufficient to allow developed countries to keep up with the changing needs of the market place. Hence, local automotive sectors will depend upon imported technology. This will involve either foreign direct investment or licensed operation by locally owned firms.

If there are capable entrepreneurial groups locally, if there is access to engineers and managers with the ability to absorb new knowledge and adapt it to local conditions, the availability of trained and skilled workers, the existence of a supply of basic materials, parts and components, available local capital and a willingness by outside companies to grant licences and for modern products, then licensing can be a viable option.

With licensed production there is always the danger that the global producers of vehicles and components will not sell their current designs and tooling for export production. This was the case in Eastern Europe. Hence production lags a generation or so behind the best. Direct investment by a multinational obviates the need for all the conditions for successful local licensing and the reluctance to supply the most up to date products and facilities. Such is the difficulty of establishing a motor industry based upon licences, hiring foreign designers and managers and borrowing from abroad, that very few have succeeded in doing this. Hyundai of Korea and Proton of Malaysia are amongst the few that come to mind.

However, there is the question of ownership and control. Money flows out of the country and decisions are made elsewhere. This is the case in most developed countries, for instance the UK, as well as developing ones. Such fears have been one of the reasons for the establishment of joint ventures.

Joint Ventures

Foreign investment plans can come from foreign direct investment, licensed production or joint ventures. The latter can be with local enterprises or the host government.

Either the foreign partner or the local one can be the minority partner albeit a large one.

The joint venture is helpful to the host country as the state or local shareholders receive part of the profits. Local capital which may have been borrowed by the multinational is converted into equity. How much local control goes with local ownership is debatable. The logic of a multinational enterprise calls for a closely knit world organisation, operated for the benefit of the group as a whole. The willingness to accept joint ventures may be based upon control remaining with management and with the local partners more likely to be allies than antagonists. However the state does have sovereign power that can be brought to bear as a control mechanism, especially as the motor industry is not a particularly difficult case to tackle as regards transfer pricing. Remedies are possible as long as information is collected.

Joint ventures are important as a source of investment not just because of the sums themselves, but also because local enterprise can experience world best practice. The lean production systems are more than a match for low-wage systems. The two must be allies not protagonists. However, even lean production needs large volume production for economic manufacture to exist. A joint venture by combining a local operation with a global enterprise can provide the necessary effective volume. In

addition the lower costs mean lower prices and an expansion of the local market. In turn this stimulates intra-regional trade.

Foreign direct investment will provide a rapid influx of knowledge and which is maintained over time. Licensed production is a useful second best approach. All of this strengthens the co-operation between developing countries but especially with developed countries. Joint ventures and buying local firms obviates the learning costs involved in a greenfield site.

Technology Updating

Technology updating is accelerating as international competition increases. It is not feasible that more than a handful of indigenous enterprises will be able to keep up with the needs of the market place through their own efforts. Consequently, technological upgrading must come from foreign sources. Local owners will have to use licensed technology for products and production process, with capital equipment being purchased abroad or licensed built. This involves royalty costs, restrictions on exports, but is the only viable way to keep up to date with technology. Direct foreign investment and joint ventures are the other main access routes.

The aim of achieving improved specifications and international quality control demands technology updating and process control. The smaller the market and the greater the product mix the less attractive the market for joint ventures and direct investment and the more difficult the establishment of a viable industry leave alone technology updating. Manufacturing a local car can be seen as a way of attracting technology

transfer and updating. However, in small fragmented markets this is not a viable prospect. Any attempt to increase the output of a particular model by restricting the available range of products might improve efficiency for a vehicle but at the cost of monopoly power and ultimate inefficiency.

Technological update also involves training personnel and long term technical assistance. This and gradual increases in viable local content will increase the value-added of technology. So although basic know-how will still be imported some adoptive R and D may be possible. Especially in the case of component parts, manufacturing equipment can be sourced in developing countries, particularly in East and South East Asia.

The world motor industry is in the throes of a period of super competition, and technological update will be part and parcel of a survival strategy. New motor industries are appearing with aggressive companies. In Korea, Daewoo is in the throes of a \$5.5 billion investment in Asia and Eastern Europe. For instance, one venture will be in Uzbekistan which is establishing a major wide range of automotive industry.

Challenges and Opportunities exist.

E. CONCLUSION AND RECOMMENDATIONS

(i) Conclusion

It has been said that the basic principles of the automobile have been widely known and changed little over the years, that the industry is not a particularly high technology industry and that its products and production processes have been standardised. There

is truth in this but in the last decade the industry has experienced major changes in the process of production and the nature of the product, and that the needs of the market are driving the search for new technological solutions. Even when such change was absent no developing country had proved capable of independently designing and developing a motor car or of producing one in volume. Perhaps it was Korea that got closest but even here foreign technology, licences and exports were used. (Even the USSR had to buy a modern design and know-how to produce on a large scale from Italy and France). Now that the industry is in a state of flux the challenges facing developing countries are even greater. It is true that some countries having used foreign links to establish an industry, with India now capable of producing and selling a unique truck in world markets solely from national resources, in general developing countries are still dependent on foreign enterprises either through direct investment or licences or imports or whatever, for automotive technology.

Major problems in the supply structure of automotive sectors in protected economies are high costs, a foreign exchange burden, a technological gap, and other forces that undermine future growth. Measures to improve the economic efficiency of this industry must deal with such structural difficulties. The fundamental obstacle of economies of scale may be partly overcome by rationalised production for internal markets, but major gains would exist if that market was at least regional. A global or semi-global reach would be even better. That is, major gains are also found by increasing economies of scale through specialised production for world markets. This is happening and is a sure sign that motor vehicle production in some developed countries can be viable. However, as in the developed world not every developing

country can hope to establish a viable motor industry. Some will play host to component firms and others for facilities that cater for the after market and vehicle sales but will not be able to offer enough to have any major type of significant component, vehicle or bodybuilding capability. For those countries able to sustain automotive activities specialised production would be boosted by a country participating in international industrial complexes manufacturing and marketing automotive products.

An infant economy often needs some protection if it is to develop industry. However the use, degree and length of protection must be carefully considered, as protectionism all too often leads to inefficiency. Production costs are so high that any benefits are overwhelmed, but vested interests makes the dismantling of protection difficult. Behind protection an industry can soldier on with obsolescent techniques and designs, but these are difficult to sell elsewhere even at low price. Product proliferation can also undermine efficiency, yet any rationalisation behind protection can lead to problems of monopoly power. This applies to component making as much as vehicle making. Product proliferation associated with transplant technology is not economic for domestic production as there are no scale economies, and obsolete products and techniques cannot compete in world markets.

In contrast to proliferation and small markets, liberalisation and regionalism can offer a more fruitful alternative. A rationalised range per country can co-exist with regional competition. The market can be of such a size, especially with the complementary production of components and vehicles, to give something approaching viable

production. These products can reach a wider market. Increased imports, liberal local content but substantial exports can be the expansive policy with no foreign exchange constraint. In comparison, assembly perhaps should not be contemplated for countries with annual markets less than 25,000 cars and 10,000 CVs as assembly is not only inefficient but usually costs more in foreign exchange than imports of built up vehicles. Indeed, average production runs of 25,000 because of fragmented production is too low even for lean producers to make economically. Lean production even if it changes the nature of mass production does not eliminate the cost penalty of small scale production. However this fragmentation and low scale is found in too many developing countries.

Lean production is more than a match for low-wage production. Hence the motor industry in the developing world must embrace modern techniques. At the same time as basic inefficiencies are taken out of the system, viable scale must be achieved. The latter can be approached through regional or specialised production with fewer models, components, and plants serving domestic markets. Improved efficiency can help exports which in turn reduces the foreign exchange burden of motor manufacture. This could mean that a REDUCED domestic content by increasing efficiency will reduce or even eliminate the foreign exchange burden.

Environmental concerns are spreading rapidly in developing countries. Already environmental legislation is placing requirements on vehicle makers in developed countries. To sell cars in these markets they must meet strict requirements. Even if the environmental challenge in developing countries was not increasing, there would be

no future in developing countries making cars to inferior environmental standards if they wished them to sell more widely. To ensure that non tariff barriers do not appear, regional markets must agree on standards for environmental, safety and operating needs.

The modern motor industry is a shifting world of co-operation and collaboration, strategic alliances, joint ventures and partnership. It is a demanding world where protection is falling, product differentiation eroding and homogeneity of quality growing, competition is increasing. Faced with a massive array of production the consumer is sovereign as never before. In such a world there is nowhere for the inefficient to survive for any length of time. Hence, only those countries with, or the potential for, the preconditions, such as a viable size of market, local skills, local production of components, for an efficient motor industry, should allocate scarce resources to its expansion, or creation. Preconditions may be found on a regional rather than a domestic basis.

A gradual shift in the centre of gravity of the world motor industry is occurring, but it still remains within the developed countries and with their vehicle makers and component producers. (Appendix 2). These activities because of continuing technical and economic change do have a future in high wage, developed countries. However, economic and political pressures means that the greatest growth of the motor industry will take place in developing countries, with output in the home developed countries more or less stabilised at current levels. Consequently, developed and developing countries can both benefit from the diffusion of supply.

(ii) Recommendations

1. There must be a clear strategy for the motor industry in developing countries. This should involve the activities that exist and those that should be encouraged and over what time frame. This should cover not just the industry but: wider issues such as transport policy; the future trends in demand; and whether a country or region has the pre-requisite for a viable motor industry.

2. So that countries will know where they stand there should be national surveys to establish a data base covering motor industry and ancillary activities. This will allow countries to see what these motor industries consist of and what developments may be feasible. Before starting a journey it is a good thing to know where one is starting from as this can determine the destination and the best route to it.

3. Protection may be needed in the early stages of motor industry development. The precise nature of the protection must be established, and a timescale for liberalisation of trade established.

4. Local vehicle manufacture and component making should be orientated towards introducing cost saving measures. These must involve improving the cost base at any given scale of operations and increasing the size of operation so that economies of scale can be established. Improved efficiency will allow reduced protection without threatening local activities. In turn lower costs and prices will expand local demand to give a boost to increased volumes.

5. Local content rules are useful in helping and establishing local assembly and component making. This must be done with efficiency in mind. Therefore, local content must not be increased at the expense of local efficiency or quality. Otherwise local production will be costly, prices high, local customers alienated and exports constrained. Efficient component manufacture will not occur if there is a lack of competition and volume. Policies must be geared to providing both.
6. Local production must not be hindered by high duties and tariffs on equipment and components needed to manufacture and assemble local vehicles and components.
7. Competition or official policy must be aimed at reducing model and component proliferation. This must be done without severely reducing customer choice or increasing monopoly power. Therefore reduced proliferation must go hand in hand with measures to liberalise imports and to establish a regional approach to manufacture and marketing.
8. Domestic measures should be put in place to increase efficiency. Companies should be helped to introduce 'best practice'. This could involve benchmarking, access to international surveys, and government schemes to help small businesses. The attraction of a large single automotive investment would also help. The facility would demonstrate what best practice is, help local

suppliers reach this and be a flagship for exports demonstrating that the country in question can survive amongst the best in the motor industry.

9. Governmental and International agency involvement in partnership with automotive investors can be useful in the highly competitive market for inward investment. This brings a degree of certainty to the project and the power of the state can drive through needed local decisions and developments.
10. Investment need not only be greenfield. Great benefit would be derived from the expansion and renewal of existing facilities. Inward investment could be directed to joint ventures with local firms or to the purchase of local enterprise.
11. A framework of good industrial relations must exist. There are many competing locations wanting investment, and firms will avoid areas with poor labour relations and labour productivity.
12. Schemes to train the workforce and industry management in efficient design, production and marketing techniques are required.
13. Technology transfer and update are crucial. Local incentives to create a research and development input, the supervision of licences, and the integration of all types of local capability into a critical mass of expertise should be pursued. This can involve international agencies.

14. Local industry must follow international standards of manufacture and quality. Access to global companies, and standards authorities must be available if the local industry is to be viable.
15. Co-operation and integration with international companies must be considered. This can bring a package of measures which gives instant access to technology and global links. It must be stressed that the local activities of an international company in a developing country are not necessarily world class or experienced in lean production. This is so even for local Japanese owned or linked operations. Hence, the local authorities must establish monitoring systems that can emulate the efficiency of local operations.
16. A local institutional infrastructure should be established. This will involve trade associations, training and standards bodies, and government departments. This can represent the interests of the motor industry, monitor developments and help to formulate strategy. This will also disseminate new information and lead the drive to world class capability.
17. There should be co-ordination with other sectors locally. This could establish larger markets for certain processes and components, whilst encouraging them to purchase the products of local makers.
18. The motor industry in different developing countries is at different stages of development. In some instances national developments must be the aim. That

is, bring the local industry up to the standard where it can compete with adjacent countries. The next step, and what some are already doing, is to bring the industry up to the standard where it can survive within an integrated regional market.

19. The motor industry in the developing countries must be able to survive in a "buyers market" having often been in a protected "sellers market". The philosophy must be one of meeting the needs of the consumer in a competitive environment.
20. There are many car, CV and component firms looking to expand. The developing country must make every effort to pick the right partner and major investor. Different companies have different philosophies and objectives. For individual countries some companies may be more appropriate partners than others.
21. Local Governments should have a policy towards vehicle operating standards. Older vehicles should be tested. This can stimulate the sales of replacement parts and boost the new vehicle market through increased scrappage rates.
22. Financial schemes to help vehicle purchase should be available. The take-off of vehicle markets in developed countries always involved the existence of consumer credit. In short, Government should create a good climate for automotive manufacture be it helping production or demand.

23. Liberalisation and privatisation appears to provide a better climate for a viable motor industry to develop than protection and state ownership. This should be encouraged.
24. As motor industries in developed countries have not developed independently, links with multinational investors or license providers must be pursued wholeheartedly. Local ownership and inward investment by a global company can be provided by a joint venture. Most countries will have a motor industry mainly consisting of foreign owned companies. This applies to developed as well as developed ^{ing} countries. To establish a 'national' industry will still need foreign links via licences, human resources and capital provision. This is a risky strategy but it can produce results. Licensed component production may be an easier 'national' route to a viable automotive sector than licensed vehicle assembly.
25. The fundamental obstacle to production efficiency is the diseconomy of scale associated with production orientated to internal markets of limited size. Policy must seek to overcome the scale disadvantage either through extending the size of the market or rationalising production or both. The former can be achieved through regionalism and specialised production for world markets. The latter by reducing the number of products and plants serving the domestic markets.

26. Policies must be aimed at reducing the foreign exchange burden. This can be done by improving efficiency, including a smaller domestic content, to produce goods acceptable to the export market. The recommendations above are geared to this end.
27. Developing countries should produce cars, CVs and components that meet international and not local standards of performance and environmental impact. Product differentiation on the grounds of making simpler less environmentally friendly models would not be a feasible long term policy.
28. Economies of scale are enjoyed at lower volumes for CVs than for cars, especially where bodywork is concerned. Also the use of CVs in relation to cars is greater in developing countries. The specification of CVs for developing countries can be simpler at no cost to the environment or safety. Truck and Buses in developed countries are often 'over specified' where the developing world is concerned. Hence, strategies aimed at developing CV production should be formulated.
29. Countries should seek to establish complementary agreements and regional trading blocs. This allows product specialisation and a larger automotive market. Specialisation is very useful where production runs are small; where there is a low bulk to value ratio so that transport costs are absorbed; where there is labour intensity; and where the part or vehicle is being phased out in the developed world but a market still exists.

Summary

Some developing countries have gone through a substantial period of industrialisation under a system of protection and input substitution. They are now seeking ways and means to phase out manufacturing activities that are uneconomic by competitive standards, or to upgrade this efficiency. Countries embarking upon industrialisation should be interested in finding a more economic solution to the way a motor industry can be established and developed. Small market economies, even within a regional context, should think twice before embarking upon even vehicle assembly operations, leave alone more parts manufacture in depth. Many small developed countries have managed well without external automotive manufacturing sectors. If a determination to establish a motor industry remains then for each country there are ways of how not to proceed as much as there are ways which should be pursued. As Appendix 1 shows, there is a widespread motor industry in the developing world, but many of the operations are alarmingly small in markets of limited size and with fragmented production.

It is worth remembering that very few developed countries were successful in establishing a viable motor industry. Experience indicates that to establish a national motor industry a country must have (a) a population in excess of forty million (b) a gross domestic product per head which is more than the price a car maker must charge for a family car to be profitable (c) a well ordered credit market to finance car purchase and (d) some export business. Not many developing countries meet this

criteria. Hence, their motor industries often will have to be part of the activities of global enterprises.

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Appendix One
Motor Manufacture in Developing countries 1993

	PRODUCTION		Total Output¹	EFFECTIVE Rationalisation
	Number of Companies			
	Cars	CVs		
<i>Africa</i>				
South Africa	12	18	300,000	Low
Algeria	1	2	-	Low
Botswana	0	3	3,000	Low
Central Africa	1	0	-	Low
Ivory Coast	0	2	100	Low
Ethiopia	0	1	100	Low
Ghana	0	1	100	Low
Kenya	5	19	11,000	Low
Libya	0	2	2,000	Low
Egypt	5	8	18,000	Low
Madagascar	0	1	-	Low
Morocco	4	10	20,000	Low
Mozambique	0	2	-	Low
Nigeria	2	6	16,000	Low
Sudan	-	1	70	Low
Tanzania	-	9	300	Low
Tunisia	1	3	6,000	Low
Zambia	3	5	600	Low
Zimbabwe	2	13	12,000	Low
Total	42	101		
<i>South America</i>				
Argentina	4	5	262,000	Low
Brazil	4	6	1,200,000	Low
Chile	1	1	18,000	Low
Columbia	4	6	53,000	Low
Ecuador	5	2	26,000	Low
Paraguay	0	22	100	Low
Peru	2	8	31,000	Low
Uruguay	9	6	10,000	Low
Venezuela	7	11	92,000	Low
	36	47		
<i>Oceania</i>				
Australia	4	12	292,000	Medium
New Zealand	7	10	41,000	Low
	11	22		
<i>North America</i>				
Mexico	5	10	1,120,000	High
	5	10		

cont/d

	<i>Cars</i>	<i>CVs</i>	<i>Total</i>	<i>Effective Rationalisation</i>
<i>East Asia</i>				
Burma	0	22	1,500	Low
South Korea	5	7	1,730,000	High
Indonesia	13	9	260,000	Low
Malaysia	18	20	200,000	Medium
Philippines	8	7	60,000	Low
Thailand	12	10	328,000	Low
Viet Nam	4	3	4,000	Low
Taiwan	<u>12</u>	<u>11</u>	410,000	Low
<i>Total</i>	<u>72</u>	<u>69</u>		
<i>Other Asia</i>				
Saudi Arabia	0	2	2,000	Low
Bangladesh	0	5	1,000	Low
Iraq	1	5	-	Low
Iran	2	13	100,000	Medium
Sri Lanka	0	6	2,000	Low
Pakistan	2	5	42,000	Medium
<i>Total</i>	<u>5</u>	<u>36</u>		
China	6	26	1,100,000	Low
India	<u>3</u>	21	350,000	Low
<i>Total</i>	<u>9</u>	<u>36</u>		
Kazakhstan	1	1	-	Low
Uzbekistan	1	2	100,000	High
<i>Total</i>	<u>2</u>	<u>3</u>		
<i>Overall Total</i>	<u>182</u>	<u>314</u>		

Note: 'Effective' rationalisation takes into account individual volumes per company in relation to optimum levels. Therefore, although there are many assemblers in Malaysia in relation to total volume, the skewness of total production to Proton gives an effectively degree of rationalisation. In contrast production in Libya is concentrated but this does not produce optimum volumes.

1. Output is production and assembly. Local assembly accounts for less than 50% of value added

APPENDIX ONE

Typical Volume and Distribution of Production* (Major Groups)

	<i>North America</i>	<i>Europe</i>	<i>Japan</i>	<i>South Korea</i>	<i>South America</i>	<i>Others</i>
General Motors	4,700,000	1,800,000	380,000	-	300,000	80,000
Ford	4,500,000	1,700,000	(Mazda)	-	270,000	200,000
Chrysler	2,600,000	100,000	-	-	30,000	60,000
Volkswagen Group	250,000	2,200,000	-	-	600,000	130,000
Peugot Citroen	-	2,200,000	-	-	30,000	30,000
Ranault	-	2,100,000	-	-	120,000	10,000
Fiat Group	-	1,850,000	-	-	600,000	5,000
Toyota Group	600,000	200,000	4,100,000	-	5,000	350,000
Nissan Group	650,000	400,000	2,100,000	-	-	100,000
Suzuki	100,000	28,000	800,000	-	-	185,000
Mazda	-	-	1,000,000	-	30,000	-
Mitsubishi	170,000	100,000	1,300,000	-	-	50,000
Honda	600,000	150,000	1,000,000	-	-	-
Daewoo	-	50,000	-	400,000	-	-
Hyundai	-	-	-	1,200,000	-	-
Kia	-	-	-	700,000	-	-
Ssang Yong	-	-	-	45,000	-	-
BMW-Rover	-	1,100,000	-	-	-	25,000
Mercedes	-	750,000	-	-	50,000	35,000
Volvo	6,000	400,000	-	-	10,000	-

* *Cars and Commercial Vehicles*

APPENDIX 2 (Cars and Cvs)

MAIN CENTRES OF VEHICLE MANUFACTURE

This covers some 'assembly' operation where production may be also included in the host country. Hence, only Ford is a Belgian producer. The figures for the assembly operations of General Motors, Renault, VW and Volvo are included in Opel Germany, Renault France, VW Germany and Volvo Sweden.

The Fiat 178 "world car" will be made in eight countries but the project leader was Fiat of Brazil. A global production of 900,000 a year is envisaged of which 600,000 will be built in Brazil and Argentina. Malaysia's Proton will see major expansion and new models. Daewoo will expand production to 2.2 million cars of which only 50% will be made in Korea. Over 600,000 vehicles will be made in Europe, 200,000 in Uzbekistan, 240,000 in India, and another 120,000 in other parts of Asia. All this indicates that developing countries will play a major role in the world motor industry in the immediate future. However, as appendix two shows, the industry is dominated by global players in North America, Europe and Japan, and this position will not change dramatically in the next ten years.

APPENDIX 2 (Heavy Cvs)

World Trade Production (6 tonnes plus) ('000) leading Producers

<i>Company</i>	<i>6 Tonnes +</i>	<i>15 Tonnes +</i>
Mercedes-Freightliner	156	91
Isuzu	108	20
Toyota-Hino	79	24
Ford	62	9
Mitsubishi	60	27
Navistar	60	30
Iveco	54	28
Volvo-White	48	41
Nissan Diesel	46	20
Telco	59	2
Renault-Mack	42	33
Paccar	30	30
Scania	29	25
MA.N.	31	25

Mercedes, Volvo and Renault own major facilities in the USA. Navistar and Paccar together with Ford are the remaining US companies. Scania has major foreign facilities especially in Brazil. Telco is an Indian company and is the first vehicle manufacturer headquartered in a developing country which has world class scale. Some Korean car makers are striving to emulate this.