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MANUFACTURING IN THE AUTOMOBILE
INDUSTRY - SOME RECENT TRENDS

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The automobile industry has long since been international. In the early 1900s Fiat and Mercedes assembled luxury cars in the United States and Ford in Ireland and Great Britain. Exports are not new either; with the development of the EEC, the interpenetration of European markets grew: imports took between 20% and 50% of most European markets. Import penetration also reaches 25% in the United States. In 1980 Toyota - which does not manufacture in the United States - is the fourth largest seller in that market, whilst Volkswagen is the fourth largest car manufacturer in the United States.

More recent, ill-reflected in trade or investment statistics, and potentially as critical to the future of the auto industry as the earlier growth of foreign investment and international trade, is the fast integration of manufacturing internationally. Volkswagen cars sold in the United States are using parts which come not only from Germany and the United States but also from Brazil and Mexico. Some General Motors cars use parts from such widespread locations as Germany, Brazil, the Philippines and Australia. Key parts for Chrysler cars are made by Volkswagen in various countries. Volvo, Renault and Peugeot share the production of an engine plant in France, Renault and British Leyland are likely to coproduce gearboxes. In this paper we analyse the forces which led to the multinational integration of manufacturing activities in the auto industry and describe the strategic responses of major competitors confronted with the globalisation of their industry.

THE FORCES LEADING TO INTERNATIONALISATION OF MANUFACTURING(1)

Integrated manufacturing operations across borders enable firms to exploit economies of scale. Economies of scale in distribution as well as in production encouraged the evolution to worldwide competition in the automobile industry. Factor costs differences among countries encouraged international trade. Finally, the convergence of product requirements among distinct geographical markets and the adoption of free trade policies by most governments made the internationalisation of the industry possible. These five structural characteristics - economies of scale in production, and in distribution, convergence of geographical markets, differences in factor costs and productivity and the adoption of free trade policies - are analysed in this section.

Economies of scale in production

All estimates suggest that auto production is extremely sensitive to economies of scale, although there are rather wide discrepancies among available estimates. The size of operations needed to exhaust all significant economies of scale is very high: 2 million similar units per year for body stamping and casting of mechanical components, 1 million for

machining of power train (engine and transmission parts), and 250,000 for final assembly(2). These figures apply to units of a single type at the various stages of production. Some estimates are lower, however(3). Substantial cost differences result from economies of scale. In a very detailed study of the body stamping operation, McGee suggests that penalties for operating at lower than most efficient scales are significant(4). No other car manufacturing operations have been studied so carefully as body stamping but some sense of the overall impact of economies of scale can be grasped by considering the typical variable cost breakdown of a car and the effect on elements of the variable cost of doubling annual production volumes (exhibit 1).

A doubling of annual production rates cuts total variable costs by 8.4%, or roughly 5% of the total costs. Low unit margins in the industry make that difference very important. Net profit margins before taxes typically range from 2% to 5%, and a doubling of model production rates from 250,000 to 500,000 per year, for instance, may achieve a shift from losses to substantial profits.

In 1976-1977, almost every model in the European car industry sold substantially fewer than 500,000 units. Exceptions were the Fiat 127 (selling at a rate of 600,000 units per year), the Volkswagen Golf, and Ford Taunus-Cortina (about 500,000 units each per year), the Ford Fiesta and Renault 5 (450,000 each per year)(5). Estimates of the production capacity, for all models, of the major manufacturers also show that many models were produced at volumes and rates well below the most efficient scale (exhibit 2). Yet, as model counts are not absolutely clear-cut - many components being common to several models and some others specific to submodels - data on production by model may underestimate the extent to which some manufacturers took advantage of economies of scale. Manufacturers differ considerably in the extent to which they take advantage of economies of scale for major components.

Two major European manufacturers, Volkswagen and Fiat, provide a contrast (exhibit 3). Volkswagen's whole 1977 European product range used only two types of manual gearboxes, and a single type of automatic transmission. Fiat used six types of manual gearboxes, and two automatic ones. Engines and platforms show comparable differences: few types at Volkswagen, many types at Fiat. Although differences in costs between producing a narrow and a wide range of components may not be large for each item, cumulatively they may result in wide cost differences. Other major companies active in Europe fall between Volkswagen and Fiat in terms of common major components for several models, with GM-Europe and Ford close to Volkswagen, Renault in an intermediate position, and all other European companies more similar to Fiat. A comparable differentiation could be found in Japan where Nissan has numerous types of components and Toyota much fewer.

Economies of scale in distribution

Marketing advantages may offset to some extent the costs of missed economies of scale over a wide range of models and components. As the growth of demand for cars in Europe slowed, and as the customers became more demanding and discriminating, car dealers came to play a very important role in increasing or maintaining the market share of individual brands. Consequently, as competition for market share intensifies, a key concern of most manufacturers is that they do not lose their good dealers to the competition. To gain dealer loyalty most manufacturers developed a network of exclusive dealerships which in turn requires a broad product range covering all volume market segments. Car makers with a narrow product line are therefore at a disadvantage. The need to maintain dealers and to avoid their switching allegiance to competition, suggests not only the need to maintain a broad product range, but also the need to maintain separate brands following mergers or acquisitions.

Economies of scale both in production and in distribution impose conflicting requirements. Economies of scale in marketing and sales and concerns over brand differentiation create pressures for model proliferation; economies of scale in manufacturing call for large volume production of each model. Taken together they make the minimum size of a competitive volume car manufacturer very high.

Similarity among geographical markets

The evolution of the automobile industry towards worldwide competition was accelerated by the convergence of product specifications among geographical markets. Regulations imposed by the U.S. Federal Government to conserve energy led to the development of a whole new generation of U.S. cars comparable in size to European ones. In the meantime, within Europe the transition from minicar (below 1000 cc) to larger sedans (1 300 to 2 000 cc) was only slowed by the oil crisis(*), the medium size segment (by European definition) consequently emerged as the mainstay of both markets. This convergence enabled imports from Europe and Japan to increase their share of the U.S. market to over 20%. U.S. exports to Europe did not increase much in the short run, but the U.S. companies had plans to increase shipments from the United States to Europe substantially. General Motors planned annual shipments to Europe of 100,000 units. More significantly, General Motors decided to produce similar cars in the United States and Europe. Whereas until Honda's entry in the late 1960s, most early Japanese cars had enjoyed only limited appeal in Europe, more modern designs began to gain popularity in the 1970s so that Japanese imports to Europe increased

(*) At least in North West Europe from 1973 to 1978. Very recent market evolutions suggest that new oil price increases may lead to a larger permanent segment for smaller cars.

substantially. From the United States, Europe and Japan, the major line of market demarcation shifted to differences between developing countries which often require simpler, sturdier, easier to maintain vehicles than those now developed in Europe, Japan or the United States.

Factor costs and productivity differences

Until the 1970s, the lower labour productivity of the European car industry, in relation to the United States, had been more than offset by lower wages. By the mid-1970s, wages in Europe had caught up to U.S. wages, but European productivity still lagged considerably behind. Japanese productivity had increased faster than Japanese relative wage levels, giving a larger absolute cost advantage to Japanese manufacturers over Europe and the United States (exhibit 4).

Though direct labour represented only about 10% of the total cost of a finished car, unit margins were so low as to give slight savings on unit variable costs a very large impact on after-tax profits. Thus, Europe had become much more vulnerable to lower cost competition from other countries and European car makers saw increasing benefits in expanding outside Europe. Progress in methods of shipping vehicles (in particular special purpose ships used by Volkswagen, Toyota and Nissan in supplying the U.S. market) made the supply of European markets from lower cost countries attractive.

Free Trade Policies

Since the 1920s, when Ford and General Motors started volume exports to Europe, European markets had been closed behind tariff walls. In 1919, the United Kingdom had imposed a tariff of 33.33% ad valorem(*); in Italy protection varied from 122% to 212%; in France quotas were imposed until 1959. Even Germany, in the late 1920s, had closed its market to imports(6). Various other regulations, for instance horsepower taxes, also protected local companies. Both Ford and General Motors established large manufacturing plants in Europe not to be locked out of the markets.

Protection continued until the implementation of the European Economic Community. European governments encouraged exports, particularly in the United Kingdom. In the 1960s, the EEC common external tariff was reduced to 17.6% and then decreased further to 11% on cars and 9% on parts. Within Europe, trade became completely free and the norms and standards guiding automobile production were unified, at least for major components. A few governments lagged in complete trade liberalisation. For instance, Italy imposed a special

(*) According to British sources the impact of this tariff, other protective measures, and fiscal and monetary policies was equivalent to an 88% tariff level.

purchase tax heavily slanted against imported cars and other countries used excise taxes to penalise imports. But on the whole, by the late 1960s, a policy of complete free trade within the EEC and of low, common external tariffs was in effect(7). Further, in the absence of common EEC investment control policy, MNCs were free to invest in one country or another, according to relative factor costs or government incentives, and serve the whole EEC market from whatever location they had chosen.

In sum, for a variety of different reasons, the automobile industry is characterised by intensifying worldwide competition. The maturing and the slowing growth of the markets in developed countries meant that growth for individual manufacturers would come only through penetration of new markets in developing countries - markets usually controlled and regulated by governments - or through taking customers away from other suppliers in mature markets, a difficult and costly process. The growing homogeneity of markets across borders, their finer segmentation between similar customer groups in various countries, and the lesser costs of long distance transportation, made the development of common products for the world market feasible. Once such products were developed, economies of scale often made their production in a single location desirable. Changes in factor costs, particularly in the relationship between wages and productivity, also made the position of Europe more difficult and gave a cost advantage to the United States, Japan and newly developing countries. Firms reacted to these evolutions in different ways.

INTEGRATION STRATEGIES

The most obvious strategic response to the evolution of the automobile industry structural characteristics described above is integration of operations across borders, in search of lower cost and more efficient production to respond to the increasingly demanding economic imperatives. Integration, however, can take different forms according to the starting position of the company and the economic and political constraints on its evolution.

Multinational companies that had the necessary resources could integrate existing operations, this being the approach followed mainly by Ford and later by General Motors. Strong national companies could attempt to increase their size and their efficiency by developing integrated multinational operations. This approach was followed largely by Volkswagen and Peugeot for passenger cars and IVECO and, to a certain extent, Daimler Benz for heavy duty commercial vehicles. Volkswagen developed its integrated network largely on its own by pushing activities in the Americas. Peugeot acquired Chrysler's ailing operations in Europe and focussed its overseas efforts on assembly in developing markets (e.g.,

Nigeria).

Companies which lacked the resources, or the international expansion of which had been constrained by their national character attempted to reap some of the benefits of multinationality by cooperating with other companies but staying well short of outright mergers. These approaches can be called "quasi-integration" strategies and range from limited component cross supply or joint manufacture agreements (e.g., Chrysler using Volkswagen engines) to partial equity control of other companies (e.g., Renault's stake in American Motors). Integration strategies are described and analysed in this section, quasi-integration strategies in the next section.

Ford

In the early 1960s the backbone of Ford's European operations was provided by Ford of Germany and Ford of Britain. These two large companies each performed product engineering, manufacturing, marketing and sales functions autonomously. Their six car lines had little component commonality. Ford also had sales subsidiaries in twelve other countries which sold products from Ford of Germany or Ford of Britain, and in many cases from both. To avoid confusion, Ford of Germany cars were often sold under the brand "Taunus", though the Ford affiliation was also made explicit. Though Ford's European operations were relatively successful, Ford's top management saw advantages to a worldwide approach very early, with great foresight. They were the first to recognise fully the implications of free trade within Europe and to bet on Britain's entry into the EEC. Ford of Europe was created in July 1967 as a coordinating staff for Ford's European operations.

Actual implementation of integration took time. It started with the introduction on the continent of some of Ford of Britain's products: the medium-sized Escort, the Transit van and the Capri coupe. These models were manufactured both in Germany and in the United Kingdom, some were assembled in a plant in Ghent, Belgium. An aging Taunus product line and a deteriorating market position made the Ford of Germany management more responsive to Ford of Europe's coordination. The new British-designed models helped sales in France and Italy.

Simultaneously work started on a more ambitious scheme: the integration of design and engineering activities to eliminate duplication of work and make possible European products. Responsibility for all mechanical engineering was given to Britain, responsibility for body engineering and design to Germany. Joint teams were organised for all major components. This product oriented structure cut across national boundaries(8).

Success was not immediate, however. The new 1970 Taunus Cortina car line still made allowances for national differences and in its creation the potential benefit of joint operations was not fully achieved. The next effort, the 1972 Consul Granada, came on the market late, had some quality problems, and was not as successful as expected on the market place. The merged engineering teams were still learning to work together. It is only with the Bobcat programme, in 1973-74, that the joint design and engineering process was put to full use (9). In the Bobcat case, advanced engineering and concept definition took place in the United States and the car line development was transferred to Europe in the fall of 1973 only. This simplified the coordination task, though substantial redesign and engineering took place in Europe, to the point that the car introduced on European markets in 1976 as the Fiesta bore little commonality with the one designed in Dearborn in 1972. Full cooperation, from advanced preprogramme work to market introduction, therefore, was achieved only in the late 1970s with the "Erika" programme (the output of which is the frontwheel drive 1980 Escort) and the "Tony" programme (to replace the Taunus Cortina with a frontwheel drive vehicle in model year 1982).

Without manufacturing integration, design and engineering merger would remain partly ineffective. Ford created two European manufacturing divisions, one for "Power Train", the other for "Body and Assembly". Manufacturing operations were now able to achieve economies of scale by integrating manufacturing operations for the various components and finished products. In the early 1970s Ford also created major new plants in Saarlouis (Germany), Bordeaux (France) and Valencia (Spain). Exhibit 5 portrays the pattern of manufacturing integration evolved for the Fiesta in 1977-78. The general policy was to produce only two car lines in each plant, and in some cases (e.g., Valencia) just one, each in large numbers. Common engineers and components were also used on several car lines, achieving lower cost levels based on large volume.

Responsibility for sales and marketing remained largely delegated to a group of national subsidiaries, but overall marketing policies as well as short term delivery programmes were closely coordinated among the various subsidiaries.

Beyond the three major functions of manufacturing, product development, and marketing, Ford of Europe maintained staffs for industrial relations and finance. Finance was very centralised and closely linked to the corporate level. Industrial relations, on the other hand, were delegated to the national level, in conjunction with the involved manufacturing division (power train or body assembly). In addition to these central staffs, overall coordination was maintained through a set of management committees:

1. Operating Policy Committee, to consult on general matters of operating policy and, where appropriate, on the review of significant plants and programmes which are not the responsibility of other advisory committees.
2. Project Appropriation Committee, to review all major project appropriation requests, including leasing projects and product programme funding requests.
3. Product Planning Committee, to receive product plans from the Car Strategy Committee, Truck Strategy Committee, and Design Committee, and review them prior to obtaining recommendations from Ford-U.S.
4. Car Strategy Committee, to develop car forward product strategies, review and coordinate preprogramme actions, and submit final proposals to the Product Planning and Design Committees.
5. Truck Strategy Committee (same as car strategy for trucks).
6. Design Committee, to review all major appearance proposals relating to the products of Ford of Europe markets.
7. Special Product Committee, to develop special product forward strategy review and coordinate preprogramme actions and submit final programme proposals to the Product Planning Committee.
8. Programme Timing Committee, to review the status of forward products, and related facilities and programmes and the status of actions taken to correct timing problems.
9. Programming Committee, to recommend monthly production programme and schedules.
10. Sales Review Committee, to evaluate sales results and performance.
11. Pricing Review Committee, to consider wholesale and retail recommended prices.

12. Product Reliability Committee, to review warranty and policy objectives and performance, quality trends, level of customer satisfaction and other factors relating to product reliability. Identifies problems and recommends plans and persons responsible to correct problems and improve quality.

Despite these successful efforts, Ford's position was not quite secure. Heavy investments in the United States and the depressed markets in Europe and the United States led to huge losses in 1980. Whereas in 1979 Ford of Europe had been profitable and had generated cash in support of U.S. investments, by 1980 Ford of Europe, too, was registering losses.

General Motors

After a long period of design neglect, GM drafted a ten-year European plan in 1973. The objective was to capture a 15% market share by 1985 and to specialise European operations: all passenger car engineering to Opel in Germany, all commercial vehicle engineering to Vauxhall in Britain(11). Manufacturing for passenger cars would be directed from Opel, that for commercial vehicles from Vauxhall. The GM organisation in Europe would move away from the geographical orientation (i.e., autonomous national subsidiaries) and be organised by functions and product lines. Marketing units would be established for each brand in the various countries and would be the first line of contact with dealers. Sales staff and marketing planning functions would be centralised at the source plants, and the source plants would have profit and loss responsibility for their products down to the dealer organisation level. Profit responsibility would thus shift away from the individual national subsidiaries to the respective source plants. With engineering, manufacturing and marketing organised Europe-wide by brand and product line, all residual functions of the GM national subsidiaries would be performed by a new organisation called the "Administrative Support Unit".

In the early 1970s, the part and component manufacturing operations, whose performance was lagging, had been integrated first under the management of a separate subsidiary, GM Ltd in London. Between 1975 and 1977 the Belgian assembly operations were brought under Opel management, and in 1977-78 Vauxhall was split in two divisions: passenger cars and commercial vehicles. The organisation of the car division was made to parallel that of Opel, so that there would be direct counterparts in the two organisations. European coordination staffs were built up in London. Formerly autonomous sales subsidiaries became part of a matrix structure where the individual brands could play a leading role. Simultaneously,

coordination staffs were developed in London. In 1976, Mr Cunningham, who had headed European operations was promoted to manage the whole of GM's overseas operations. In cooperation with GM's top management he decided to apply the concept of rationalisation and integration to the whole of GMCO and evolve towards "world car" concepts, i.e., a similar car line for all markets in the world. To make such an approach feasible, however, management processes had to be changed extensively. A tradition of subsidiary autonomy, comparatively weak central staffs and, in some cases, relatively primitive management systems made immediate cooperation impossible. A new planning process was implemented in 1976-78, bringing clear cooperation among the various GM units and deeper longer-term strategic thinking to the subsidiaries(12). GMCO staffs were moved from New York to Detroit and subsequently merged into their domestic functional counterparts to make cooperation between domestic U.S. divisions and foreign subsidiaries easier. New products were engineered in "Product Centres" to which various divisions and subsidiaries cooperated. GM's first world car, coded "J" car, was designed in a multinational project centre involving subsidiaries in Europe, Japan, Australia, Brazil, the Philippines, South Africa, Canada and the United States. The "J" car line is to be introduced between 1981 and 1985 in all these markets and will be made available to export markets elsewhere. Manufacturing processes and sourcing patterns for parts and components are also to involve all these subsidiaries. To facilitate such multinational cooperation GMCO's major subsidiaries were elevated to full divisional status starting with Opel and Vauxhall in 1978, with GM do Brazil and GM Holding in Australia following soon thereafter. These subsidiaries are now on the same footing within the corporation as major car or component divisions in the United States, such as Chevrolet, Pontiac or Fisher Body. Space limitations prevent the full analysis of GM's administrative and managerial changes to be made here; they are summarised in chronological order in exhibit and more detailed accounts have been presented elsewhere(12).

Following these changes, GM committed massive resources to the new strategy. First, a new small car (GM's first entry in that market(*)) was developed by Opel for introduction in Europe in 1982. Second, major new investments were committed in Spain and Austria to manufacture this new small car and to provide component and assembly capacity for the new "J" car. GM took over part of Chrysler's Latin American operations and expanded its operations in Brazil and Australia to prepare for the "J" car. In both these countries GM negotiated with the government to be authorised to offset car imports with component exports. Traditionally these countries had imposed almost self-contained manufacturing by demanding high levels

(*) GM's prior entry in the small car segment was based on the Kadett in Europe and the Chevette elsewhere, leaving the smaller car segment to such models as the R5, the Fiesta or the Fiat 133 in Europe and to some Japanese imports in the United States.

of local content. Altogether more than \$13 billion are earmarked by GM for international investment in the 1978-1982 period, and GM is clearly committed to becoming a major worldwide competitor in the auto industry.

Other multinational manufacturers

Ford and General Motors are the only major automobile manufacturers which had operations in many countries before the 1970s. Most European manufacturers had plants in a number of countries but these were mostly comparatively small scale assembly operations using CKD kits supplied by the mother company. In a few cases tooling for obsolescent models no longer made in the home countries were transferred to these foreign operations.

By the late 1970s, however, other manufacturers were starting to follow Ford's and GM's leads. After 1975, Volkswagen expanded its operations in Brazil (where it produced more than 500,000 cars in 1978) and Mexico. Volkswagen also established an assembly plant in the United States, with an initial capacity of more than 250,000 units. In the early 1980s that capacity is being doubled. The company was also integrating its newly expanded operations: cars were assembled in the United States from components made in Brazil, Germany, Mexico and the United States. Volkswagen also moved the production of models most exposed to price competition to low wage countries, in particular the worldwide production centre for the venerable "Beetle" was transferred to Brazil and large scale manufacturing was undertaken in Nigeria. New plants in other countries, such as Egypt, where labour was abundant and inexpensive, were under consideration.

In France, Peugeot was confronted with the same competitive pressures as Volkswagen, but chose a different expansion route: acquisitions. Peugeot first acquired Citroen in 1974 and started to integrate their product ranges. In 1979, Peugeot acquired Chrysler's European operations. Altogether the new company found itself with no fewer than 45 plants. Citroen had been acquired by Peugeot when Citroen was on the upswing: new plants (partly financed by state relocation subsidies) and a whole range of very successful high technology new models. Chrysler Europe is in a much more difficult predicament(13). Chrysler's French plants are relatively satisfactory, but not the British plants. It has an aging product line and old plants where Chrysler had underinvested. In 1979, the ex-Chrysler operations ran at a loss, despite good volume. Lower 1980 volume led to huge losses (in the order of \$400 million).

Peugeot's top management had decided to integrate industrial activities, without losing the brand identity. With roughly 17.6% of the European market, the new group decided to keep three differentiated brands (renaming the "Chrysler" products

"Talbot") and completely distinct dealer networks. Yet, major components would be produced in common. Also, some components would become interchangeable. For instance, in 1976 Citroen started to sell a Peugeot designed car equipped with a Citroen air-cooled engine. The integration of component production, over time, was expected to lead to significant plant closures and redundancies(14). According to its top management, the new group had twice too many plants and determined to close some down. Employment at the ex-Chrysler operations was immediately trimmed by 3,000 (out of a total of 88,000). Plant closures were announced in France. The major issue remained however, the strife-plagued Linwood plant in Scotland. Chrysler had never been able to operate this isolated plant efficiently, and considered closing it down in 1975. With political outcries in Scotland, it was saved (15). Peugeot finally decided, in 1981, to close it down(16).

A further weakness for Peugeot was its aging product range with few attractive models in the small car market segments which came to be the mainstay of the European market during the 1979-1980 economic recession in Europe.

To speed up integration Peugeot quickly installed a central corporate structure to merge the three operations(17). Operations were split between components and car lines and the plants from the various brands regrouped (see exhibit 6). Despite these efforts, the integration of Chrysler operations was relatively slow. Social and political hostility to the closing down of plants in areas already depressed (such as North Eastern France) further complicated the rationalisation and integration process. Other new investments had to be postponed.

Yet, assuming Peugeot can successfully integrate the ex-Chrysler operations and rationalise its model range and components production, it is the best placed European competitor to resist the offensive of efficiently produced "world cars" from Ford, GM and Japanese suppliers.

For commercial vehicles, only Fiat, with its IVECO venture developed a multinational integration strategy. Created in 1973, IVECO regrouped Fiat's Italian truck making operations, a Fiat subsidiary in France, Unic, and Klockner Humboldt Deutz's truck operations in Germany. Between 1974 and 1977 a simplified common product line was engineered and introduced and plants were specialised so as to minimise duplications. Marketing, sales, service and part supply operations in various countries were also rationalised and streamlined. Major investment programmes were carried out to modernise factories and automate production of components. After a relatively unsuccessful attempt at managing operations through a country-function matrix structure, IVECO, adopted in 1979 a Europewide functional structure. Space limitations prevent a full analysis of IVECO, but this is available elsewhere (18).

Renault's industrial vehicles subsidiary (RVI) started to emulate IVECO in 1980-81 with the acquisition of an equity position in Mack in the United States and a joint venture with Peugeot to integrate the Dodge European truck operations into RVI (these operations were part of Chrysler's European activities sold to Peugeot in 1979).

QUASI-INTEGRATION STRATEGIES

Short of rationalising already existing operations into an integrated network (e.g., Ford, General Motors) building such a network (e.g., Volkswagen) or developing one through mergers (e.g., Peugeot-Citroen-Talbot), other car makers with significant European operations have tried to gain some of the benefits of integration without committing themselves to full integration. Most national competitors in Europe developed a growing web of agreements and alliances with competitors or suppliers. The common goal of these alliances was to take advantage of economies of scale.

Most such alliances involved joint manufacturing, such as the Societe Franco-Suedoise de Moteurs producing two-litre engines for Volvo, Renault and Peugeot. Each of these companies taken separately did not have enough volume to justify an efficient engine plant; but together they did. Small cars assembled by Chrysler in the U.S. received mechanical components from Volkswagen, Mitsubishi and Peugeot-Citroen. Other U.S. companies supplied parts from European and Japanese suppliers (see exhibit 7). In the commercial vehicle business, several companies had pooled their interest to develop a common medium-sized truck. The agreement was known as "Club 4". Numerous other examples of such cooperative agreements could be cited; they all represented efforts by manufacturers to pool their resources and their needs to produce components efficiently.

More ambitious strategies were aimed at exploiting distribution economies of scale. Renault, which had tried several times with only modest success to penetrate the U.S. market on its own, allied with American Motors Corp. (AMC) to distribute selected Renault cars in the United States and AMC's Jeep line of four-wheel drive vehicles in Europe. It was expected that by 1983, a derivative of the Renault R18 might be produced in the United States, possibly at a volume of 200,000 per year, with a mix of imported and U.S. made parts and components. Renault, with only 320 dealers in the United States, hoped the agreement with AMC could boost its U.S. sales of other models substantially (19).

Another move of a similar nature was made between Honda and British Leyland (BL). Honda was licensing its medium two-litre "Prelude" car to BL in Europe. The car was to be manufactured by BL for sales in Europe and by Honda for sales in the Far East and the United States. BL, with an aging

model range and few resources to develop a new one, stood to gain a lot from the deal: a new, successful model when it is most needed. To Honda, the BL deal was a way to penetrate the European market without having to set up its own extensive dealer network. It also enabled Honda to circumvent many of the adverse reactions surrounding the rapid market share growth of Japanese importers in the United Kingdom. This growth had been of such concern to the British government that it negotiated a "voluntary restraint" agreement with the Japanese government to limit the growth of Japanese imports. Teaming up with British Leyland was a way for Honda to enter the British market on a large scale and still appear to make a contribution to the local industry. Such alliances as that between AMC and Renault, or BL and Honda, can be particularly useful for companies not yet effective in competing globally. It overcomes a major barrier to rapid entry by giving them quick access to a new market through an existing dealer network. It also increases their car line production volumes. Such alliances can also fill in gaps in product ranges quickly and at a low cost.

Outright transnational mergers have also taken place, with varying degrees of success. The most significant was the creation of the Industrial Vehicles Corporation (IVECO). The IVECO merger brought a substantial rationalisation of the product line and integration of manufacturing activities. Although the full benefits of such an effort do not become fully evident for years, early increases in labour productivity clearly pointed to substantial benefits. The merger of Volvo in Sweden with DAF (marketed as the Volvo 343) was a hastily and poorly designed product that faced numerous manufacturing snags⁽²⁰⁾. Furthermore, Volvo and DAF had very different operating patterns and traditions differences between their respective approaches to manufacturing methods. Following this unsuccessful merger, Volvo's car division started to cooperate more narrowly with Renault. Typically, most pressures for rationalisation and integration were felt by smaller, marginal producers in the worldwide auto industry, those with precious little resources and little time to implement mergers successfully.

The second-tier Japanese companies - small producers in comparison with Toyota and Nissan or larger European companies - had taken an intermediate position between distribution or license production agreements (a la Honda) and full merger with a foreign company. Each of them teamed up with a U.S. multinational. Isuzu (about 43% GM-owned) supplied light pick-up trucks and other small vehicles to GM, and distributed GM cars in Japan. With the development of "world cars" GM expected Isuzu to become more closely integrated into GM's operations. In 1979, Ford had taken a 25% equity interest in Toyo Kogyo with whom it had long standing technical cooperation agreements. Ford also expected to bring Toyo Kogyo more closely into its international production network. Finally, Chrysler had a minority-owned joint venture with

Mitsubishi to manufacture small cars. These cars were sold by Mitsubishi in a number of Asian markets and under the Dodge brand by Chrysler in the United States. Chrysler owned 35 percent of the joint venture. In 1979, Chrysler - short of cash - sold its Australian subsidiary to Mitsubishi since Mitsubishi also took over the distribution of its cars in Latin America from Chrysler when Chrysler sold several subsidiaries to other manufacturers.

Such quasi-integration strategies as those described in the above examples were expected to continue through the multiplication of interfirm agreements on components. Such agreements were expected to involve mostly the second tier of European firms: Renault, Fiat, British Leyland, and the Scandinavian producers. In 1979 Renault and BL were negotiating on the possible joint manufacture of components for their new mini cars to be introduced in 1982-83. In general, strategic moves in the truck segment of the auto industry paralleled these in the car segment(21). Both moves to produce components jointly and to gain access to distribution networks, (mainly in the United States through agreement such as these between Mack and Renault Vehicules Industriels (RVI) venture with Rockwell for the manufacture of axles, and a plan to produce jointly transmission with Daimler Benz was frustrated only by the German cartel administration which saw in it an attempt to monopolise the German truck market(22). Quasi-integration strategies and the pressures of economies of scale could also result in a shift in the boundary between the car industry and the automotive component industry(23). It was expected that vertical integration would decrease, i.e., that volume car makers would buy as many standard components from large volume external suppliers as they could rather than manufacture them(24).

The major concern of all the quasi-integration strategies was to gain quickly some of the benefits of the integration, at a low cost, while preserving the firm's autonomy, and avoiding the administrative and managerial difficulties and uncertainties involved in fully-fledged mergers. Since only national champions survived the waves of national mergers in the 1960s, further mergers would have to be transnational. Managers of car companies balked at the idea of such mergers because of their political sensitivity(25), and because the record of transnational mergers in other industries was far from successful (26).

Quasi-integration through specific piecemeal deals between car makers preserve the independence and the national character of each partner and make transnational mergers less necessary. They probably provide the means for comparatively small companies to survive in a difficult environment where cost pressures are increasing. They also allow the maintenance of national production capacities and, through increased automation for large volume production, decrease the pressures for relocation in low factor costs countries.

CONCLUSION

The world automobile industry is in a state of rapid transition in which multinationality is taking on a new dimension with the integration of manufacturing networks on a global scale. Forces rooted in the economic characteristics of the industry, in product development, manufacturing and distribution, drive this globalisation of manufacturing. The few competitors which had existing networks of foreign subsidiaries are responding to these forces by unifying these subsidiaries into integrated manufacturing systems. Such integration requires major managerial changes. A shift from subsidiary autonomy to a common strategy and centrally managed integrated operations represents a difficult, slow, time-consuming organisational transition. Ford successfully implemented such a shift in the 1967-1974 period within Ford of Europe. With the new Escort-Lynx car line it has extended this shift to a global basis. General Motors is implementing such a shift globally, the "J" car to be introduced in 1982 being its first concrete result. Fiat's truck subsidiary, IVECO, has implemented such a shift between 1974 and 1980.

Most auto manufacturers have kept a strong national identity and few manufacture abroad beyond scattered small scale high cost assembly operations in developing countries. Some of these manufacturers have responded to the economic pressures for globalisation by developing international integrated production systems, albeit on a smaller scale than GM and Ford. Most prominent are Volkswagen, with a network based on the Americas and large developing countries (e.g., Nigeria) and Peugeot which remained more narrowly based in Europe.

Other smaller national manufacturers are overcoming some of the difficulties of small scale through quasi-integration strategies: they develop a network of coproduction, joint design and engineering or common marketing agreement with other independent national procedures. Except for some speciality car manufacturers, quasi-integration may be the only means of survival for smaller manufacturers. These alliances and informal coalitions are also more palatable to governments than outright transnational mergers. They also provide a means for stronger manufacturers to ally with and use weaker manufacturers rather than eliminate them (e.g., Renault-Volvo, Honda-British Leyland). The social consequences are likely to be less than that of bankruptcy or acquisition by foreign interests of the smaller least successful companies.

In turn, Japanese companies - which so far have been mainly exporters from Japan - may be coaxed or lured into such alliances more widely. The agreements between Honda and British Leyland in Britain and that between Nissan and Alfa Romeo in Italy may pave the way for future cooperation.

1. For an analysis of integration strategies in various industries see Yves L. Doz, "International Industries, Multinational Companies and Government Policies: the European Experience" in Walter Goldberg (ed.) MNC Host Government Relationships in Developed Countries (Cambridge, Mass: Oegelschlagen, Gunn and Hainn, forthcoming).
2. Euroeconomics, "Motor Industry Report", presented at the European Motor Industry Conference, Frankfurt, 1977. Report dated 29.9.1977. See, in particular, Appendix B, pp. 37-40. Figures quoted in the Euroeconomics report were provided by the Bristol University Motor Industry Research Group. The original estimates for the most scale intensive operations, foundry and body stampings, were provided by the Ford Motor Company (U.K.), and by D. G. Rhys in "The Motor Industry: An Economic Survey" (London: Butterworths, 1972), respectively.
3. See, for instance, L. J. White, "the Automobile Industry Since 1945" (Cambridge, Mass. Harvard University Press, 1971) for lower estimates.
4. John S. McGee, "Economies of Size in Auto Body Manufacture", The Journal of Law and Economics (16 October 1973) pp. 239-273.
5. Compiled from various sales statistics of automobile manufacturers for 1977, rounded figures.
6. For historical surveys of European government policies towards the automobile industry see Louis T. Wells Jr., "Automobiles" in Raymond Vernon (ed.) Big Business and the State (Cambridge, Mass. Harvard University Press, 1974) and Mira Wilkins "Multinational Automobile Enterprises and Regulation: An Historical Overview" in William J. Abernathy and Douglas Ginsburg (eds.) Government, Technology, and the Automobile Industry (New York: McGraw Hill, 1980).
7. Ibid.
8. For more detailed description of these changes see Harold C. Livesay "Strategy and Organisation Structure: Ford of Europe" (Ford document GM30), Yves L. Doz "Ford Bobcat (A1) and (A2)" (ICCH No 4-380-093, 4-380-094) and John Constable "Ford of Europe" (Cranfield Management Institute, mimeographed cases).

9. See Yves L. Doz, "Ford Bobcat (B)" (ICCH No 4-380-100)
10. Ibid.
11. See Yves L. Doz, "General Motors Overseas Operations - Europe" (forthcoming case study).
12. The evolution of GM's overseas operations is also analysed in Y. Doz and C. K. Prahalad "Headquarter Control and Strategic Change in Multinational Corporations" (paper presented at the International Research Symposium on Transnational Corporations, Stockholm School of Economics, Stockholm June 2-4, 1980). A summary of this paper, titled "Headquarter Influence and Strategic Control in MNCs" is forthcoming in Sloan Management Review.
13. See Stephen Young and Neil Hood, "Chrysler U.K.: A Corporation in Transition" (New York: Praeger, 1977).
14. Personal communication to the author.
15. The history of Chrysler U.K. and that of the government rescue programme has been abundantly documented; among various summaries see in particular "The Multinational that Wanted to be Nationalised" in Multinational Business, No 1; 1976, pp. 1-18; also Chrysler U.K. (A) and (B), case available from the Intercollegiate Case Clearing House, Boston, Mass. (ICCH No 9-278-119 and 9-278-120), and also "The Crunch at Chrysler" in Management Today, June 1978, pp. 58-65. See also Stephen R. Jenner "The Effect of External Uncertainty on Management, Workers and Business Policy; The Case of British Leyland and Chrysler-Peugeot U.K." (mimeo, University of Hawaii, 1979).
- 16.
17. See "Comment Le Lion Peugeot digerera-t-il l'oursin Chrysler?", Le Monde, 21 August, 1979, pp. 11-12.
18. See Y. Doz and C. K. Prahalad "Headquarter Control and Strategic Change in Multinational Corporations", and Y. Doz IVECO (A) and (B) (forthcoming INSEAD cases).
19. See "American Motors' Plan for Survival" in Fortune, Vol. 100, No 1, 16 July 1979, pp. 66-82; also "Renault: Why the French Car Maker Needs the Link Up as Much as AMC" in Business Week, 19 June 1978, p. 114.

20. See, for instance, W. M. Steele "The Volvo Group", mimeographed case study (Cranfield: Cranfield Institute of Technology, 1979).
21. See "Single Truckers Seeking Partners" in World Business Weekly, 4 June 1979, p. 11.
22. See my IVECO (A) and (B) cases (ICCH) and William K. Hall.
23. "Motoring into the '80s", op. cit.
24. For summary data on the components industry's evolutions see "The Multinational Spread of Car Part Manufacture Accelerates" in Multinational Business.
25. Renato Mazzolini "European Transnational Concentration" (New York, McGraw Hill, 1974), and Mark Fuller "Government Intervention in the Auto Industry" (forthcoming).
26. See Milton S. Hochmuth "Organising the Transnationals" (The Hague: Sijthoff, 1973).

Exhibit 1

Sensitivity of car variable manufacturing costs to scale

<u>Major operations</u>	<u>cost</u> (as percentage of total variable cost)	<u>sensitivity to scale*</u>
Engine mfg.	15%	-15%
Gearboxes	7%	-15%
Axles	10%	-10%
Other mechanical parts	12%	-10%
Body stamping	8%	-30%
Body assembly	10%	-5%
Accessories and seats	11%	Negligible
Final assembly/painting	27%	Negligible

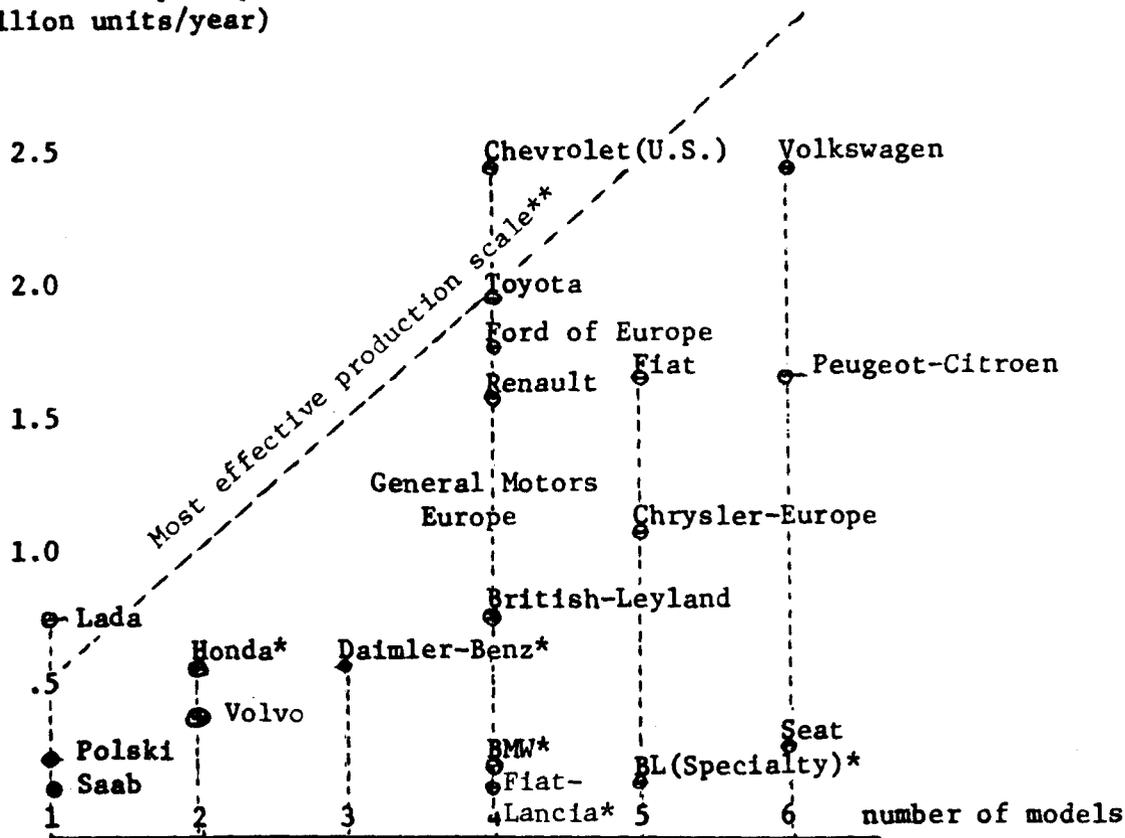
* Average unit percentage cost decrease generated by a doubling of annual production volumes of one model, in the 200,000 to 500,000 units per year range.

Source: compiled by author from various industry experts' interviews.

Exhibit 2

Effective Production Capacity for Passenger Cars

Production capacity
(million units/year)



Sources: compiled by the author from Euroeconomics Report (Note #2), various industry statistics and data from individual manufacturers.

* Specialty car manufacturers

** 500,000 units per model line per year (average)

VOLKSWAGEN (1976) 8 models

Platforms

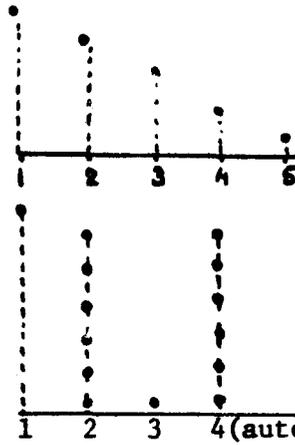
- . Beetle
- . Polo/Audi 50
- . Golf/Rabbit/Scirocco
- . Passat/Dasher/Audi 80
- . Audi 100

Platform types :5
(including the Beetle being phased-out from European production)

Gearboxes

- . Beetle
- . Golf/Rabbit
- . Scirocco
- . Passat/Dasher
- . Polo/Audi 50
- . Audi 80
- . Audi 100

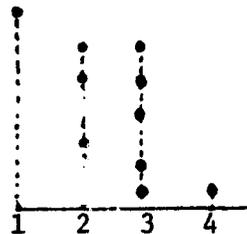
Gearbox types: 3 manual
1 automatic



Engines

- . Beetle
- . Golf/Rabbit
- . Scirocco
- . Passat/Dasher
- . Polo/Audi 50
- . Audi 80
- . Audi 100

Engine types:4

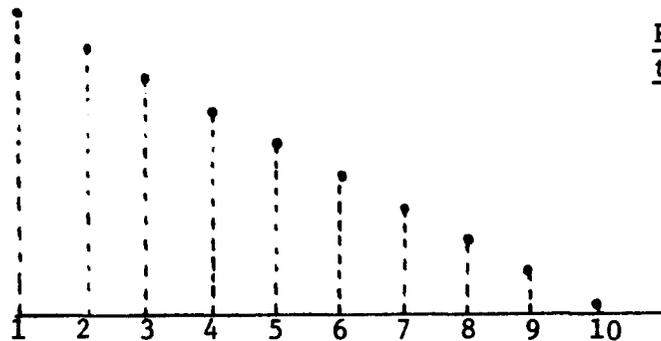


FIAT (1976) 10 models

Platforms

- . 126
- . 127
- . 128
- . X1/9
- . 131
- . 132
- . 130
- . A112
- . BETA
- . GAMMA

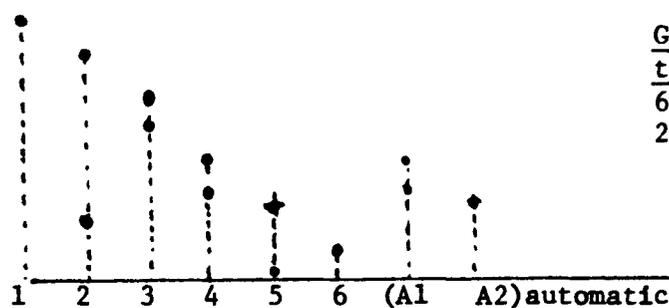
Platform types: 10



Gearboxes

- . 126
- . 127
- . 128
- . X1/9
- . 131
- . 132
- . 130
- . A112
- . BETA
- . GAMMA

Gearboxes types:
6 manual
2 automatic



Engines

- . 126
- . 127
- . 128
- . X1/9
- . 131
- . 132
- . 130
- . A112
- . BETA
- . GAMMA

Engine types: 7

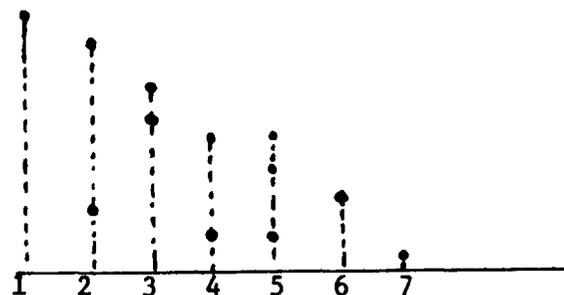


Exhibit 4

Vehicles Produced per Employee, per Year

	<u>1955</u>	<u>1965</u>	<u>1973</u>
United States	11.1	13.9	14.9
United Kingdom	4.2	5.8	5.1
Germany	3.9	7.1	7.3
France	3.6	6.1	6.8
Italy	3.0	7.4	6.8
Japan	1.2	4.4	12.2

Note: Figures based on total employment (including clerical staff) in the automobile industry, including components and parts suppliers; output adjusted to reflect differences in product mix (a) between cars, and (b) between cars and commercial vehicles. Does not take into account differences between countries in the relative proportion of component imports/exports.

Source: Quoted in The Central Policy Review Staff The Future of the British Car Industry (London: Her Majesty's Stationery Office, 1975), p. 80.

Average relative wage levels in the automobile industry*

(Index, United States = 100)

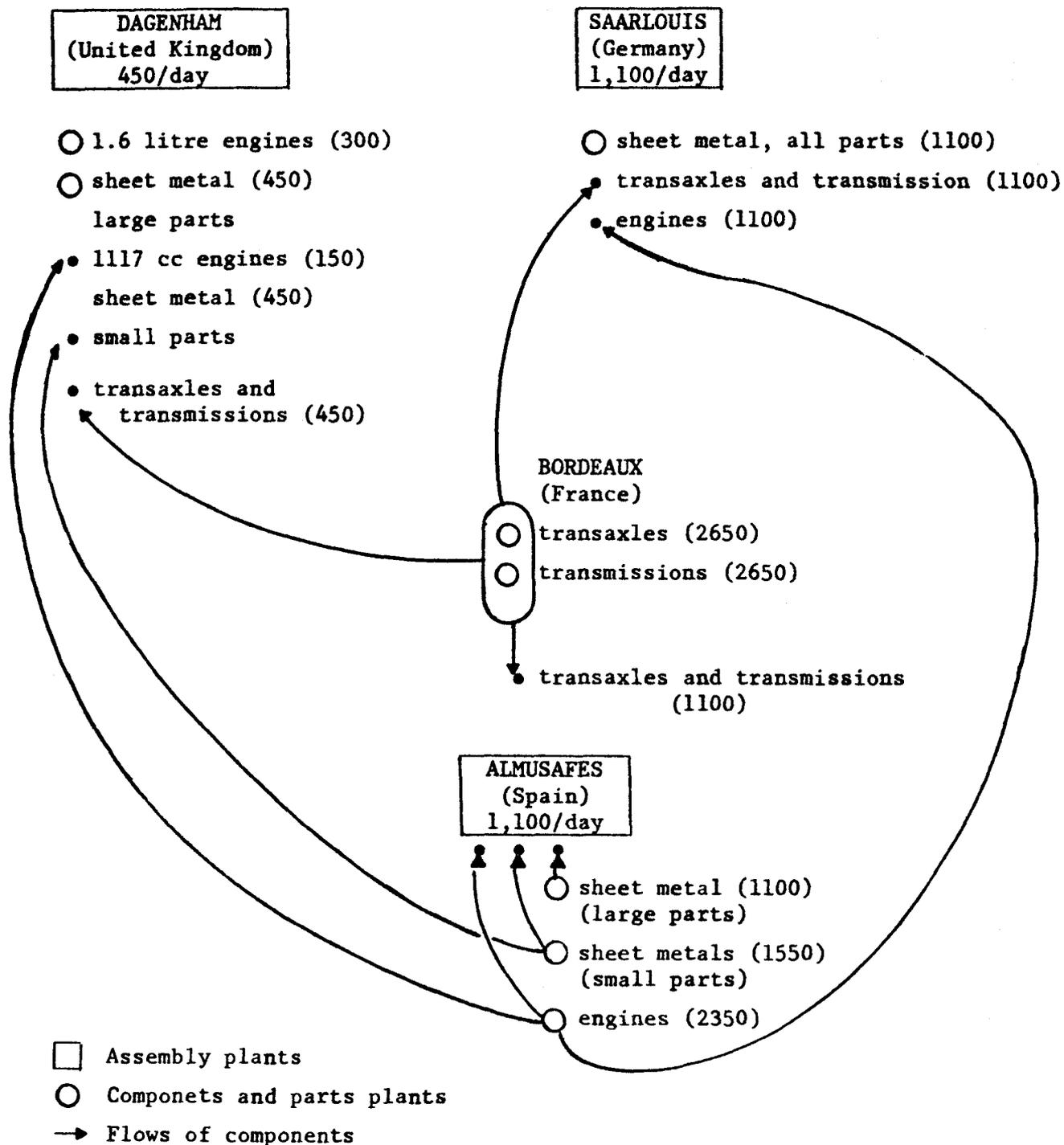
	<u>1975</u>	<u>1980</u>
United Kingdom	41	55
Germany	80	103
France	54	70
Italy	54	67
Japan	37	48

Note: Total compensation per hour worked.

Source: U.S. Department of Labor.

Exhibit 5

Integration Pattern of Ford of Europe for Fiesta Car Line



Note: All figures between parentheses indicate daily production capacity.

Source: Ford Motor Company. For more detail on Ford of Europe see Ford Bobcat cases (A1, A2, B, C, D). Available from Intercollegiate Case Clearing House, Boston (ICCH #4-380-093, #4-380-099, #4-380-100, #4-380-101, #4-380-102).

Exhibit 6

The Peugeot Structure

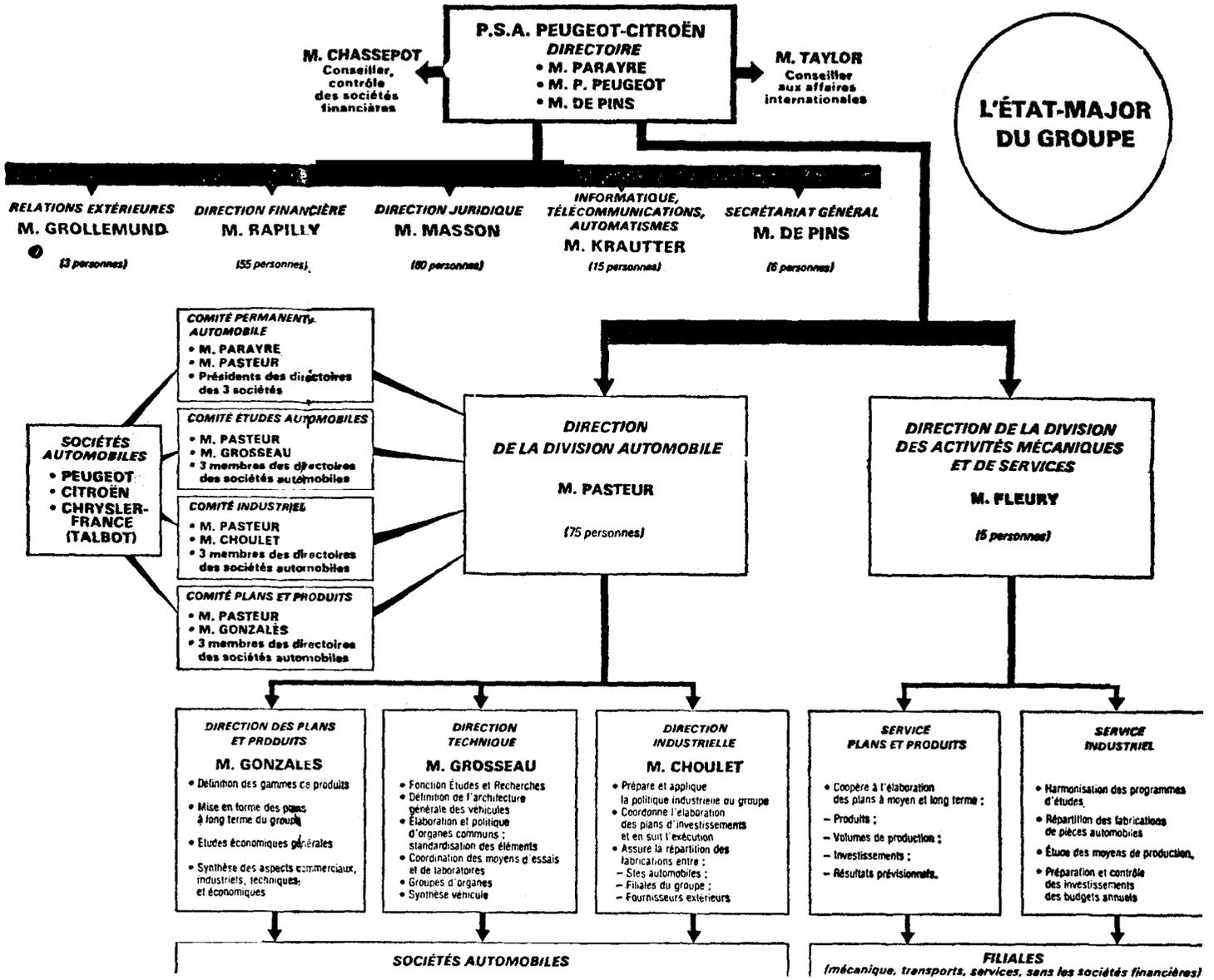


Exhibit 7

FOREIGN SOURCING - RECENTLY-ANNOUNCED COMMITMENTS BY U.S. AUTOMOBILE MANUFACTURERS TO PURCHASE FOREIGN-MADE COMPONENTS FOR USE IN DOMESTIC VEHICLES PRODUCTION

<u>Automobile Manufacturer</u>	<u>Description of Component</u>	<u>Intended Use</u>	<u>Manufacturing Source</u>	<u>Approximate Number of Components</u>	<u>Period</u>
G.M.	2.8 liter V-6	Cars	GM de Mexico	<400,000/year	1982-
	2.0 liter L-4 with transmission	Mini trucks	Isuzu (Japan)	100,000/year	1981-
	1.8 liter diesel L-4	Chevette	Isuzu (Japan)	small numbers	1982-
	1.8 liter L-4	J-car	GM de Brazil	250,000/year	1979-
	THM 180 automatic transmission	Chevette	GM Strasbourg (France)	~250,000/year	1979-
Ford	2.2 liter L-4	Cars	Ford-Mexico	<400,000/year	1983-
	Diesel L-4	Cars	Toyo Kogyo	150,000/year	1983-
	2.0 liter L-4	Mini trucks	Toyo Kogyo	<100,000/year	1982-
	2.3 liter L-4	Cars	Ford de Brazil	~50,000/year	1979-
	Diesel 6 cyl.	Cars	BMW/Stegr	100,000/year	1983-
	Turbo-diesel/4 cyl.	Cars	BMW/Steuer	-	1985-
	Manual transaxles	Front Disc Cars	Toyo Kogyo	100,000/year	1980-
	Aluminum Cylinder heads	1.6 liter L-4	Eurone, Mexico	-	1980-
	Electronic Engine control devices	Cars	Toshiba	100,000+/year	1978-
Chrysler	Ball Joints	Cars	Musashi Seimibu	1,000,000/year	1980-1984
	L-6 and V-8 engines	cars	Chrysler de Mexico	<100,000/year	early 1970's
	2.2 Liter L-4	K-body	Chrysler de Mexico	<270,000/year	1981
	2.6 Liter L-4	K-body	Mitsubishi	1 Million	1981-85
	1.7 Liter L-4	L-body (Omni)	Volkswagen	1.2 Million	1978-82
	1.6 Liter L-4	L-body	Talbot (Peugeot)	400,000 total	1982-84
	2.0 Liter Diesel V-6	K-body	Peugeot	100,000/year	1982-
	1.4 Liter L-4	A-body (Omni replacement)	Mitsubishi	300,000/year	1984-
AMC	Aluminum Cylinder Heads	2.2 liter L-4	Fiat		
	Car components and power train	AMC-Renault	Renault in France and Mexico	300,000/year	1982-
VW of America	Radiators, Stampings	Rabbit	VW de Mexico	250,000/year	1979-
	L-4 diesel and gas	Cars	VW de Mexico	300,000 +/year	1982-

SOURCES: Compiled from Automotive News, Ward's Engine Update, Ward's Automotive Report, American Metal Market, Detroit Free Press, and Japan Economic Journal.