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Firm Structure and Market Structure:  
A Case Study of the Car Industry

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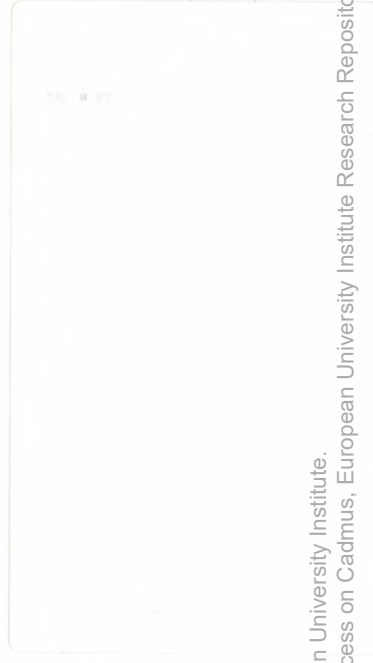


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**SANDRINE LABORY**

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# Firm Structure and Market Structure: A Case Study of the Car Industry

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## Abstract

This paper examines organisational forms in the car industry, in order to derive stylised facts that can be used to model the interaction between firm structure and market structure. The analysis of the car industry since 1945 points to a fundamental change in production technology, that brought about changes in organisational forms. A new organisational form is claimed to be emerging, and is defined.

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# 1 Introduction

This paper addresses the issue of the effect of firm structure on market structure in oligopolistic markets. Oligopoly theory has recently started to be enriched by the relaxation of the black-box assumption. Considerations of firm structure in oligopoly models include two main lines of research. First, agency models are brought into oligopoly models (Labory, 1997a). Second, the interaction between financial and production decisions are considered (for example, Brander and Lewis, 1986). This paper considers a third line of research, namely organisational forms and oligopolistic competition. The study of organisational forms is an important part of the theory of the firm. An important contribution in this field is the theory of transaction costs, defined by Williamson (1975). In oligopolies, few contributions exist. Since the study of organisational forms lacks formal developments, the methodology of this study is to first analyse organisational forms in oligopolies, in a case study of the car industry, and then derive stylised facts to be modelled. Therefore, I analyse the key features of the evolution of the automobile industry since World War Two, in terms of production, demand, and technology, in order to outline the main structural changes that took place in the industry, and how both organisations and market competition evolved as a result. By organisation I mean the hierarchy, the relationship between the head office and the divisions, be they defined in terms of regions or products. I focus on the top level of organisations, because this is where strategic decisions are taken, and the link with strategic interactions in oligopolies is most obvious.

The major change that has occurred is the shift from the rigid Fordist production system to the flexible production system, initiated by Toyota. Toyota and other Japanese car makers experienced particular demand, financial and labour conditions after 1945 that led them to adopt a particular production system, producing variety at low cost, and a particular organisation, characterised by horizontal as well as vertical information flows. These turned out to be the basis for a competitive advantage in the 1980s.

In the 1990s, all car manufacturers in the world have adopted the

flexible production system, and adapted their organisations accordingly. The major adaptation concerns relationships within and across firms, which appears to be leading to a new organisational form.

Since drastic changes in organisational structures occurred as a result of the introduction of the new technology, the hypothesis advanced here is that:

1. organisational forms are determined by technology and competition conditions;
2. whereas the multidivisional form of organisation was optimal to coordinate the activities and motivate the members of the Fordist firm, the shift to the flexible production system means this organisational form is no longer optimal. In contrast, a new organisational form is emerging that optimally organises the firm with a flexible production technology;
3. since the flexible firms' success is persistent after rivals have adopted the new technology, it appears that not only the technology (implying cost advantage), but also the *form of organisation* (information flows inside the firm) are crucial determinants of firms' long-term performance in oligopolies;
4. Changes in organisation are rare and costly and have long-term effects. Their effect in oligopolies is to establish barriers to entry/exit.

The paper is structured as follows. In a first section, the general evolution of the car industry is analysed. The particular cases of three automakers, Ford, Toyota and Honda are examined, and point to a new organisational form that seems to be emerging in the industry. The latter is then defined in the last section. Conclusions are then drawn, outlining organisational aspects of innovation.

## 2 General Evolution since 1945

### 2.1 Producers, demand, product

The period 1945 to 1972 is characterised by a fragmentation of the world industry into different oligopolies, mainly the USA, Europe and Japan. Producers of the latter two oligopolies were concerned about reconstruction and recovery of post-war levels of production.

#### - Production

In Europe, car production reached its pre-war level only in 1950, from which time mass production really began. Markets expanded rapidly since they were at the early stages of the product life cycle. Between 1950 and 1959, car production increased from 0.26 to 1.13 million in France, 0.52 to 1.19 in the UK, 0.22 to 1.5 in West Germany, and 0.10 to 0.47 in Italy<sup>1</sup>, and a large part of this production was exported (mainly to the USA).

Japanese automakers produced only trucks and commercial vehicles, in small volumes, until the mid-50s. Both Toyota and Nissan launched their first passenger car in 1954-55. However, the Japanese market remained small and production in large volumes, as in the USA, was impossible. Hence firms had to find ways to combine line production (which enables economies of scale) and small volumes. The strategy of Toyota was based on waste minimisation and on an incentive system that rewarded gains in productivity and reduction in production time (Ohno, 1978). Japanese producers had to cope with the lack of financial funds after the war and the reorganisation of the financial sector brought about by the dissolution of zaibatsu by the American authorities<sup>2</sup>. Keiretsu links with suppliers based on trust and cost minimisation were established. Agreements with trade

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<sup>1</sup>Source: C.C.F.A. (Comite des Constructeurs Francais d'Automobile).

<sup>2</sup>Zaibatsu were family-owned holding companies controlling large companies in important industrial sectors. Each zaibatsu included a bank, which provided funds to the members of the group. After their dissolution, new groups emerged without a holding company at the top, but where members are linked by cross-shareholding. Those groups usually include a financial institution and a large trading company.

unions reduced the power of the workers, thereby ensuring “peaceful” industrial relations (Cusumano, 1988).

The strategy of cost minimisation by the reduction of waste and of labour and other variable costs continued even when demand in Japan improved. Sales of new cars in Japan surpassed sales in France only in 1969. The boom of Japanese production took place in the second half of the 1960s. In 10 years, from 1964 to 1973, the domestic market expanded from 0.5 to 3 million vehicles, while Japanese car makers production rose from 0.58 to 4.5 million cars, the difference being exported mainly to East Asian markets.

#### - Producers

The “Big Three”, that is, the main American firms, Ford, General Motors (GM) and Chrysler, rapidly switched from military vehicle production to utility vehicles and passenger cars. As early as 1947, car production in the USA reached the level of 1940. The American automobile market was large and diversified: sales varied between 5 and 7 million cars per year. The production and variety offered by GM and Chrysler increased rapidly, while Ford started to significantly enlarge its range of models only in 1960<sup>3</sup>.

From 1973 onward, a number of events hit the car industry worldwide, so that firms had to cope with increasingly similar problems. This corresponded to the progressive integration of regional oligopolies into a worldwide oligopoly, increasing trade and foreign direct investments between the regions. Thus three major market phenomena have hit all car manufacturers simultaneously. These are the oil crises of 1973 and 1979, fluctuating exchange rates in the early-1970s and financial deregulation in the 1980s.

Yet problems specific to some firms or some countries were numerous. The power and importance of consumer movements was typically American. In the USA, the 1970s was the decade in which the American automotive market internationalised. The Big Three averaged about 88% share of the US. passenger car market in the 1960s, falling to 80% after 1970 and under 75% in 1979<sup>4</sup>. Imports

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<sup>3</sup>Bordenave (1995).

<sup>4</sup>Flynn, 1995.

were about 15% in 1970, and 22% in 1979. The mix of importers changed dramatically over the decade. In 1970, 8 out of the top 10 importers were European, while in the end of the decade 6 of the top 10 importers were Japanese. Japanese companies expanded their dealership network typically by signing agreements with the Big Three. MMC (Mitsubishi Motors Corporation) and Chrysler, Isuzu and Ford, Mazda and GM signed such agreements. This enabled American producers to complete the range of models offered, since the smaller and more fuel efficient Japanese cars were sold through the Big Three's outlets. This provided an easy access to the American market for Japanese automakers, an initial entry on the small car segment which was followed in the 1980s by entry on other car segments. American producers did not expect such subsequent aggressive competition of Japanese entrants on their own segments, that is large and luxury cars. The decade of the 1980s therefore was a tumultuous decade for American car makers, since their share of the market fell by 9% to the benefit of Japanese automakers. Honda started production in the USA in 1982, and was followed by Nissan (1985), Toyota (with GM in the JV NUMMI) in 1986, Mazda in 1987 and MMC in the joint venture with Chrysler in 1989. This was accompanied by the setting up of about 300 Japanese parts suppliers on the American market.

In Europe, each firm acted as a leader in the home market and a follower elsewhere.

The particular problem in Japan was the financial crisis of the early-1990s, brought about by the collapse of the financial bubble, which implied a rise of the cost of investment (many banks were going bankrupt), exchange rates problems (the high yen reduced the scope for exports), and most importantly an economic recession that translated into a fall in the demand for cars and an adjustment in tastes (consumers no longer willing to pay for a very large variety and luxury but preferring less personalised cars, in terms of options, at lower price), which revealed an over-diversification of the range of models offered by Japanese producers.

Over the years and especially in the 1990s a contradiction appears: the automobile oligopoly has become global, and players have to de-

fine strategies on a world basis (for example by selling in every possible regions in the world), while regions keep their specificities, due to different cultures and mentalities, and translating into different consumers' tastes, different governmental regulations, and so on. All car manufacturers worldwide have to face this contradiction, notably by adapting their organisational forms.

#### - Demand

In terms of demand, all major market, namely Europe, the USA and Japan, expanded rapidly after the Second World War, and became renewal markets from the 1970s onward. Nowadays all those markets are saturated, so that competition between producers is more intense. They have greater incentives to expand to newly emerging markets in order to compensate for this.

#### - Product

Product characteristics also changed. After the second oil crisis, the American, European and Japanese models started to converge in size, packaging concept, styling, and so on. International competition therefore became more direct in that individual models from different firms and regions started to compete against each other within the same segment of the global market. Consequently, car makers have accentuated their differentiation strategy, so that the product life cycle has been reduced, and the cost of R&D has risen dramatically. Alliances among producers have therefore developed, aiming primarily at spreading the cost of product development, and resulting in the emergence of networks of relationships between competitors.

The large variety is evidenced by the large number of models produced<sup>5</sup>, as well as the number of options for each model. Tables 3 and 4 below illustrate this point for the cases of major Japanese car manufacturers. This implies a change of strategy and of the organisation of producers. Instead of concentrating all product development in the home country, it appears optimal that models be produced in the re-

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<sup>5</sup>However, the number of models has an upper bound. Thus Japanese producers recently had to reduce their number of models offered because consumers complained about the complexity of choosing a car.

gion where they are mostly demanded, like small cars or diesel engine cars in Europe, in the quantities necessary to reach the profitability threshold, and then sold to other markets where they may also be demanded. This strategy has the major advantage of good adaptation of the product to local needs and tastes. In each segment (small, medium, large,...) producers try to maximise economies of scale by developing as many common features as possible for cars aimed at different markets. This commonisation is unlikely to lead to a world car, that is a single car for all regional market. The reason for this is the specificity of each market previously outlined<sup>6</sup>.

**Table 1. Range of models produced by the main Japanese car makers.**

	1984	85	86	87	88	89	90	91	92
Honda	12	13	13	14	14	16	16	16	18
Toyota	19	21	21	21	21	23	24	28	28
Nissan	21	20	21	22	23	26	26	23	23

Source: JAMA report, 1995.

**Table 2. Model changes of Japanese car makers, 1970-89\*.**

	Number of 1970-79	new models 1980-89	Number of 1970-79	model changes 1980-89
Toyota	3	5	15	22
Nissan	3	4	18	19
Mazda	2	1	7	6
Honda	3	4	1	11
Mitsubishi	4	3	6	7
Isuzu	0	0	1	3
Fuji	0	2	4	3
Daihatsu	2	1	0	5

\*: Excluding very small cars, jeep-type models and cab-over vans.

Source: Clark and Fujimoto (1991, 1992), who point out that although the Japanese automakers did not spend more on R&D, they introduced many more models than Western producers (over the period 1982-87, they introduced 70 new models, against 20 by American

<sup>6</sup>The example of Ford is interesting in this respect, and is discussed below.

*producers and 40 by European ones).*

## 2.2 Technology

The automobile industry is characterised by incremental, progressive innovation. The product is never changed fundamentally but producers incrementally improve both the production process (for instance, a new machine to produce bodies) and the car itself (for example, four-wheel drive, ABS braking system, airbags, and so on). Until the 1970s, the technology in the car industry was stable, as the structure of the industry and the organisation of firms. However, during the 1970s Japanese producers introduced a new production system<sup>7</sup>, which turned out to be a competitive advantage and all other producers adopted that technology. After the generalisation of this production system during the decade of the 1970s, the focus was again on product innovation and generally incremental innovations from the 1980s onwards. Japanese producers maintained their competitive advantage (high quality, low cost, small time-to-market) even after rivals adopted the new technology<sup>8</sup>. I argue that the persistence of their competitive advantage<sup>9</sup> is due to a particular organisational form, which is optimal given the new technology and intensity of competition.

Bianchi (1991) provides a precise explanation of the flexible production system, in contrast to the linear Fordist system. The flexible system organises the production cycle so that production functions can be specialised without restricting them to specific products. Thus parts across different products are “commonised” so that differentiated products are manufactured on the same line at some stages of

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<sup>7</sup> which was developed by incremental innovations over a certain time period, and not discovered suddenly (this was stressed by Toyota managers met during research trips).

<sup>8</sup> See Fujimoto (1994) for a discussion of the advantages of Japanese producers relative to Western producers.

<sup>9</sup> where competitive advantage is defined as an advantage affecting the long-term position of the firm in markets, especially barriers to exit from certain segments, and barriers to entry.



the production cycle. As a result, increasing economies of scope are realised without losing scale economies. Inside the firm, the flat hierarchy and integration of functions<sup>10</sup> (marketing, research, design, engineering, manufacturing, etc.) increases communication between employees in the different departments and information flows between the consumer and the producer, so that the product is really fitted to consumers' needs and tastes.

The mass production system invented by Henri Ford at the beginning of this century dominated the car industry until the 1970s. This system is optimal when firms have large market power over their home market, face little competition and differentiation is not important. The main elements of this model include a highly centralised management structure, an increasingly automated assembly line, a separation of activities (marketing, R&D, engineering,...), collective bargaining, wages based on productivity, a ready access to capital, a market driven by falling costs and oligopolistic competition. The automotive industry in the USA in particular emphasized product design and technology, but paid much less attention to process techniques and manufacturing technology than Japanese car makers.

The adoption of this new technology by Western producers involved large investments in machinery in order to match the flexibility of Japanese producers<sup>11</sup>. However, from the late-1980s this tendency is reversed in favour of a refocusing on human resources, seen as the most important source of flexibility (defined here as the production of variety at low cost)<sup>12</sup>. As a result, the work force was dramatically reduced. Thus Ford reduced its work force by 21.6 % over the decade of the 1980s, while Peugeot S.A. (PSA) reduced employment by 25% over the period 1981-91.

Work organisation changed towards a larger participation of workers. This re-organisation of product development (PD) included parts

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<sup>10</sup>As stressed by Clark and Fujimoto (1991, p97).

<sup>11</sup>For instance Fiat constructed "highly automated factories" (Camuffo and Volpato, 1994).

<sup>12</sup>Toyota itself built an almost entirely automated factory at Tahara, Japan, to confront the problem of labour shortage in Japan. This turned out to be very costly without the expected returns in terms of quality. Consequently, the focus on automation was abandoned.

procurement policies. Thus most Western automakers experienced a vertical disintegration, and established partnership relationships with suppliers. These relationships involved some shifting of cost and R&D to suppliers, with quality and low price ensured by comparing suppliers performance, thereby inducing competition between them<sup>13</sup>.

The organisation of distribution also changed. The Fordist system has distribution systems based on exclusive dealers under the authority of car manufacturers. The Toyotist system has a different distribution system, where dealers are involved in cost minimisation (reduction of stocks, manufacturing after orders,...), in quality (of services to the customers, especially after-sales services), and in the sharing of information (to better understand consumers tastes before developing a new product). Non-exclusive distribution has developed in the USA, but the practice of exclusive dealers is still widespread in protected markets like Europe and Japan<sup>14</sup>.

By the end of the 1980s, the technology in the automobile industry seems to have stabilised once again, and producers now focus on product innovations as barriers to entry, to gain or maintain market shares. The intensification of competition in the 1980s implies the emergence of two key factors for success: time and creativity (for variety, quality and low cost). The first factor means that products have to be developed rapidly (in order to be the first mover in some market segments). The second is that frequent incremental product innovations have to be made in order to attract consumers. This raises an issue: are there organisational forms favouring rapid product development and creativity, that is, implicitly, favouring market performance?

The study of particular automakers will bring more insight on this matter. The analysis of major changes in the organisation of Toyota, Ford and Honda since 1945 is presented below, and points to common new features of organisation adopted, that might define a new form of organisation.

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<sup>13</sup>See De Banville (1989), De Banville and Chanaron (1991) and Baudry (1993) on this issue.

<sup>14</sup>See Shirai (1994, p17) for an explanation of the Japanese system.

## 3 The Case of Ford

Ford is an interesting case study because it experienced some dramatic changes following big downturns in the 1970s and late-80s. Ford's long-term performance was lagging behind major Japanese producers like Toyota, in terms of quality, production costs, productivity, etc. Recessions triggered changes with long-term consequences, because the competitive pressure (threat of exit), is larger during recessions. Overall, Ford's production system remains rigid. However, it has a long history of multinationalisation and has R&D, production and sales facilities in the three main regions in the world (USA, Europe and Japan), that interact. Ford has a long presence in Europe, which started before the second World War. In Japan, Ford's introduction has been helped by its collaboration with Mazda.

### 3.1 Ford's downturns

Ford is the most internationalised car manufacturer, although it depends to a large extent on the American market, which has represented two thirds of Ford's world revenue since 1980 (23% for Europe, 10% for the rest of the world<sup>15</sup>).

The dependence on the American market shows that Ford's organisation is centralised, with a large part of production and sales done in the home country, where the head office keeps rigid control over the company. The American market represents about half of the world sales of the company. Ford has experienced three important downturns: in 1974-75, 1979-82 and 1990-92. The last two crises triggered dramatic changes in organisational structure. The reason is that organisational changes are costly and difficult to make, and are better accepted by the firm's members in bad times. Thus after the second crisis of Ford, managers and employees accepted the introduction of innovations and organisational changes because they were worried about the possibility that the firm might not survive. The organisational changes included the introduction of Japanese cost control

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<sup>15</sup>Bordenave (1995).

methods, which Ford learned from Mazda, of which it took a 25% stake in 1979. Over this period a new agreement was signed with the trade union (UAW) with greater involvement of employees in the firm and wage reductions.

The extent of the changes carried out by Ford can be illustrated by a comparison of several indicators before and after the crisis, as in table 3 below.

**Table 3. Changes from 1976-82 to 1983-92**

Number employed	-20 %
World sales	+8 %
Total cost / turnover	-2 %
Equipment	+ 17.9 %
Labour cost	- 20,2 %
R&D spending / total cost	+ 4.15 %
After tax profit / turnover	+ 185 %*

Source: G.Bordenave, 1995, GERPISA.

*\* This high rate does not result only from the inclusion of the economic recession of 1979-82 in the first period. According to Bordenave, the signs of variation are not changed if the comparison is limited to expansion phases of both periods.*

This reorganisation induced a remarkable recovery at Ford. Table 3 shows that sales grew by 8% between the periods 1976-82 and 1983-92. Long-term sales growth is a measure of long-term performance. Hence in the long-run, and beyond cyclical fluctuations in profitability, the changes in internal organisation had a significant effect on Ford's performance.

The main reason for the problems of Ford in the 1970s was increasing competition from Japanese producers, who benefitted from a competitive advantage in terms of technology, hence quality and price. Ford lacked model renewal and had a range of models concentrated on the upper part of model range, that is large and luxury cars, whereas tastes were changing and American consumers, especially women,

were turning to smaller cars. In 1980, the small cars segment represented 64 % of the American total market<sup>16</sup>. Besides, Ford's quality image was very poor. Flynn (1995) shows that in the 1970s consumers reported on average 7 defects per American car, only two for Japanese cars. Lastly, mass production in the Fordist model had to be altered because the necessary increase in variety could not be met by a rigid production system.

An attempt was made at standardizing the car at world level, in order to realise economies of scale. However, this concept was a failure, because each regional market keeps specificities which have to be met, thereby preventing a total standardization of the car at world level. Ford announced the launch of a world car in 1980, the Escort, but the model was very different across continents, with different manufacturing and different parts, so that no economies of scope were realised. The differences in culture across continents make this concept impossible to realise. Therefore, Ford launched a new concept in the end of the 1980s, very much like the Honda concept of "global-local". It is a world car in the sense that the platform, the basic interior and the technology are common (standardized), as well as sometimes the name or even exterior design. However, different options (colour, number of doors, electronic system, safety systems, ...) are created for each market, in accordance with its specific needs. Products are therefore not strictly identical across regions but adapted to local needs. Thus the Mondeo is a "global-local" car. American and European engineers have cooperated to develop the Mondeo. However this car is not a world car, since it is sold in the USA and in Europe with different designs and different names (Mondeo in Europe, Mercury-Mystique and Ford Contour in the USA).

The major organisational changes are introduced at the beginning of the 1990s.

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<sup>16</sup>Mintzberg and Quinn, 1995.

### 3.2 Changes in Ford's organisation

After the third downturn in the early 1990s, Ford's managers realised that the first changes were not enough. Several remaining long-term problems were identified, the solutions of which were shown to require further changes in organisation. The table below shows that Ford recovered from the drop in sales due to the second downturn, but in the long-term, sales growth was still negative in 1987 relative to 1978. Growth of North American car sales between 1978 and 1987 was -20.8%.

**Table 4. Factory Sales, 1978 - 1987.**

(Millions)	1978	79	80	81	82	83	84	85	86
North America (1)	2.9	2.3	1.6	1.5	1.4	1.8	2.2	2.1	2.3
World (2)	6.6	5.9	4.4	4.4	4.3	5.0	5.7	5.6	6.0

*Source: Annual reports (1: cars; 2: cars and trucks).*

The failure of the world car is also due to a lack of cooperation between regions. This induced a duplication of effort which contributed to increase the cost of product development and limited the range of models offered on each market. Quality was poor. A study by Baily and Gersbach (1995) finds that the Japanese car industry enjoyed a quality premium of 12% over the USA in 1987, and 16% in 1990. Product development was slow. For instance, it took 5 years for the Taurus to be redesigned, while such redesign in Japan takes only 4 years.

In terms of organisation, top managers of Ford identified two problems: lack of horizontal communication between divisions and too heavy a bureaucracy, with many top hierarchical levels, and a separation of activities without interactions.

Therefore in January 1993 Ford's CEO decided to change Ford's organisation in order to coordinate efforts of regional units, with a central worldwide management structure (against existing regional structures) with global goals and strategies. A two-year study was initiated, leading to agreement on the definition of a new organisa-

tional structure, to be implemented in the FORD 2000 program by the end of this century, starting with the merger of European and North American automotive operations in January 1995.

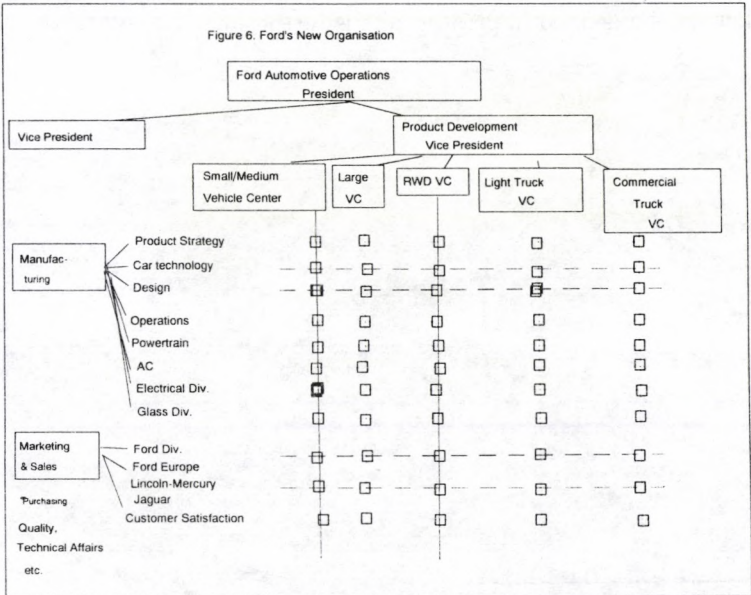
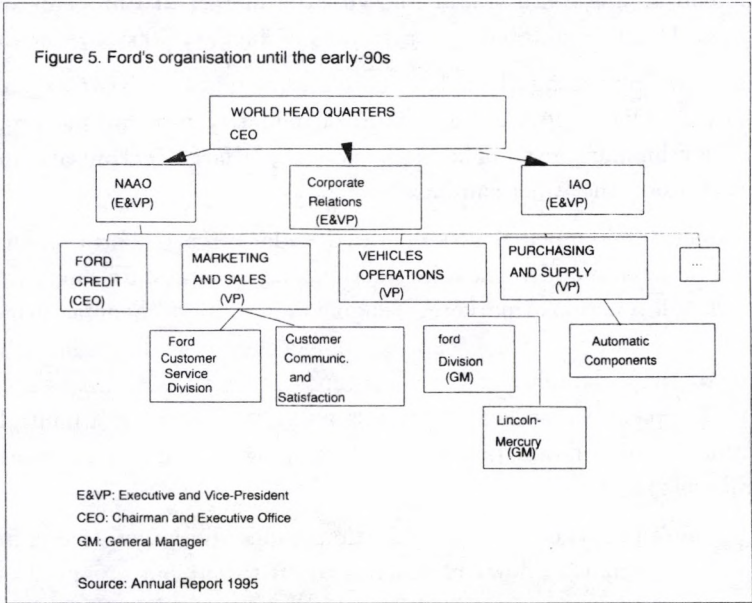
As shown by the figures below, Ford's reorganisation has two main aspects. One aspect is the set up of a matrix form at the product development level. The other aspect is a large centralisation of activities on the American base.

Product development is now operated under a matrix form, in that both horizontal and vertical interactions have been established. Vertically, all functions (marketing, engineering, design, manufacturing, etc.) cooperate to develop a specific model (large, small, medium,...). Horizontally, the functions of all product divisions also intersect. This is precisely the flexible production system, namely, a multiplication of information nodes<sup>17</sup> by developing cars in teams, where functions interact.

This multiplication of communication nodes for larger (more frequent) information flows is generalised to the global organisation. This is a first major characteristic of the new organisational form that will be defined in greater details further on.

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<sup>17</sup>where a node is an intersection point between horizontal and vertical information flows,





In the new organisation form, the activities of Ford's facilities in each region (R&D, manufacturing, sales, etc.) are coordinated at world level by a centralised management, based in the USA. Also, each car model is managed centrally by a worldwide director. For instance 5 Vehicle Program Centers (VPC) have been established, one located in Europe (small cars), and the other 4 in the USA. Each center has a worldwide responsibility for the vehicle assigned to it. The aim is to commonise (in the sense of standardizing car interior) car models as much as possible. However, this is evidence of a centralisation of powers in the USA, which raises some issues. First, the concentration on the USA may lead to a lack of adaptation of models to regional markets, since the world directors may not assimilate perfectly information from each regional market. Second, since regional subsidiaries are given less responsibility, regional managers may have less incentive to provide effort and in particular may lack the incentive to perfectly report local information to the head office. Thus European managers have expressed concerns. They fear that Europe will become a career backwater, are reluctant to move to the USA, and fear losing power in front of the powerful labour unions, in Germany in particular.

In contrast to Ford, General Motors has a policy of regional independence for better adaptation of models to local tastes, but with relationships between regions in order to share experience and commonise as much of the vehicle as possible. GM has strong regional operations that develop vehicles for their own markets. Then, if a vehicle has strong crossover potential, engineers and marketers from different regions meet to suggest customizing.. Thus Cadillac will get an Americanized version of the Opel Omega small luxury sedan developed by Opel in Germany, while Opel will get a minivan designed mainly in the USA. GM managers claim that such ad hoc efforts are cheaper and more flexible<sup>18</sup>. As a result, the product developed in one region is mainly sold in that region but also sold in other regions, with minor changes in design. Products are therefore truly "global-local". This coherence of the organisation of the company which gives regional divisions the necessary autonomy (adaptation

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<sup>18</sup>Business Week, 3 April 1995.

to local markets, motivation) while ensuring exchanges between divisions of products and information, thereby avoiding duplications of effort and improving innovation, is a second characteristic of the new organisational form that is claimed to be emerging.

Some changes in the top hierarchy and in incentive systems have been carried out at Ford in order to accompany the reorganisation. In order to reduce bureaucracy, the number of top hierarchical levels has been reduced. Thus top management has been cut by 20%, and the span of control of remaining managers has increased. Red tape as well as the number of corporate committees have been reduced to make decision-making less costly and faster (the number of corporate committees is now 3 instead of 11). Changes in job definition include job rotation: engineers used to be permanently assigned to a department, but will now be induced to move to different functions and different vehicle centers. The flat top hierarchy is a third characteristic of the new organisation.

As a conclusion, short-term downturns have triggered large changes in organisation that were made necessary by poor long-term performance parameters. In the short-term, organisational costs (costs of organising activities in the firm) increase because of the costs associated with employees' layoffs and training of personnel for new tasks and responsibility. Once the organisation is put in place, organisational costs reduce because contracts are more efficient, so that the profit of the company increases. Ford announced very clearly its changes. One interpretation is that this was a signal of efficiency to rivals so as to effectively deter entry on certain market segments.

## 4 The Case of Toyota

### 4.1 Evolution of performance

As noted above, the Japanese model developed due to specific constraints existing in Japan after WW2: low demand, lack of financial funds, etc., constrained Japanese producers to immediately produce

variety while maximising economies of scale. This led to the flexible production system, that became the dominant system worldwide from the 1970s onward.

The analysis of Toyota is interesting for two reasons. One is that it enables to better understand the new system of production, and the reason is that it leads to an outline of the essential elements of the Japanese competitive advantage. Thus the Japanese competitive advantage would not have been what it is without the strategy of exports, which Japanese producers adopted very early. They were induced to export because of the small size of their domestic market.

Toyota's exports and production abroad rose dramatically, especially in the 1980s. Exports to the USA increased from almost 800,000 units in 1980 to a peak of 1,100,000 unit in 1986<sup>19</sup>. More generally, Toyota's sales abroad were higher than those in Japan over the period 1979-1986, denoting a strong policy of long-term development on a world basis.

**Table 5. Share of exports in production (passenger c. rs, %)**

	1960	64	68	70	74	78	80	84	88	90
Nissan	5	24	23	29.5	50	49	53	55	45	42
Toyota	9	10	30	31	36	44	48	45	40	41

*Source: JAMA*

From 1986 exports fell from a total of about 2 million cars to about 1.5 million in 1994, but this was compensated for by a rise of overseas production in the same period, which increased from less than 136,300 vehicles in 1985 to 1,051,300 vehicles in 1994<sup>20</sup>.

## 4.2 The true advantage of TPS is flexibility, not just-in-time (JIT)

This dramatic increase in world market shares of Toyota in the 1980s shook Western competitors, who did not expect such a sudden rise

<sup>19</sup>Toyota, annual report 1995.

<sup>20</sup>Toyota, annual report 1995.

of this Japanese competitor to top performance levels. Business researchers therefore started to study the issue, aiming at explaining what they saw as the end of Western producers' dominance and the start of the Japanese-led era<sup>21</sup>. Dualist theories (Japan/West, Toyotism/Fordism, lean/mass, flexible/mass) developed that suggested Japanese superiority and the need for Western firm to adopt their system in order to survive. The literature on Toyota is large and very often confuses the TPS (Toyota Production System) with the Japanese model. I think this generalisation is too restrictive: Japanese automakers have different experiences and organisations. The analysis of the TPS enables us to distinguish fundamental elements of the TPS and to avoid too rapid conclusions, especially concerning the opposition Japan / the West. Thus the analysis of the "just-in-time" principle, often claimed to be the key element of the TPS, points to the caution necessary when dealing with empirical analysis of firm's internal organisation. Data are difficult to get, and firm managers might provide very subjective judgements.

According to managers interviewed at the British factories of Toyota<sup>22</sup>, the Toyota Production System (TPS) has three main tools, Kaizen, Jidoka, and Just-in-Time (JIT). Jidoka represents features built in the production process that give workers the possibility to stop the line at any time if a fault occurs. However, Shimuzu (1995) argues this did not function. Workers were so pressured to raise productivity (with wages based on productivity improvements) that they would never dare to stop the whole line because of a possible defect. For the same reason, their participation in improvement of the production process was very limited. Thus Kaizen, the idea that everywhere in the firm employees should aim at small but continuous improvement in the work they do, did not really work.

JIT is a "pull" system that makes the production process go from one step to the next on the production line "only in the type and quantities needed and at the time they are required"<sup>23</sup>. A tool of JIT is the Kanban system whereby a label is put on the car being

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<sup>21</sup>Guillain (1969), Vogel (1979), Van Wolferen (1983).

<sup>22</sup>At TMMUK, Burnaston, Derbyshire, July 1994.

<sup>23</sup>Toyota factfiles 1994.

produced, indicating its characteristics (such as its colour), and the parts it requires (such type of seats,...), which enables workers to exactly know at each step of production what quantity of parts is and will be needed. Close relationships with suppliers are needed so that parts are delivered continuously in just the small quantities required.

Another aspect of the system is the organisation and coordination of relationships with suppliers. Procurement in the Japanese system is based on networks of subcontractors. Inside such keireitsu, suppliers are financially dependent on automakers. Cross shareholdings between suppliers and automakers ensure the dominance of the car producer in the relationship. This is a key aspect of JIT and requires ideally that all suppliers be located on site, as in Toyota-City. Unless all suppliers follow the assembler in different markets in the world, JIT is not possible as a globalisation strategy.

This is how Toyota itself together with advocates of the TPS as a best system present its advantages. However, Toyota has recently reorganised its factories, due to both the shortage of labour and ageing of the population in Japan. It has constructed two new factories (Motomachi and Kyushu), where new work organisation methods are being tried out<sup>24</sup>. The four new features of work organisation at Toyota all aim at introducing a more humane nature into work. These are<sup>25</sup>:

- a new wage system which puts less emphasis on productive efficiency, thereby putting less pressure on workers to work ever more intensively (wages depend primarily on age and skills rather than on productivity achieved);
- new personnel management methods, including promotion, training (of new recruits, in order to reduce the turnover rate), skill acquisition (so that workers aim at gaining know-how and get more satisfaction in work);
- New shop floors, less dirty and more comfortable, where women and older people can also work;

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<sup>24</sup> As explained by a manager at Toyota-City, Japan, June 1995.

<sup>25</sup> Shimuzu (1995), p41.

- A division of assembly lines into subgroups, which enable stocks between sublines and reduces work intensity.

Hence new *incentives* were established for a better coordination and motivation of the firm's members, resulting in new relationships inside the firm. Besides, the reorganisation shows that JIT is *not* the key advantage of TPS. In my view, the key advantage is the flexibility it offers. The new factories built in locations far away from Toyota-City shows that Toyota is abandoning the idea that JIT is a key to the TPS and requires that suppliers be on site. In fact, thanks to modern means of communication, proximity in space is no longer necessary. Toyota is flexible not only because it produces various mixes of models on assembly lines, but also because it adapts to the environment in which it operates. Thus Abo (1994) shows that Toyota has adapted to the specificities of the local markets where it has carried out foreign direct investments. It is also flexible in that it constantly aims at improving.

### 4.3 Toyota's Global Organisation

Toyota remains very centralised on the parent company in Japan, which retains great authority over its subsidiaries. However, the situation is changing. Thus the share of local managerial jobs held by Japanese is progressively reducing, and more autonomy is given to local employees when they are familiar with the methods of the company.

This progressive, although small, decentralisation of Toyota shows that the company is concerned with local adaptation, hence of the need to be "global-local". In the USA, the NUMMI experience<sup>26</sup> helped Toyota understand American business and culture, so that the Toyota facilities set up later could adapt well to the specificities of the American market. In Europe, Toyota's British manufacturing plants follow the corporate goals and strategies defined at the Japanese headquarters, but are responsible for adapting these to the European reality, i.e. determining European consumers' needs, or-

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<sup>26</sup>Joint venture with General Motors.

ganising production, and establishing supply and distribution networks. This is increasingly true as the transplant integrates more to the local market (Abo, 1994).

Progressively, a larger autonomy is given to the regional unit, so that the latter can take some local strategic decisions without having to wait for the parent company's agreement. This will probably lead in the longer term to the specialisation of each regional facility in the models for which local demand is higher than that of any other demand. This specialisation will not prevent exchanges of both products (sale of a model in another region if there is a demand) and information (know-how, ideas), which is optimal given the present conditions of globalisation (need to be present in all regional market and in all segments). This decentralisation concerns steps of the production cycle from production research (renewal of models and technology of production) to commercialisation. Basic research (on car of the future, new materials to be used, and so on) remains centered on Japan, because this activity is highly secret. Besides, R&D has been to a certain extent recently decentralised in the USA, with the opening of the Carly Design Research Inc., where Japanese and American designers cooperate on the R&D of new designs. The new Previa model was developed in the USA primarily for the American market, and was then manufactured in Japan in a Japanese version called Estima. Table 6 below shows the main automobile industry research centers of Toyota in Japan, the USA and Europe.

**Table 6. Toyota Research Centers in the main markets.**

**Japan**

- Tokyo Design Center (research on new designs)
- Higashi-Fuji Technical Center (Research and advanced developments)
- Shibetsu Proving Ground (Vehicle testing and evaluation)
- Toyota Technical Center (Toyota-City)(Planning, design, prototype)

**USA**

- Toyota Technical Center USA Inc.(testing and evaluation of new cars)
- Carly Design Research Inc. (R&D of new designs)

**Europe**

- TMME\* Technical Division (research & test of car technology for Europe)
- TMME Design Division (Support of global product development)

\*: *Toyota Motor Manufacturing Europe*

Source: *The Automotive Industry: Toyota and Japan, 1995.*



## 5 The Case of Honda

Honda was a late-comer in the car market. Having started as a motorcycle producer, it had to establish a specific strategy for successful entry into the Japanese car market in the early-60s. This successful strategy had two aspects. On the one hand, Honda entered by differentiation of its product relative to existing products, by bringing in a sporty image and technical advances (such as high performance engines). On the other hand, and unlike other Japanese producers, Honda immediately turned toward world markets. The share of exports in production rose dramatically, and Honda rapidly developed cars specific to foreign markets, especially the American one. Thus over the period 1990 to 1994, about 75% of Honda's total sales were overseas, and about 25% in Japan. As shown by the following table, Honda experienced a dramatic rise of production after its successful entry into the car industry, from zero in 1960 to more than 1 million cars in 1980.

**Table 7. Growth of Honda's worldwide automobile production**

### 1960-1995

	Automobiles and light trucks (units)
1960	0
1965	52,000
1970	393,000
1975	414,000
1980	957,000
1985	1,363,000
1990	1,928,000
1995	1,797,000

*Source: Honda Annual reports, JAMA.*

Honda has now two car factories in Japan, at Sayama, where larger models (such as the Legend, Accord and Prelude) are produced, and Suzuka, specialised in smaller models (Civic, Concerto, Integra, Today and City). Each factory can manufacture several models on the

same line. For instance at Sayama, 7 types of car body can be accommodated: the basic Accord, Prelude and Legend, the two-door Legend, and the Accord derivative, namely Inspire, Vigor and Ascot. This contrasts with the specialised factories of Ford. The same models can be made on more than one assembly line at each factory, thereby facilitating a balanced use of each line. This provides Honda with the same flexibility as Toyota, where models are produced in lots of one, but with the additional advantage of less complexity, since the logistical planning of parts supply is much easier when production lot size is increased.

It is interesting to outline some of the features of Honda's organisation of production, because they are precisely the features introduced by Toyota during its reorganisations of the early-1990s. This points to some convergence of production organisations of automakers.

The labour process is less rigid than the precisely defined tasks at Toyota (this is what Toyota is moving to nowadays). Production is done in small lots of 30 to 60 vehicles, against lots of one at Toyota. Honda moved to smaller lot sizes in recent years in its Japanese plants. Honda also emphasizes the innovative uses of production technologies, with an important role of its subsidiary Honda Engineering.

Concerning production-market relationships, the range of models produced by Honda is much smaller than that of Toyota, because it has been centered on American style cars. Honda needs to develop cars more fitted to other markets. However, quality is maximised, as at Toyota. R&D plays a central role: the reputation of Honda was built on its innovative capacity and the firm is organised so as to stimulate engineers' creativity. This points to an important issue concerning innovation. Jacquemin (1996) argues that successful innovation results from innovation considered in all its dimensions; innovation is not only technological, but also financial, and, as stressed in this chapter, organisational. Thus the coherence of the firm's organisation is necessary for ideas to transform into commercial success.

## 5.1 Honda's organisation: a network

Honda's organisation has always been peculiar. Unlike other Japanese companies, Honda has never been part of a business group, and did not maintain close relationships with the government. Thus Honda entered the automobile market despite the strong opposition from MITI.

This policy of "difference" carried over to the organisational form adopted. Since 1945, the organisation has been characterised by:

- an "expert system" in which creative people are encouraged to use their skills, without any constraints from supervisors, thanks to a flat organisation;
- research focused on product activities in small teams, typically 2 to 10 people. Each team pursued competing technical solutions until the most appropriate was selected;
- incentives based on ability rather than on seniority, unlike other Japanese companies;
- flat hierarchy at top level: only three tiers of management, and a world organisation of activities. For instance, the sales manager in the American division reports directly to the manager of sales in Japan.

Honda has organised from the outset as a worldwide *web* of production facilities, in motorcycle production as well as car production.

Concerning the organisation of the divisions, Honda conducted some reforms recently. In 1991, Honda split its business divisions into three distinct operations: automobiles, motorcycles and power products. In 1992, the automobile business was split into four regional operations: Japan, North America, Europe and the Rest of the World. In 1994, another reorganisation was conducted, the whole Honda business being no longer split between the three distinct operations, but only between five main regions: the Americas, Europe, Japan, Asia and Oceania, and Middle East and Africa. The company is therefore

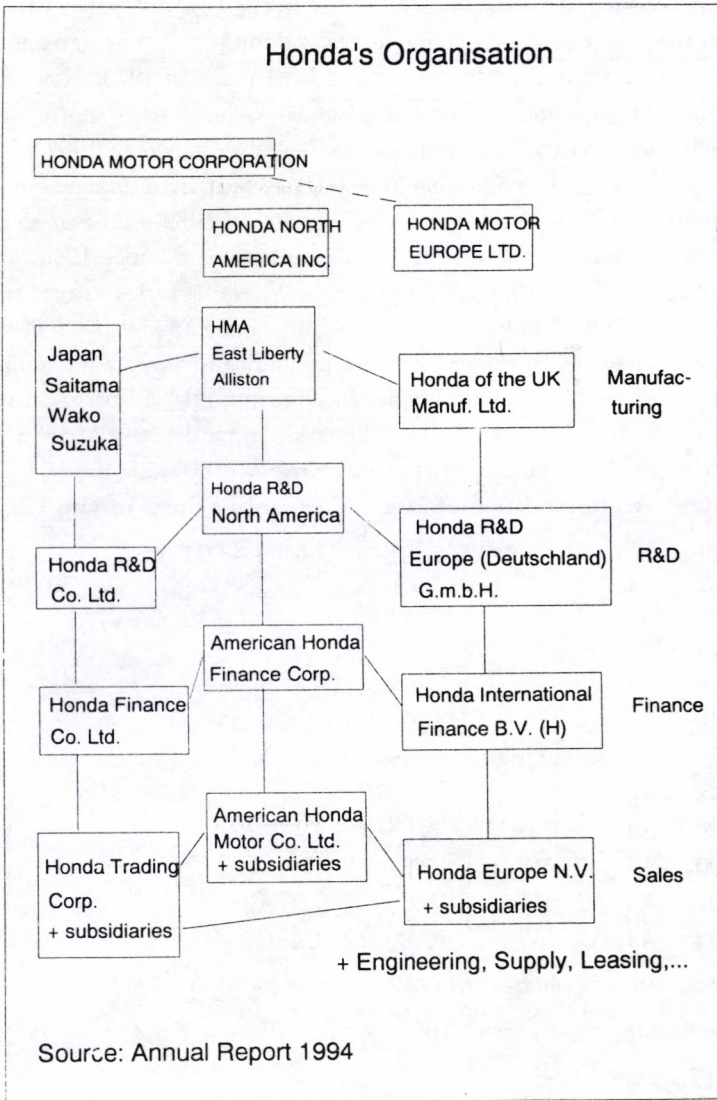
divided vertically by regions, but each regional activity (R&D, manufacturing, etc.) interacts horizontally with similar activities in other regions. Honda's organisation can be represented as in the following figure, outlining both vertical and horizontal information flows in the company.

The divisionalisation according to regions enables Honda to adapt products to local tastes. Honda has three main R&D centers worldwide, so that the local systems of Honda's global organisation comprise all key activities, from production, marketing, R&D, engineering, sales. For instance in the USA, Honda-USA is developing products specific to the American market, which are then sold elsewhere in the world. HRA (Honda R&D of North America, Inc.) conducts market research, product planning, design, making of prototypes and testing. Manufacturing is carried out by Honda of America Mfg. (HAM), which also manufactures more than 80% of the best selling Accord models sold in North America. Honda Engineering North America (EGA) develops the production technology used by HAM. In 1993 was launched the Civic Coupe, the third Honda car manufactured exclusively in North America, following Accord Coupe and Accord Wagon. This enables Honda to really integrate locally, so that it can both better understand local demand and fully exploit local resources, such as local engineers' competence.

Therefore Honda's organisation can be defined as a global network, where some responsibilities are delegated to regional units, and where interactions between units are encouraged. Units are therefore linked by many routes, unlike the centralised global organisation of Ford.

This also boosts creativity since the different poles share experience. Thus certain experiences of Honda's Anna engine plant in the USA, including in-house production of pistons and other engine components are unique at the American plant and have been transferred back to Honda's engine plant in Japan. This is evidence of reciprocal information flows between regions and of the setting up of local networks in each region.

## Honda's Organisation



## 5.2 Adaptation to local markets

### 5.2.1 Honda as fourth American producer

Honda considered establishing a factory in the USA as early as 1975, when the boom of the Civic model was taking place. The agreement on the opening of a car factory in the USA came in 1979. However, Honda's internationalisation started much earlier for the motorcycle branch, since its motorcycle plant in Belgium opened in 1962. The facilities for car manufacturing in North America are a dual assembly line automobile plant at Marysville, opened in 1982, and two single automobile assembly lines: one at Alliston Ontario (since 1986) and the other at East Liberty, Ohio (1989). These factories are characterised by a rapid model changeover and mixed model production. The American factories produce both small and large cars, unlike the specialised factories in Japan. In addition, all 4 factories in the USA are managed together. The allocation of models to the different factories therefore changes over time, as shown by table 8.

**Table 8. Balanced use of Honda assembly lines in the USA.**

Years	Marysville	Alliston	East Liberty
1982	A4		
1983	A4		
1984	A4		
1985	A4, A3		
1986	A4, A3, C4	A4	
1987	A4, A2, C4	A4	
1988	A4, A2, C4	C3	
1989	A4, A2, C4	C3	C4
1990	A4, A2, AW, C4	C3	C4
1991	A4, A2, AW	C3	C4, A4
1992	A4, A2, AW	C3, C2	C4, C2

*Source: Annual reports, Honda, compiled by Mair (1994).*

*(A = Accord; C = Civic; AW = Accord Wagon; 2,3,4 = number of doors).*

The decision as to which model should be produced in which factory

is made on a global basis. Thus in 1988 Honda was the first Japanese company to import some cars made in America back to Japan. The North American production facilities also supply 28 different countries, such as Korea and Taiwan, Israel, and Europe (since 1991). For instance the Honda Accord Wagon was developed by HRA, manufactured by HMA, and is sold in 6 European countries, including the UK, France and Germany, through Honda Motor Europe. Exports from North America to other regions were planned to almost double over the period 1993-94, from 42,000 units to 75,000 units<sup>27</sup>. Over the long-term, the factories will add or drop models according to demand in the different world regions. The domestic country therefore does not have exclusivity any longer, to the benefit of a decentralisation leading to a functioning as a network. The new organisational form that is claimed in this study to be emerging is therefore called a “network” form.

**Table 9. Honda’s ”Global Supply Network”**

<b>Plant location</b>	<b>Product</b>	<b>Countries supplied</b>
Japan	Accord, Prelude, Legend, Civic, Concerto, Integra, Today, City	All other regions
North America	Accord, Civic, Acura	Brazil, Italy, Portugal, Germany, Japan, Taiwan, Israel, Netherlands, UK, 14 others
UK	Accord, Concerto	All European countries
Asia	Civic in Pakistan	

*Source: Annual report, 1994.*

The table above shows the flows of product between regions. The major production base remains Japan, where almost all models of Honda’s range are produced, then sold both locally and abroad. The American production base manufactures the Accord and Civic mod-

<sup>27</sup>Honda annual report, 1994.

els, not only for the North American market but also for other markets, such as markets in Europe and South America. The allocation of models to the regional production bases is balanced in that models are produced where they are mostly demanded and then sold in other regions where some demand exists, thereby exploiting local resources and comparative advantage. The Accord model is produced in the USA, Europe and Japan: it is a "global-local" model in that the basic model (interior, technology) is common to all regions, but the exterior and the options may change in each region in order to adapt to local consumers needs. Some models are specific to some regions, like the Acura model in the USA and the small models Today and City in Japan. Similarly, a new European model is to be developed specifically for Europe, with some exports if needed.

The American pole is specialised in the Civic and the Accord, which are produced only there and exported to Japan and Europe. Honda launched a new model specific to the European market at the end of 1994. As a result, Honda's network is extended, enabling a better balance of the production of the various Honda models in different factories in the world, reducing the cost of overcapacity and allowing demand to be met rapidly. Honda has been very successful in the USA, because it developed cars specific to the American market. Honda cars became very Americanized between 1975 and 1985, both in size and styling. As a result, Honda became the fourth largest producer in the USA in the late-80s<sup>28</sup>.

### 5.2.2 The European experience

Europe is a very demanding market in that it is fragmented into many national markets. Honda's approach<sup>29</sup> in Europe was cautious: it entered through an agreement with a European producer, Rover. The agreement with Rover was a partnership based on mutual advantages, Rover benefitting from Honda's efficient system of production, while Honda benefitted from Rover's suppliers and distribution network.

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<sup>28</sup>Mintzberg and Quinn (1993).

<sup>29</sup>Explained by a manager at the Honda-UK head quarters in London, July 1994.



This agreement ended in 1994 with the purchase of Rover by BMW from BAe. Now Honda is starting to develop models specific for the European market.

Another pole for production of the flexible global factory of Honda will be East Asia, where Honda has been investing massively in the 1990s. All Japanese car manufacturers are investing massively in South East Asia, and Honda followed the move of its Japanese rivals. South East Asia is attractive for both short-term reasons (reaction to the move of rivals), and for long-term reasons: this market has a strong growth potential since it is still at early phases of development<sup>30</sup>.

In summary, Honda's organisational form is decentralised. It is divisionalised by regions, the managers of which are delegated not only operating decisions, but also strategic decisions, to the extent that these concern the local market. Each activity of the regions (R&D, marketing, engineering, etc.) is carried out in cooperation with the same activities in other regions. Hence communication flows inside the organisation are numerous and horizontal (across activities) as well as vertical (inside regions and from regions to the head office). The autonomy given to regional managers raises the issue of their control. Since the performance of the divisions (regions) are correlated, it is difficult for the coordinator (head office) to distinguish which regional managers performs well or not. The asymmetry of information existing between the regional management and the head office may result in moral hazard problems, whereby the regional manager does not report truly on its division's performance, which the coordinator cannot check. However, the horizontal information flows provide an additional monitoring that appears to solve the moral hazard problem. The director responsible for each product or activity worldwide can monitor regional managers. Moreover, the job rotation system enables higher levels to assess the ability of a manager, when he moves to different activities and different regions. In contrast to the traditional hierarchy, career prospects change. Promotion is no

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<sup>30</sup>The average annual growth rate of demand for passenger cars is expected to be 3.5 % in Asia, 5.7% in Latin America, 8.8 % in Africa and 9.9% in Eastern Europe, over the decade 1992-2002. (source: C.C.F.A., 1993).

longer by climbing the vertical ladder, but by accumulating skills and experience in job rotation.

Consequently Honda's organisation seems well fitted to the 1990s contradiction, that is the need to be global and local. The network of regional factories across the world enables Honda to adjust its mix of products to both the regions' needs and to the cyclical fluctuations of demand in the different markets in the world. This flexibility allows changes in demand to be detected and then met rapidly.

This organisational form may therefore be the optimal new form to adopt in the 1990s. Since both Ford and especially Toyota are also changing their organisations to include some of the features of this new form, (matrix form at product development level and flatter top hierarchy for Ford, decentralisation at Toyota), this might be the organisational model towards which car manufacturers are converging.

## **6 The emergence of a new organisational form**

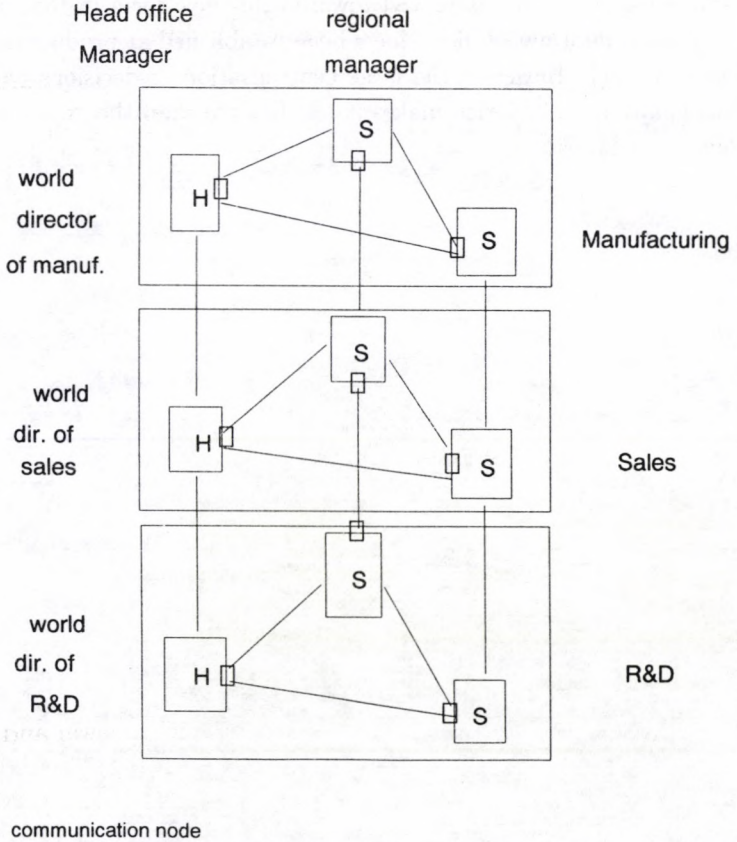
The change in organisational form resulting from the change in technology and resulting intensification of competition due to entry, is a multiplication of relationships, hence information flows, between functions, across product teams and across regions. The number of communication nodes is therefore increased, since information flows are horizontal (across units in the same hierarchical level) as well as vertical (across hierarchical levels). Hence a new organisational form can be defined that differs from the traditional vertical hierarchy and the multidivisional form. This new form can be called a "network" form since it is characterised by units or levels linked to other units or levels via different routes. Hence I define this as "N-form", "N" standing for network or new. This is represented in the figure below, and is a model of Honda's organisational structure. The main features of this form are:

- horizontal as well as vertical information flows;

- a flat top hierarchy;
- incentives based on ability rather than jobs, and job rotation rather than climbing the hierarchical ladder;
- decentralisation of local strategic decisions to regional units.

Ford's organisation has moved towards this new form in that some horizontal information flows have been established at product development level. However, the large centralisation of decisions on the headquarters in America makes it less flexible than the "new" form mentioned above.

## Horizontal and Vertical Flows in the N-Form



Toyota's organisation was characterised by horizontal as well as vertical information flows (relationships) from the outset. However, its global organisation was very centralised on the headquarters in Japan, and has recently started to be decentralised, with some strategic decision (R&D efforts) delegated to American facilities, and with the delocalisation of production even inside Japan. The need for creativity was recognized and incentives changed accordingly. For instance the pressure on workers has been reduced by a reorganisation of assembly lines enabling stocks and by a wage system no longer based exclusively on productivity improvements but also on skills acquired and teams' creativity.

Honda is a truly "global-local" organisation. Production is balanced across regions, decentralisation enables it to exploit local resources while horizontal and vertical information flows enable the head office to monitor the regional units, as shown in the figure below.

## 7 Conclusion

The analysis of the car industry therefore enables us to point out some links between firm structure and market structure. The shift to the flexible production system provided Japanese automakers with a cost advantage that led to their massive entry on American and European markets. However, after other producers adopted the new technology, Japanese automakers kept an advantage in terms of rate of product renewal and time-to-market. Beyond the change in technology, another factor determined a competitive advantage: the form of organisation.

The flexible production system is more a mode of organisation than an appropriable technology. At product development level, this leads to the matrix form of organisation, and Japanese producers entered American and European markets thanks to a cost advantage resulting from this new organisation at PD level. At top firm level, there seems to be a corresponding optimal organisation, characterised by horizontal as well as vertical information flows, wages attached to ability

rather than to jobs, a flat hierarchy and decentralisation of local strategic decisions to regional divisions: the N-form. The paper has shown that both Ford and Toyota have recently altered their organisation, introducing features that characterised the N-form. Honda was shown to be a typical N-form.

Compared with the traditional hierarchy, incentives change. In particular, promotion is no longer based on an assessment of individual performance, but of skills accumulated by rotating jobs in different teams and regions in the world. The incentives in the N-form will be investigated more precisely in further research. I model incentives of divisional managers to share experience in another work (Labory, 1997a), which could be extended to model job rotation and evaluation of skill accumulation. Labory (1997b) formalises the superiority of the N-form over the traditional multidivisional form when the flexible production system prevails.

The network exists not only inside the firm, but also outside. Car companies are linked by many agreements of joint production or joint research. These “strategic alliances” constitute another interesting topic to study in further research.

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