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CoCKEAS

FINAL REPORT

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Coordinating Competencies and Knowledge in the European Automobile System

CoCKEAS

Final report

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Preface

Within the Fifth Community RTD Framework Programme of the European Union (1998–2002), the Key Action 'Improving the Socio-economic Knowledge Base' had broad and ambitious objectives, namely: to improve our understanding of the structural changes taking place in European society, to identify ways of managing these changes and to promote the active involvement of European citizens in shaping their own futures. A further important aim was to mobilise the research communities in the social sciences and humanities at the European level and to provide scientific support to policies at various levels, with particular attention to EU policy fields.

This Key Action had a total budget of EUR 155 million and was implemented through three Calls for proposals. As a result, 185 projects involving more than 1 600 research teams from 38 countries have been selected for funding and have started their research between 1999 and 2002.

Most of these projects are now finalised and results are systematically published in the form of a Final Report.

The calls have addressed different but interrelated research themes which have contributed to the objectives outlined above. These themes can be grouped under a certain number of areas of policy relevance, each of which are addressed by a significant number of projects from a variety of perspectives.

These areas are the following:

• ***Societal trends and structural change***

16 projects, total investment of EUR 14.6 million, 164 teams

• ***Quality of life of European citizens***

5 projects, total investment of EUR 6.4 million, 36 teams

• ***European socio-economic models and challenges***

9 projects, total investment of EUR 9.3 million, 91 teams

• ***Social cohesion, migration and welfare***

30 projects, total investment of EUR 28 million, 249 teams

• ***Employment and changes in work***

18 projects, total investment of EUR 17.5 million, 149 teams

• ***Gender, participation and quality of life***

13 projects, total investment of EUR 12.3 million, 97 teams

• ***Dynamics of knowledge, generation and use***

8 projects, total investment of EUR 6.1 million, 77 teams

• ***Education, training and new forms of learning***

14 projects, total investment of EUR 12.9 million, 105 teams

• ***Economic development and dynamics***

22 projects, total investment of EUR 15.3 million, 134 teams

• ***Governance, democracy and citizenship***

28 projects; total investment of EUR 25.5 million, 233 teams

• ***Challenges from European enlargement***

13 projects, total investment of EUR 12.8 million, 116 teams

• ***Infrastructures to build the European research area***

9 projects, total investment of EUR 15.4 million, 74 teams

This publication contains the final report of the project Coordinating Competencies and Knowledge in the European Automobile System, whose work has primarily contributed to the area "The dynamics of knowledge in the economy".

The report contains information about the main scientific findings of CoCKEAS and their policy implications. The research was carried out by 14 teams over a period of 30 months, starting in March 2000.

The abstract and executive summary presented in this edition offer the reader an overview of the main scientific and policy conclusions, before the main body of the research provided in the other chapters of this report.

As the results of the projects financed under the Key Action become available to the scientific and policy communities, Priority 7 'Citizens and Governance in a knowledge based society' of the Sixth Framework Programme is building on the progress already made and aims at making a further contribution to the development of a European Research Area in the social sciences and the humanities.

I hope readers find the information in this publication both interesting and useful as well as clear evidence of the importance attached by the European Union to fostering research in the field of social sciences and the humanities.

J.-M. BAER,

Director

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Abstract

The European thematic network CoCKEAS (Coordinating Competencies and Knowledge in the European Automobile System [EAS]) was an attempt to analyse all of the structural changes that affected the EAS via an approach focusing on the new issues involved in coordinating the competencies and knowledge of the system's actors. Bringing together 13 research teams (including the GERPISA international network) from seven EU countries, CoCKEAS mostly looked at vertical relationships, intangible elements (finance, social usage) and changing geography of automobile production. Comparisons with other automobile regions (North America, Japan, the emerging countries) emphasised EAS distinctiveness. The following main findings reflect the sum total of the research output that was presented and discussed as part of the work that this thematic network achieved.

The automobile industry's entire value chain has undergone a profound reorganisation. The purpose has been to rationalise and improve the coordination of all of its activities, from whole vehicle design to final product manufacturing to retail distribution. Part of a move from a push to a pull logic, this change took place in an environment where greater differentiation and responsiveness became key constituents of competitiveness. ICT may have driven this change, but the diffusion thereof varied greatly from one area to the next and often encountered a number of structural obstacles. The reorganisation inferred a deep-seated restructuring of the relationship between car manufacturers and their suppliers, marked by an increasing delegation of design, production and module assembly functions to first tier suppliers. The move to modular production seemed particularly rapid in Europe. At the same time, the concentration that resulted from this new tiering led to the formation of worldwide oligopolies covering the main businesses, an outcome that increased the vulnerability of small and medium-sized enterprises.

Studies by the CoCKEAS network have highlighted the key role the services play in EAS competitiveness by consolidating its extremely dense fabric of design and engineering companies and due to the strategic importance of automobile sales and motoring expenses. This has also paved the way for a new research agenda inasmuch as it underlined the ever-closer interactions between the world of finance and the automobile sector whilst offering an analysis of automobile utilisation systems that could delve into these new challenges.

Lastly, work focused on two main elements in the European automobile area's new configurations. Although the opening to Central and Eastern Europe led to the appearance of a new type of territorial competition, this did not cause any massive

delocalisation to the detriment of EU member states. The reason lay with the mobilisation and coordination of knowledge amongst actors – a factor that reinforces the spatial agglomeration of automobile activities at both the design and production levels (supplier parks).

In-depth analyses of ongoing transformations in the EAS and comparisons with other major automobile regions have led to three main implications for automobile policy. Firstly, European technological policy supporting the automobile industry has to be strengthened. Secondly, to channel the territorial competition effects that will result from EU enlargement, assistance will have to be given to small and medium-sized enterprises: consolidating automobile regions, supporting the SMEs' cooperative capabilities and their internationalisation. Thirdly and regarding competition policy, the existence of a shareholder of reference is a guarantee of stability for car companies. It is important that this be consolidated without any concessions being made to the mirages of corporate governance and free capital market.

I. EXECUTIVE SUMMARY

1. Introduction

1.1. The automobile industry in a regime of permanent innovation

At the dawn of a new century, automobile firms again have to cope with major structural changes requiring them to reorganise their current production systems. This modification of the automobile industry's economic and social environment stems from three main factors:

- technological developments (specifically in microelectronics and ICT) in which reinforced innovation serves as a factor of competitive rivalry;
- the competitive process, marked by the double dimension of the new internationalisation phase and featuring an increasing number of mergers-acquisitions and alliances between the three automobile poles (Europe, United States, Japan) on one hand, and a reinforced regionalisation of the automobile system on the other;
- the institutional context, in reference to the relationships between the different actors in the automobile system, notably the governance compromise underlying the implementation of corporate strategies. Greater shareholder power and institutional investors' increased influence on corporate executives' strategic decision-making are partial explanation for some of the changes in the industrial system, and more specifically for the trends towards an increased externalisation of activities.

To cope with these new technological, economic and institutional challenges, the organisational forms that had allowed the auto industry to develop over the past 100 years needed to be reconfigured. During the 20th century the automotive industry was a matrix for new productive models (Fordism, Sloanism, Toyotaism, etc.) that gave birth to many organisational innovations that would later spread to other sectors of economic activity. Today, the deep-seated and rapid developments that have taken place within this sector underline the need for reactive forms of productive organisation within a permanent innovation regime in which new knowledge necessarily derives from the mobilisation and combination of diversified competencies.

1.2. The methodology

The analytical framework we are suggesting is an all-encompassing one, the idea being that the automotive industry should be analysed at the system level as a whole. This means that analysis should not only cover carmakers but also components makers, who produce about 60% of a car's value. This is because the coordination of competencies and knowledge in design, manufacturing and assembly between carmakers and their suppliers has become a critical issue for the automotive system. In addition, we should also go beyond a purely manufacturing-oriented perspective focusing solely on tangible production and integrate all of the immaterial activities that make such a telling contribution to the dynamics of automobile production, including new car sales financing and services inferring the existence of new competencies to be mobilised and coordinated.

The dynamics of a given system are basically determined by the way its activities have been co-ordinated. Co-ordination can be organised according to three basic economic principles: the market; the firm (hierarchy); and co-operation. In a permanent innovation regime, co-operation tends to become the main method of automotive systems coordination. As such, analysis should no longer focus on the firms themselves (and particularly on car manufacturers) – instead, it should inspect the system's overall inter-firm relationships.

1.3. The aims of the CoCKEAS project

Respecting this methodological framework, the CoCKEAS research project studied ongoing structural changes in the European automotive system by emphasising five major dimensions thereof (each corresponding to a project work packages). These will be analysed below.

Firstly, a study was made of the changing relationships between carmakers (or Original Equipment Manufacturers [OEM]) and First Tier Suppliers (FTS), with the latter group having played an ever-greater role in designing and manufacturing motor vehicle subsystems. Coordination of OEM-FTS relationships, during both their design and production activity phases, is a key part of the on-going transformations in the European automotive system.

Secondly and above and beyond this one relationship, it is important to also account for the other actors (lower tier suppliers, engineering companies, distribution networks, etc.) that help to determine the European automotive system's economic performance.

In addition to these productive transformations, analysis of the automotive industry's immaterial dimensions (and notably the relationship between the world of finance and automobile manufacturing) paved the way for a new research agenda that could be particularly interesting in the light of the current debate on the financialisation of the world's economies.

A fourth point focuses on the relationships between these structural changes in productive organisation, and on how they affect the geography of automobile production in Europe: expansion towards the countries of Central Europe and/or on a regional scale; and agglomeration/clustering dynamics.

Lastly, comparing current changes in Europe with automobile industry developments in other parts of the world helped us to identify the distinctiveness of the European automotive system, as well as the competitiveness advantages and handicaps that are associated with it.

In conclusion, based on the work carried out by the CoCKEAS thematic network we will be able to deduce the main implications for European automobile policy.

2. Changes in the OEM-FTS relationship

2.1. Recent trends

In the 1980s, belief in the Japanese automobile industry's competitiveness led Western (North American and European) carmakers to wonder openly about what sort of relationships they should be maintaining with their suppliers. Supply relationship management seemed to be one of the foundations of Japanese competitiveness. Furthermore, the transition towards a permanent innovation regime caused the FTS to take on a new role in new vehicle design. To enhance economic performance (costs, quality, delay) and innovation management, carmakers, inspired by Toyota, introduced new supply relationship management methods involving the development of forms of cooperation with fewer suppliers, each of whom was expected to possess strong technological and organisational innovation capabilities and be capable of undertaking ever-greater responsibilities.

The 1990s featured a new step in the automotive industry's long-term internationalisation drive, one that was associated with globalisation and with the reinforcement of inter-firm competitive rivalries all across the world (marked by a proliferation of mergers and acquisitions, both for the OEM and the FTS). This was also a time of strong internal growth, based on crossed external direct investments between automobile regions. A rationalisation drive that was already underway began to take on a new strategic dimension insofar as it was now guided by the search for a closer relationship to the market, something that involved setting up new relationships with end-users (*make-and-deliver-to-order* approach). This meant that all automotive system interactions had to be restructured, from whole vehicle design to final product manufacturing and distribution to drivers. Whereas up until this point re-organisations had mainly affected firms' internal management organisation, this new strategic rationalisation drive centred on inter-firm relationships and on coordinating activities within the automotive system. Asides from exacerbating competitive rivalries, due to pressure from institutional investors globalisation also entails a search for greater financial profitability. This caused firms to focus on their core businesses inasmuch as this constitutes the source of their competitive advantage. It also led them to externalise activities for which other parties, notably the FTS, had an advantage in competencies and scale economics. This is why carmakers/OEM delegated to the FTS the main systems and modules design, production, preparation and delivery, as well as the management of relationships with lower tier suppliers.

This trend translated into several significant developments:

- greater outsourcing, with activities being sold off to specialised suppliers (i.e., foundry or bearings operations) and even a spin-off of equipment making subsidiaries (Delphi for GM, Visteon for Ford, Magneti-Marelli asset sales for Fiat);

- FTS concentration as the OEM began to deal directly with fewer and fewer suppliers whilst delegating ever-increasing responsibilities to them;

- more co-design, with the FTS being associated in the first stages of a vehicle's design, helping to define its subsystems and main equipment by interacting closely with the OEM;

- platforms that were shared and designed to serve as a basis for several differentiated car models. With the OEM sharing the main components and a common product architecture, the product range could be broadened, due to economies of scope;

- system integration and modularisation, with FTS having to design functional systems capable of fitting in with the vehicle's modules (physical integration) or some of the elements thereof. The twinning of functional and physical integration[1]

[1] [1] A *module* can be defined as a collection of components that are assembled and supplied as a single unit, whereas a *system* is a set of components interfaces or software that performs a key function in a vehicle (see the

created difficult interfacing problems that firms tried to anticipate within a general co-design framework;

- the advent of supplier parks and consortiums, with FTS agglomerating in the vicinity of assembly sites in order to prepare their modules at these locations;

- global sourcing. The search for improved value-for-money gave birth to a global sourcing of components that could be assembled into the modules in the immediate vicinity of assembly plants. North American components makers participated extensively in this trend, acquiring European firms or setting up green field plants in Eastern and Central Europe. Reciprocally, European components makers reinforced their presence in the United States, in emerging countries and even in Japan.

2.2. The impact of ICT

These trends were given a second wind by the recent diffusion of ICT, which broadened the potential for informational and operational integration all throughout the supply chain. The ability to exchange information amongst the system's various actors rose by a factor of 10, in terms of the mass, precision and speed of the information being processed. The much-desired transition from a push to a pull logic found new relays, and the ability to coordinate an entire chain of actors efficiently became a major strategic issue. Network relationships started to replace previously hierarchical relationships, and the link to the final market (the client) came to be viewed as the driver behind the supply system. The existence of an integrated information flow (EDI) was assumed even before that of an integrated production process.

But the generalisation of e-commerce (B2B, B2E, B2D, B2C) raised a number of issues. The diffusion of these technologies clearly was catalyst for change in OEM-FTS relationships, but the effects thereof were ambiguous. In fact, a distinction should be made depending on the nature of the component in question. Whereas the outlook for B2B seemed to be quite promising for standard components that could be purchased via a catalogue, it was not nearly as good for specific components, notably for items being co-developed by a car manufacturer and a FTS - actors that continued to face an

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CoCKEAS glossary). Modules infer the existence of the kinds of constraints that typify the development of a new product architecture, involving an alignment of otherwise divergent design, manufacturing, logistics and after-sales service requirements and perspectives. All too often, an assembly module does not "fit" the corresponding system module (one example being the cockpit, a physical unit that has to account for structure, appearance, safety [airbags], and HVAC functionalities, all at the same time): The best exception to this rule is the seat, whose physical structure and conceptual function perfectly overlap.

abundance of technical or economic obstacles, but who were nevertheless supposed to be the drivers behind the innovation capabilities that had become so key to modern competitiveness. In short, it became quite difficult to assess the potential cost savings from B2B (supposedly the result of greater price competition) and from the diffusion of these technologies, especially since a number of barriers remained in place. It is important to relativise the overly enthusiastic vision of some observers and not to under-estimate the impediments blocking the dissemination of such tools. Building-to-order (BTO) kinds of approaches and the computerised manifestations thereof have all stumbled over big problems, relating to logistics and to the organisation of production. Because of all these hindrances, an approach of this sort seems nowadays to be more of a case of mobilising the sort of managerial concept one could use to improve some of the catalogues' availability indicators than a representation of future production systems.

Far from a generalised diffusion of such tools, what we should be predicting is a diversity of modalities that will vary depending on the nature of the component in question. Uncertainty raises firms' propensity to experiment. Moreover, rivalry between carmakers and suppliers (to see who can control these tools) is conducive to the proliferation of e-commerce platforms. Selectivity will probably mean the organisation of fewer experiments, but we can also expect a whole range of diverse configurations to materialise, especially since carmakers' strategic orientations are far from being homogeneous in this area.

3. Other EAS actors

Although OEM-FTS relationships do lie at the heart of current EAS restructurings, it is important to account for the new relationships that the OEM and FTS have developed with other actors in this system, both upstream and downstream.

3.1. Upstream activities

The supply chain's upstream restructuring has had a direct impact on suppliers operating at tiers below the FTS, who have passed their increasingly stringent OEM demands on to their own suppliers. The consequences of this restructuring included greater design and innovation capabilities and thus new competencies; internationalisation (hence investment) to keep up with one's customers; a permanent reduction in prices/cost; inclusion in a logistical chain, etc. Suppliers, often family-run companies, were facing very difficult adaptation problems even as FTS were choosing an increasingly limited number of companies to satisfy their demands.

On one hand, the SMEs found it difficult to develop their technological and organisation capabilities. They were given an incentive to develop forms of cooperation, creating regroupings so as to be able to offer their customers a global product range. This presupposed the emergence of new and doubly cooperative modes of coordination, both amongst the SME and also with their customers. On the other hand, this restructuring occurred in a context of great financial vulnerability for the SMEs. Capacity and productivity investments infer being able to access financial resources, but this is not always a straightforward proposition and due to their indebtedness SMEs will often suffer from cash flow problems whenever a carmaker postpones its model launches, something that occurs more and more often due to technological (i.e., electronics control), coordination or economic uncertainties. This delays their receipt of the funds that will allow them to pay for the investments they have made. In this sort of environment, rationalisation led to an intensive bout of mergers-acquisitions and alliances, deeply changing the landscape of the European automotive system, especially since American (and even Japanese) multinationals were taking advantage of these opportunities to consolidate their presence in Europe.

Other actors further upstream were hit by these restructuring efforts, notably capital equipment and materials suppliers with products that were delivered directly to car manufacturers and components makers. This group was also given an incentive to contribute to the innovation policy and work together with clients (on a cooperative basis) in defining new processes and products by coming up with technological solutions that could integrate the new functionalities (i.e., constraints like lighter and safer materials). This meant that they had not only to cut their prices but also to accept more risk, not only relating to their R&D efforts but also market risk. Note that multinational firms (robot producers like ABB or steel and glass companies) are often the only ones capable of coping with the new technological, economic and financial challenges.

The same cannot necessarily be said about the service providers that were trying to take advantage of the opportunities offered by the ever-greater externalisation of activities. The EAS is characterised by the very high density of its engineering and design (styling) firms. These companies have been taking responsibility for a growing proportion of the design activities that manufacturers have been subcontracting out due to the rise in the number of models they offer (hence in the number of projects to be organised). This industrial fabric, mostly comprised of medium-sized firms (like Pininfarina) and even micro-companies, has made a major contribution to the European automotive industry's increased competitiveness, thanks to its specialised technological competencies (i.e., in mechanics) and intensive interactions with the European market (i.e., styling firms). Some (like Matra Automobiles) also took on a manufacturing activity such as niche vehicle assembly and were tempted to expand their competencies in order to be able to cover a wider spread of activities. By so doing they almost achieved a car manufacturer status. The market's ever-greater segmentation offered niches where these actors could hope to position themselves.

The situation was more heterogeneous for the other commercial services to car companies, notably logistics and e-commerce. For example, the externalisation of logistics, which became a strategic factor in coordinating an automotive system's production activities, benefited those multinationals in this sector that were in a position to offer a global product range; and which wanted to take on new functions. Similar to an FTS in this respect, they relegated transporters to a lower tier subcontractor's role. The diffusion of ICT creates a confused situation marked by a proliferation of e-commerce firms (marketplace managers, Access Service Providers, suppliers of e-commerce software, etc.) due to the uncertainty in this area (see above, 2.).

All in all, the main changes in the upstream system corresponded to (1) a reinforced competencies transfer trend, (2) the continuation of suppliers' concentration trend, notably via mergers and acquisitions, (3) a generalisation of modularisation and commonalisation strategies, (4) the entry of new actors, and finally (5) diversified activities and actors and a significantly more complex system. At this level, we should be able to verify the transition from a hierarchical sort of industrial organisation to one based on networks and involving a more intensive type of integration, as well as generalised interdependency.

3.2. Downstream activities

Restructuring efforts at a downstream level were just as intensive, whether this involved distribution, relational digitalisation, automobile repair or recycling. This was the result of three driving forces:

- strategies pursued by the automotive firms (manufacturers and components makers) and by new entrants (i.e., distributors and computer or telecommunications companies) trying to affirm their control and capture potential rents in these fields;
- technological change, with a greater role for electronics and the diffusion of ICT;
- European policy, notably automobile distribution and environmental regulations.

The changes introduced in 2002 in the regulatory framework for automobile distribution will accelerate the reconfiguration of a sector already prone to the effects of inter-agent interactions and economic and technological developments. Encouraging traditional actors (dealers) to concentrate meant affirming the role of the major multi-site and multi-brand diversified internationalised groups (like Jardine, Inchcape or D'Ieteren), with manufacturers trying to rationalise their networks and homogenise their practices. It was also with this in mind that from the late 1990s onwards many actors were persuaded to assume control of some of their outlets via a process of subsidiarisation. Observers over the past decade have frequently referred to new actors' entry into the automobile distribution (retail, e-commerce) market, but this was somewhat anecdotal in reality. Furthermore, the new regulations (and more specifically, the separation between sales and after-sales that has replaced the "natural link" which carmakers were once able to get the market to accept) mean that it is more crucial than ever for automakers to figure out how they are going to control their commercial outlets and defend their consumer brands. In a sense, renewed forms of association between a whole set of commercial services (sales financing, insurance, after-sales service, maintenance, vehicle recalls, used car repurchases, etc.) are forcing the manufacturers into a head-to-head competition with any other candidate desirous of supplying customers with a whole range of general services. Automakers were already struggling to keep up with (the slow) changes in user modes and were offering forms of long-term rentals as a substitute for vehicle purchases, or else adaptable arrangements (i.e., possibility of several vehicles being made available) varying according to people's mobility requirements. Manufacturers are not the only ones to be positioning themselves thusly at present – nor will they be the only ones to do so in the future.

As such, automakers have had to rationalise their retail networks, cutting their high distribution costs and finding other arguments to dissuade potential competitors from entering these lines of businesses. The rationalisation trend encouraged concentration in the retail sector and diffusion of ICT as companies tried to exploit their polyvalent networks in such a way as to be able to offer customers a whole menu of services - something their competition would find difficult to match. For example, one of the manufacturers' main advantages is that they can repurchase a used car as part of a new vehicle sale. Based on specific competencies instead of on (rapidly dissipating) regulatory protections, this type of advantage was supposed to drive a reconstruction of brand policies that would in any event have led to a diversification of commercial approaches and an acceptance of the idea that the customer interface role should be shared with other service providers. Note that under the new distribution regime, the direct link to consumers could dissipate, causing leading OEM to lose some understanding of consumer needs, thus necessitating new competencies to avoid such problems.

With this in mind, vehicle customisation is seen as one way for manufacturers to leverage their advantage, thus reinforcing the pull logic that assumes that the production process first starts when the customer orders his/her vehicle. Instead of having to sell the vehicle products that the OEM were forcing on the market at just any price (a system based on offering discounts, thus further eroding already mediocre profit margins), the distribution network is supposed to intervene in a more active manner. It remains that the difficulties inherent to an ideal "built-to-order" system, on one hand, and the relatively standardised and foreseeable nature of most customer demand on the other, persuaded the carmakers to give up on their excessively ambitious earlier goals, like being able to deliver vehicles only 3 to 7 days after they were ordered. Where requested, vehicle specification (customisation) could become the responsibility of the distribution network, or even of the logistical firms in charge of ensuring the new vehicles' transportation from assembly plant to dealer room.

With regards to maintenance and repairs, carmaker networks had to cope with the rise of specialised actors, and in particular with the rapid and cheap repair chains that they tried to counter through acquisitions (Midas Europe by Fiat via Magneti Marelli; Kwik-Fit by Ford before it was resold in 2002) or by building their own networks (Renault's launch of the Car Life rapid repair chain).). Recent modifications in European automobile distribution regulations are doing away with the two rents that the carmakers and their networks had been enjoying. On one hand, carmaker networks are losing their rents on spare parts, whose sales generated substantial profit margins. On the other hand, the regulatory modifications are also forcing carmakers to compete with independent repair shops on after-sales service and maintenance, despite the fact that vehicles' ever-greater electronic content infers specific equipment and competencies and therefore constitutes an entry barrier.

Finally, at the other end of the product channel, the new European regulatory framework covering recycling end-of-life vehicles have introduced just as great an upheaval in this area, with new technological and organisational competencies being mobilised and encouraging the emergence of new actors (or at least a change in the status of existing ones) as well as new forms of coordination between these actors and manufacturers - one example being the local inter-manufacturer cooperation modalities that make it possible for this group to cope with the new constraints.

4. The intangible dimension

No study of the European automotive system should be limited to a productive system approach alone. As is the case with other sectors, the service dimension has become more and more important in the automobile branch, leading to a search for new competencies, and it appears essential that two other factors be taken into account when assessing current transformations; the financial system's influence on this industry; and automobile usage systems.

4.1. The challenge of financialisation

The 1990s were marked by the financial sphere's rising imprint on firms' industrial strategies. As such, it is legitimate that the effects of greater shareholder power (featuring the semi-ubiquitous presence of institutional investors and the diffusion of shareholder value principles) on European firms be studied by focusing on car manufacturers.

The first conclusion of the studies that our network carried out on this issue was that European carmakers did not hit the profitability targets the financial community had set for them (ROCI of 12%-15%), staying on average in a range between 3.7% and 7%. The intensity of the competitive pressures (and notably price-competition) forced manufacturers to keep tight margins. As a result, economic profitability stayed within the sector's customary norms.

The 1990s were characterised by increased pressure from financial markets and institutional investors, but this does not seem to have undermined the main compromises characterising this sector. On one hand, it would be tenuous to conclude that the relative weakening of the labour unions is what caused shareholder domination - after all, and even though the unions were unable to block carmakers' outsourcing and internationalisation drives, these were sometimes negotiated in an environment that remained generally favourable for employment. Indeed, an increased number of people working directly for OEM (except Fiat), a sustained rise in real wages and a whole series of social advances (like shorter working hours) could generally be observed. Whereas in some countries, like France, Italy or England there was a manifest weakening of union power in the 1980s, in others (i.e., Germany and Sweden) labour unions remained ubiquitous partners in defining corporate strategies. The relative stability of this compromise, which did not preclude occasionally significant changes, was to a certain extent the doing of the European carmakers' main shareholders.

The institutional investors were more frequently such firms' domestic industrial partners than ad hoc foreign investors. Foreign (notably North American) investors had only a small participation in carmakers' equity, always less than 10%, and domestic investors remained the dominant ones. This lesser presence of foreign investors reflected the fact that European carmakers' capital structure hinders hostile takeovers (thus rapid capital gains). This is because of the frequent presence of a "shareholder of reference": the State for Renault and Volkswagen, the founding families for PSA, Fiat and BMW and

Deutsche Bank for DaimlerChrysler. The European carmakers' exposure to the financial (stock) market has therefore been a limited one.

Even though this helps us to understand why like other firms carmakers converted to the principles of shareholder value, improving their financial communications, introducing stock options or selecting investments that were more rigorously geared towards economic profitability criteria (thus reinforcing the externalisation trend), the real impact of these principles was hard to see in the short run. In any event, and whatever analysts have said, the automobile industry remains characterised by the need for a multitude of compromises that will help it to organise incentive-based coordination mechanisms for all of its actors: with employees and unions to ensure the regularity and quality of production; with retail networks and dealerships to consolidate the direct link to the customer base; with suppliers and components makers to maintain and consolidate their innovation capabilities and economic performances; and finally within the firms themselves, to resolve conflicts between their different departments. A configuration of this sort precludes the exclusive domination of financial criteria, especially if they are short-term oriented and even if certain institutional investors maintain a presence only in order to be able to take advantage of whatever profit opportunities may arise (i.e., Porsche).

It remains that carmakers have been seeking new profit opportunities for themselves and for those who invest in their distribution activities. New vehicle profit margins having been squeezed, manufacturers have had to build up a greater presence in customer services.

4.2. Services as a new source of profit: user systems

In actual fact, new car sales only represent a small share (less than 25% in France) of total household motoring expenditures. This has had a tendency to fall relative to other automotive spending items, those where customers are able to acquire supplies from sources differing from the ones carmakers and their networks might offer them. As such, for carmakers that want to develop the ability to capture this other type of spending (starting with credit financing or leasing), this is an interesting but problematic proposition. Note the jump in the activity levels of carmakers' captive credit companies, which nowadays finance from 25% to 40% of new car sales for PSA, VW, BMW and Fiat. This has generated new profits, but is also likely to increase such firms' vulnerability by adding to their dependency on the bond markets where they borrow the funds to finance these consumer credits and leasing deals. In other words, by acting thusly carmakers are increasing their exposure to interest rate volatility and to variations in their credit ratings (see Fiat's problems in summer 2002).

In addition to financing, carmakers have begun to offer packages that include financing, insurance and after-sales service provisions. This has evolved towards proposals that are tantamount to a "mobility service" offer. They have been forced to redo the range of services they offer in order to cope with recent changes in the automobile distribution exemption regime, which have destroyed the rents they used to enjoy (c.f., above). In the future they will have to learn how to extend their competitive watch capabilities, which have traditionally focused on their rival manufacturers, so as to keep an eye on other service suppliers coming out of areas like distribution, banking, insurance and rentals.

One of the main justifications for reforming the block exemption regime is the expectation that new car prices will fall as a result of greater competition, thus benefiting European consumers. This raises a few questions about distributive justice issues. Analyses should focus specifically on people's motoring expenditures, notably those of the more underprivileged social classes that rarely entertain direct relationships with carmakers since they usually buy used and relatively old vehicles that they have acquired outside of a carmaker's dealer network and which they get repaired or maintained by an independent operator. Thus, if the structure of household spending on consumption is taken into account, what we get is an upside-down image, with wealthier households devoting a large part of their automotive budgets to new vehicles purchases whereas the other types of expenditures (fuel, maintenance and repairs) are more predominant for the least affluent households.

In the societies we live in, the dearth of public transportation, notably in the out-of-town neighbourhoods where the poorer households live, often force people to become car owners so that they can get to work and have some sort of social life (go shopping in hypermarkets, etc.). A symbol of freedom in individual travel, the automobile is also constrained by the need for social inclusion. Not owning an automobile is synonymous with exclusion. As such, cars generate an obligatory type of spending whose breakdown and structure can vary greatly. Analysis of such issues needs to be developed with respect to their social cohesion implications.

In actual fact, automobile firms and their networks have a higher profit margin on product utilisation items than on new vehicle sales. This suggests that in the current configuration, the "poor" are paying for the "rich". If this were to be confirmed by more in-depth studies (the present analysis only touches upon the French situation), this paradoxical result would tend to indicate that another effect of the distribution regime reform will be a lessening of the social inequalities that up until now have been compounded rather than mitigated by indirect taxation and the structure of property rights.

5. The new geography of the European auto industry

Along with the enlargement of the European space, these rapid transformations in the automobile industry's productive organisation have affected the sector's geography in Europe. What we are witnessing in these new geographic configurations is a double extension (enlargement) and intensification (through the spatial agglomeration of activities) movement.

5.1. Enlargement towards new areas

The opening up of the automobile industry to Central and Eastern European Countries (CEEC) is one of the main developments of the past few years. Both vehicles manufacturers and suppliers have made major investments in this part of the world (notably in Poland, Hungary, the Czech Republic and Slovakia, as well as in Turkey) seeking new markets and production locations that offer a skilled and cheap workforce to produce vehicles and components featuring a level of technological complexity that is often relatively low (small cars, light commercial vehicles, generic components). However that these countries have moved very rapidly up the technological learning curve, thanks to their local workforce competencies and competitive domestic market rivalries, factors that have forced manufacturers to offer up-to-date models. Of course, the fact that these countries now produce models destined to be sold in the EU market plus the opening of OEM and components maker technical centres have raised fears that a number of automobile production activities will soon be delocalised away from Europe's Southern regions, and even from its very heartlands, to these new peripheries. Three arguments relativise this threat.

First of all, some regions' spectacular breakthrough (Germany's Eastern *Länder*, Hungary) should not make us forget that others (like ex-Yugoslavia or Romania) have regressed. Although current investments (i.e., Renault's stake in Dacia) make it seem like the automobile industry has been developing well in these markets, we should also consider the highly unstable and volatile nature of growth in these zones, regardless of the generally optimistic predictions (i.e., expected 2010 sales of 2 million vehicles vs. fewer than 1 million in 2001). In just a few months these markets can collapse by more than 40% (Poland, Romania) or even 60% (Turkey in 2001). Turkey's recurring difficulties in consolidating growth over the past few years should lead to lower growth rate predictions for this part in world.

Secondly, although this opening up to the East may have seemed like a threat to the automobile industry in the Southern European countries, notably the Iberian Peninsula, which has experienced strong growth ever since Spain and Portugal entered the EU; even though it is true that certain activities (notably ones relating to the production of generic components) have been delocalised towards the East, with a further enlargement towards the Mediterranean Basin (i.e., North Africa) remaining on the cards; and even if Spain and Portugal's price-competitiveness has diminished – it remains that the Iberian countries' ability to develop new competencies, notably in technological activities, has enabled them to put up a strong resistance against competition from CEEC. Iberian automobile output rose by more than 1 million vehicles between 1990 and 2000; Spain is now Europe's third largest producer of passenger cars and its leader for light commercial vehicles.

Thirdly, Europe's automobile industrial heartlands no longer seem under threat from CEEC. The "blue banana" continues to account for most high-tech activities in areas like styling and research, and is still in charge of producing most top-of-the-range vehicles and complex components. Both Germany and North France have recently benefited from the establishment of new assembly sites, including for small cars. Times have been hard for British automobile industry (due in part to the fluctuations of the £ vs. the €), but this branch has been strengthened by the Japanese carmakers' arrival in the UK. In many countries and in a number of differentiated forms, automobile firms have been negotiating with employees or forcing them to accept new modes of work organisation that increase productive flexibility.

5.2. The location of automobile activities in Europe

The location of automobile production activities in Europe has been affected by a double trend:

- specialisation, reflecting actors' desire to benefit from the opportunities offered by the markets' greater openness and by enlargement towards new zones;
- the spatial agglomeration of activities (clustering).

The regional automobile system's integration process has led to increased international and interregional trade within Europe by encouraging greater production specialisation. This latter factor is particularly apparent in analyses of car manufacturers' assembly plants, both because of the platform strategies being pursued, and also due to the way in which carmakers choose their locations in the light of a given host region's particular characteristics.

Globally we can observe the reproduction of a strong hierarchy between European regions. Technologically complex activities (design, production of top-of-the-range vehicles and sophisticated subsystems) are localised in the central core regions of Europe's industrial heartlands (the "blue banana") whereas more generic activities are spread across the Continent. We can also observe a specialisation of the peripheral countries, notably in Southern and Eastern Europe, which have moved towards the production of small cars and light commercial vehicles. Of course, the peripheral region's new functional hierarchy will be less stable than the preceding configuration had been wherever this only involved the assembly of obsolete models and simple products. The new regions have progressed rapidly on the learning curve and thus started to attract activities that can be quite complex (i.e., Audi in Hungary, Styling in Spain). This has marginally modified their overall positioning in the system. However, a permanent innovation regime also entails constant technological change and more specifically an integration of electronics, something that has tended to reproduce and consolidate dynamically the hierarchy of the spatial division of labour.

It remains that this permanent innovation regime has opened the door to a new phenomenon marked by a spatial agglomeration of activities within the automobile regions. The growing and renewed complexity of functions like design or automobile production has encouraged actors to regroup whatever activities are supposed to be coordinated, plus proximity has become a strong argument in favour of developing a multitude of modes for the coordination of competencies and knowledge amongst the different actors. Spatial concentration is also observed in both design activities (with a concentration of R&D in techno-centres located in major urban areas) and in the manufacturing activities themselves. The proliferation of suppliers' parks around the assembly plants, and even the installation and direct intervention of suppliers on carmakers' sites (i.e., MCC in Hambach) attests to this co-location, which has been associated with the development of a modular production system that allows actors to manage the variety of the models being assembled. The effects of this trend should not be over-estimated, notably in employment terms, since they often involve subsystem (module) pre-assembly activities, and even inventory management.

6.The distinctiveness of the European automotive system

Whereas in the early 1990s some observers worried about the European automobile industry's competitiveness and about its ability to resist the rise of the new Japanese champions, it would appear that the structural changes which this branch has gone through over the past decade have enabled its firms, and notably its manufacturers, to consolidate their positions not only in their local regional market (stagnation of Japanese market share, financial losses by American subsidiaries) but also in other markets via alliances or mergers (in particular the Renault-Nissan alliance and the Daimler Chrysler merger). Is this re-found competitiveness based on some specificity of the European automotive system? We can study this question by looking at the market itself, and at its productive organisation.

6.1. The specificity of the European automobile market

When we compare the European market to its main rivals, we see that its specificities are the mirror image of the limitations of globalisation, in the sense that certain segments that are important outside of Europe are marginal there: in the United States light trucks represent nearly one-half of automobile sales (vs. less than 5% in Europe); and mini-cars are very present in Japan (30%). The European consumer expects a model that is different both in terms of design and technical characteristics (with diesel motors being very important and accounting for 43% of the market). As a result, vehicles sold in Europe differ from the ones being sold in the other Triad markets. Moreover, as regards their design capabilities European carmakers continue to benefit from a strong competitive advantage.

This competitive advantage is not only limited to automakers. It pertains to all actors, including FTS, niche specialists or knowledge-intensive services. In fact, this is one of the singularities of the EAS, i.e., the presence of a fabric of medium-sized firms that offer highly developed technological competencies, not only in the luxury car/sports car/racing car niche (like Ferrari) but also in support of the major European carmakers' design and small series production activities. These engineering companies have played an ever-greater role in helping manufacturers to rapidly expand their vehicle product range. They have done this by mobilising external competencies, i.e., by externalising the aforementioned types of activity. Hence they have helped to strengthen design capabilities, something that seems to be one of the foundations of the European automobile industry's overall competitiveness.

6.2. An alternative European production system?

In production system terms, many of the concepts that have attained a paradigmatic status in the automobile industry are non-European in origin. This is true for Fordism and for Toyota-ism and can be applied in all areas, ranging from production organisation to supplier relationships and product development. Even modular production, a domain ostensibly led by the European automobile industry, draws its inspiration from modes of productive organisation in other sectors (notably the computer industry) and is mostly experimented with in other locations (Brazil, Central and Eastern Europe). Even if the emergent productive model is not an original one, the specificities of the practices being implemented raise questions about the two possible foundations for a cooperation-based European model: work organisation; and supply relationship management.

Regarding the work organisation, Europe has been a place of experimentation in finding ways to overcome the limitations of Taylorism, even to eliminate the assembly line. Sweden has played an important role in this area, specifically Volvo which since the 1970s and until its Uddevalla experience tried to enrich and redo its tasks in such a way as to humanise work by developing semi-autonomous groups and inventing forms of labour that were free from the constraints of production line rhythms and capable of galvanising operators' thinking power. There is little doubt that this path did not lead to an ostensibly original type of configuration, even though it did encourage the introduction of new practices like modularisation.

Regarding the supply relationships, note first of all the singularity of Europe's equipment making industry, with the presence of suppliers that are relatively independent from manufacturers and therefore oriented towards a number of different clients (unlike the historical link between Ford-Visteon and Toyota-Denso, for example). This is true for large FTS multinationals like Bosch and for medium-sized family companies and small firms. This being the case, the European automobile industry has gone through a marked change, moving towards a type of modularisation and specialisation which infers cooperation between firms. The delegation of design and module preparation activities to FTS seems to have been particularly advanced in Europe, due to labour union resistance in the United States and the general reluctance of the two main Japanese carmakers (Toyota and Honda), who wish to remain in control of their value chain. Although the US and Japan have changed somewhat, in particular under the impetus of more modularly oriented carmakers like Nissan, and even though not all European manufacturers have shown the same commitment towards this way of doing things, amongst the three Triad regions the European automotive system (both its OEM and FTS) has played a leading role in this field – despite the fact that the most advanced experiments were in fact run in emerging countries (especially Brazil).

Forms of cooperation developed in this context between OEM and FTS: both at an assembly level, with suppliers' parks and FTS presence on-site and on manufacturers' assembly lines (a trend that is less developed in the other two Triad regions); and also at the design level, with the advent of co-design practices that associate OEM with FTS or with engineering service firms. Japan did in fact accumulate prior experience in OEM-FTS co-development, but the modalities of European co-design were original in the sense that here FTS do not find themselves in a subordinate position or in a relationship where engineering companies have a particularly significant role to play. This bestows upon the different cooperation processes between the OEM and their partners (FTS or SMEs) a network configuration that is expressed both in an international dimension, in particular at a European scale, and also by the importance of the spatial agglomeration/clustering phenomena that extend inter-firm relationships in one case and intensify them in the other.

7. Policy implications

7.1. European automotive policy: challenges and limitations

Amongst the EAS's factors of distinctiveness, we should focus on the automobile industry's institutional environment, and specifically on State interventions. Without obfuscating the differences between the various EU member states, as regards for example the taxation of different types of fuel, it is indeed at a European level that we can try to implement the automobile policy that the Commission has progressively put in place and which it expressed in its July 1996 strategic paper on the automobile industry, written with the idea in mind of interconnecting these various modes of intervention, specifically:

- competition policy: control of State aid to companies, mergers-acquisitions, upstream and downstream (distribution-related) vertical integration;
- technological policy: large-scale programmes (RTD-FP), "Car of tomorrow" project, etc.;
- regulatory framework: technical standards, safety, emissions/recycling, taxation, etc.;
- reinforced competitiveness vis-à-vis third party countries; Japan-EU self-limitation pact (1991-2001); SME support policy, etc.;

- the social dimension, whether work organisation ("Partnership for a New Organisation of Work") or vocational training.

The various actors have made great efforts to talk things through, as witnessed by the negotiations before distribution reform, or the "voluntary agreements" (i.e., to cut emissions or increase pedestrian safety).

Nevertheless, the multiple nature of intervention levels limits the efficiency of this automobile policy, as witnessed by the delayed transposition of the European directive on recycling end-of-life vehicles, enacted in October 2000 but not yet applied in several EU member states. Moreover, the main limitation of European intervention stems from its relatively limited capacity for mobilising actors, at least in comparison with State interventions in the two other main automobile countries, the United States and Japan. This is notably the case for large technological projects heralding the advent of future developments. For example, the European "Car of tomorrow" project was much less ambitious than the equivalent PNGV ("Partnership for a New Generation of Vehicles") project in the US, both in terms of its financial resources and also with respect to the actors involved. It remains to be seen whether the perspectives that the 6th RTD Framework Programme (FP6) have opened up, a number of which seem to relate to the automobile, will be enough to offset this shortcoming.

7.2. A few conclusions regarding automobile policy

The automobile is subject to permanent technological innovation. It is a product that could be profoundly modified by a generalisation of electronics; and through research into new driving systems, notably fuel cell vehicles. Research projects of this ilk have mobilised considerable financial resources. In addition, they infer co-operative approaches so that expenses, risks and knowledge can be shared. It therefore appears essential that Europe not be handicapped by the fact that many different institutions and actors are working in these research fields, catalysts who should be supported both because of the need to strengthen the European industry's long-term competitiveness vis-à-vis its North American and Japanese rivals and also because of the collective progress that can be achieved in areas like safety and pollution reduction. A more visible European technological policy in favour of the automobile industry (as would seem to be the case for aeronautics and space, a priority thematic area of FP6) would be useful.

The regulatory framework (i.e., technological authorisations, emissions standards and recycling) should be a factor providing an incentive for such innovations. The projects being implemented should be ambitious, in terms of the financial resources they mobilise. Cooperation practices that have been widely developed amongst automobile firms in Europe (between manufacturers working on a variety of joint projects; between OEM and suppliers and engineering companies; or even in their many different cooperative efforts with scientific laboratories) should be able to create conditions that are favourable to projects of this sort - which should also be reinforced by initiatives aimed at structuring the European research space. It remains to be seen whether these *a priori* favourable conditions were in fact fully exploited in previous European scientific and technological programmes (4th and 5th RTD-FP, BRITE-Euram), and this verification has to be done before a critical general report can be finalised and provide a framework for the 6th Framework Programme (regarding for example fuel cell vehicles) by paying special attention to the integration of the SMEs.

Throughout the European automotive system (components industry, distribution, maintenance-repair, recycling), it has been very hard for SMEs to bring their technological and organisational competencies up-to-scratch relative to these new requirements. This specifically involves strengthening design capabilities that comprise, at least in part, the foundations of the European automobile industry’s competitiveness, and notably the fabric of specialised SMEs and engineering companies that must be able to take advantage of the opportunities on offer. Developing SMEs' cooperative capabilities by encouraging regroupings within a framework of co-operative inter-SMEs approaches as well as mechanisms for offsetting the risks that result from an asymmetry of power between these SMEs and the car multinationals with whom they deal – these are all policies that merit special attention in the form of an appropriate support. The internationalisation of SMEs has also to be supported.

SMEs, much like large automobile company entities, are very much under pressure from a threat of delocalisation to the new peripheries of the European automobile space, a move that offers cost and work flexibility advantages. It is important that the effects of this kind of spatial competition do not lead to any local crises in the former peripheral areas as a result of corporate predator behaviour (delocalisation). It is urgent to encourage the development of new technological and organisational competencies in these regions (clustering policies). The drive towards Central and Eastern Europe, given the outlook for these markets, should not be achieved to the detriment of the countries of the South, especially the Mediterranean Basin.

Finally, remember that the automotive system is best served whenever a long-term vision is what is orienting actors’ negotiations and countless compromises. This means acknowledging the diverse nature of occasionally conflicting interests. In this sort of framework, the pre-eminence of a privileged social actor constitutes a major industrial risk. The general environment of the 1990s was marked by the rise of firms that were more geared towards shareholders than stakeholders. The renewed competitiveness of the European automotive industry is in part due to the fact that the European carmakers resisted this pressure, thanks to the stability of their reference shareholders, this being the guarantee that their strategic decision-making will continue to be geared towards the long term. Any undermining of this configuration, in the name of general principles like the free movement of capital, could destabilise this organisation and damage it. Instead, it is by reinforcing the symmetry of the powers wielded by the various parties, for example by encouraging the development of a European entity to organise the negotiations between large automobile firms and their employees (or the SME with whom they do business) that a cooperative foundation can be found to support a competitive EAS.

The broader approach to the social use of the automobile that was developed as part of the CoCKEAS project revealed latent distributive justice issues which imply that the distribution regulatory framework should be analysed not only in terms of competition policy but also with regards to social cohesion in Europe.

II. BACKGROUND AND OBJECTIVES OF THE PROJECT

The CoCKEAS research programme analyses the ongoing changes in the European regional automotive system. The aim of our approach is to identify and to explain the complex strategies and choices of the actors who lead the main changes in automotive systems. Our work maps the new configuration of the European Automotive System (EAS) – main actors, relationships between actors – through a theoretical and empirical framework focusing on the critical issue: the coordination of competencies and knowledge between the actors of the EAS.

The research programme has been realized by 13 research teams from seven European countries, organised in the CoCKEAS consortium, all members of the worldwide international network GERPISA.

- IFReDE-E3i, Université Montesquieu-Bordeaux 4, France (co-ordinator).
- GERPISA, Université d'Evry-Val d'Essonne, France.
- GATE, University Lyon 2, France.
- CGS (Ecole des mines, and ARMINES), Paris, France.
- WZB, Berlin, Germany.
- University Erlangen-Nuremberg, Germany.

- Universita di Torino, Italy.
- Universita Ca' Foscari di Venezia, Italy.
- Erasmus University, Rotterdam, Netherlands.
- Katholieke Universiteit Nijmegen, Netherlands.
- Universidad Publica de Navarra, Pamplona, Spain.
- Chalmers University of Technology, Göteborg, Sweden.
- Victoria University of Manchester, United-Kingdom.

The research discusses the hypothesis of emergence of a new European model, through comparative studies of cooperative practices to evaluate the difficulties encountered by firms implementing new ways of coordination leading to different institutional arrangements. We analyse convergence/divergence between firms and countries in Europe, and between Europe and other automobile regions (North America, emerging countries). The distinctiveness of a "European model" is then discussed.

Vertical relationships have focused the attention of the research, evaluating the changing place between carmakers (Original Equipment Makers/OEM) coordinating the automobile industry, and the growing role of First Tier Suppliers (FTS). By delegating to components makers – which are becoming system integrators – the responsibility for the design and production of modules, carmakers are apparently retreating from the area of manufacturing, and restricting themselves to the role of architect and project manager: their involvement revolves around the design of the vehicle, the management of the chain of production and the relationship with the final consumer. The research questions such a trend: Could carmakers simply act as a driver of the process? Could this affect the innovative capabilities of the European Automotive System, leading to a better or a declining competitiveness?

The answer to this question raises yet other issues: How do firms (OEM and FTS) internally balance the competence and knowledge requirements within their own organisation in terms of capability development, human resource systems etc.? How do FTS perceive their position vis-à-vis the carmakers in terms of competence and corresponding control issues? Will the EAS be affected by some kind of "Intel Inside" syndrome leading to a declining role of the carmakers? The research aims to give at least some partial responses to such issues we initially identified. The diversity of firms' response to such issues and the uncertainties in strategies – who lead to local experiments and frequent changes – do not allow to propose a unified analytical framework.

Above and beyond the direct relationship between carmakers and FTS, what are the repercussions of these changes on the whole of the supply chain, or at least, on that part of it which is upstream from the first tier suppliers (those who are in direct contact with the carmakers), i.e. the second and lower tier suppliers? How do carmakers and FTS co-operate with independent engineering service companies and other supplier companies? The role of these actors of the EAS has been definitely underlined within our research.

Another main objective of the CoCKEAS network was to progress in our knowledge of the invisible area of the automobile system. One issue is relative to the role of Finance in the automobile industry, and its impact on the productive organisation: considering the changing firms governance, and evaluating the growing influence of financial markets on managers' strategic decision, the respective role of technology, competencies and finance in the structural change occurring in the auto industry has been discussed.

However, the organisation of production must not only integrate the limitations of the productive organisation itself - it must also reflect the entire range of activities which are associated with the use of a motor vehicle, especially any related services, be they tangible (i.e. a car's upkeep – maintenance, spare parts) or intangible. Services have long been part of the automotive system (financing, insurance, rentals, resale of used cars) – and this is still the case (logistics, remote control, and other innovations which are linked to the new technologies of information and communication such as telematics). This service-related dimension, an intangible factor, has become more and more important in determining car companies' total profitability, and in the creation of value within the automotive system: as such, it is no surprise that automotive companies (manufacturers and components makers), and other new actors, have been increasingly interested in developing their service profiles. Considering the changing rules in the European automobile distribution, this topic is directly related with the EU regulation policy in distribution.

Finally the research details the relation between structural changes in the organisation of the EAS and the location of auto activities. This includes the analysis of:

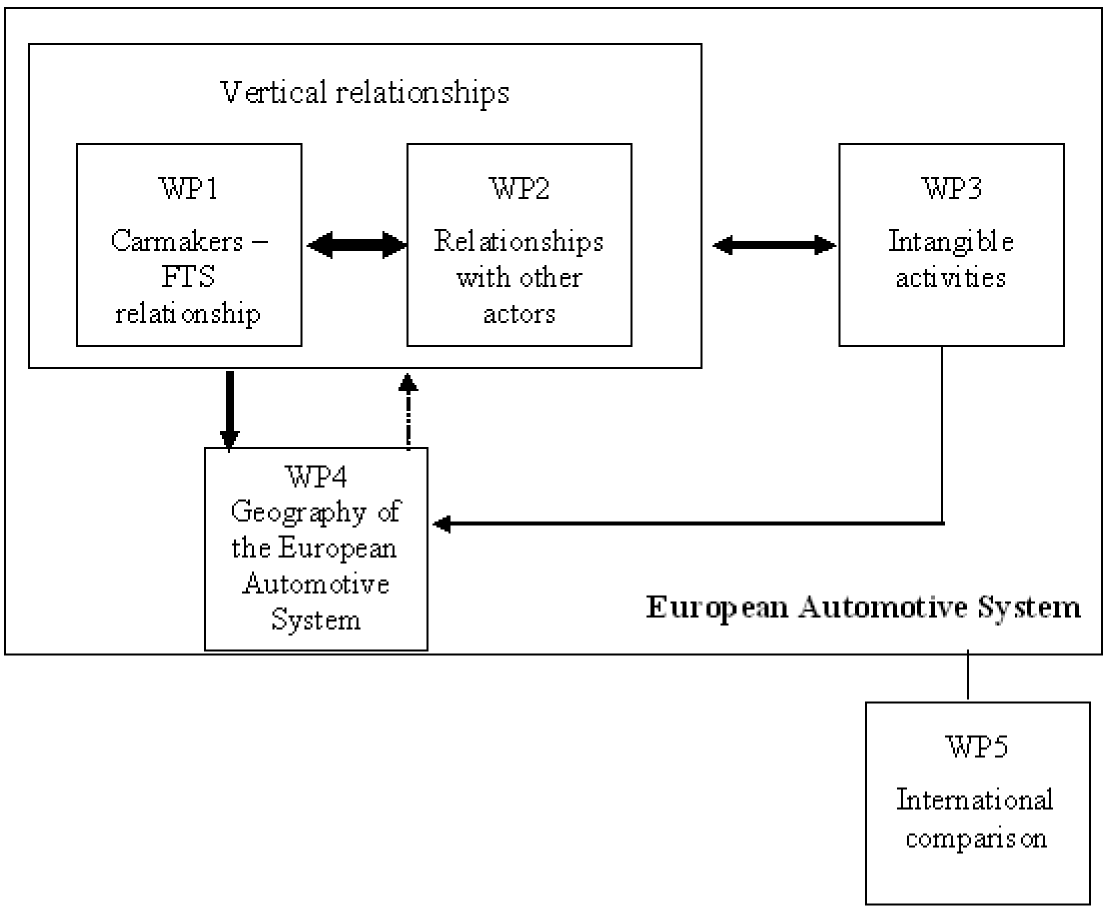
- the spatial impact of these structural changes on the location of automobile activities (design, car assembly, module assembly, component manufacturing, etc.);

• the spatial dissemination of the new productive practices, considering theoretical explanation of the heterogeneity;

• the impact of the enlargement to Eastern and Central Europe.

The plan of work has been divided into five workpackages, each corresponding to two complementary approaches: a thematic approach (WP1 to WP3), on one hand, and a geographic one (WP4 and WP5), on the other. These approaches are complementary, and the work has been done in parallel. The two first work packages cover vertical inter-firm relationships, the co-ordination of industrial competencies and knowledge both during the design phase (co-development) and during the production process (modular assembly) and they have been linked during the research programme.

Figure 1. The CoCKEAS workprogrammes



III. SCIENTIFIC DESCRIPTION OF PROJECT RESULTS AND METHODOLOGY

1. Introduction

1.1. The automobile industry in a regime of permanent innovation

At the dawn of a new century, automobile firms again have to cope with major structural changes requiring them to reorganise their current production systems. This modification of the automobile industry's economic and social environment stems from three main factors:

- technological developments (specifically in microelectronics and ICT) in which reinforced innovation serves as a factor of competitive rivalry;
- the competitive process, which is marked by the double dimension of the new internationalisation phase: an increasing number of mergers-acquisitions and alliances between the three automobile poles (Europe, United States, Japan) on one hand, a reinforced regionalisation of the automobile system on the other;
- the institutional context, in reference to the relationships between the different actors in the automobile system, notably the governance compromise underlying the implementation of corporate strategies. Greater shareholder power and institutional investors' increased influence on corporate executives' strategic decision-making are partial explanation for some of the changes in the industrial system, and more specifically for the trends towards an increased externalisation of activities.

To cope with these new technological, economic and institutional challenges, the organisational forms that had allowed the auto industry to develop over the past century years was in need of being reconfigured. Research undertaken by the GERPISA network showed that simply focusing on the opposition between *mass production* and *lean production* did not allow for a full understanding of the complexity of these processes. A more detailed analysis, i.e., one that would recognise the specificity of Fordism, Sloanism, Toyota-ism and even Honda-ism was more conducive to understanding how a profit strategy could enhance the coherency between a productive organisation and an employment relationship[2].

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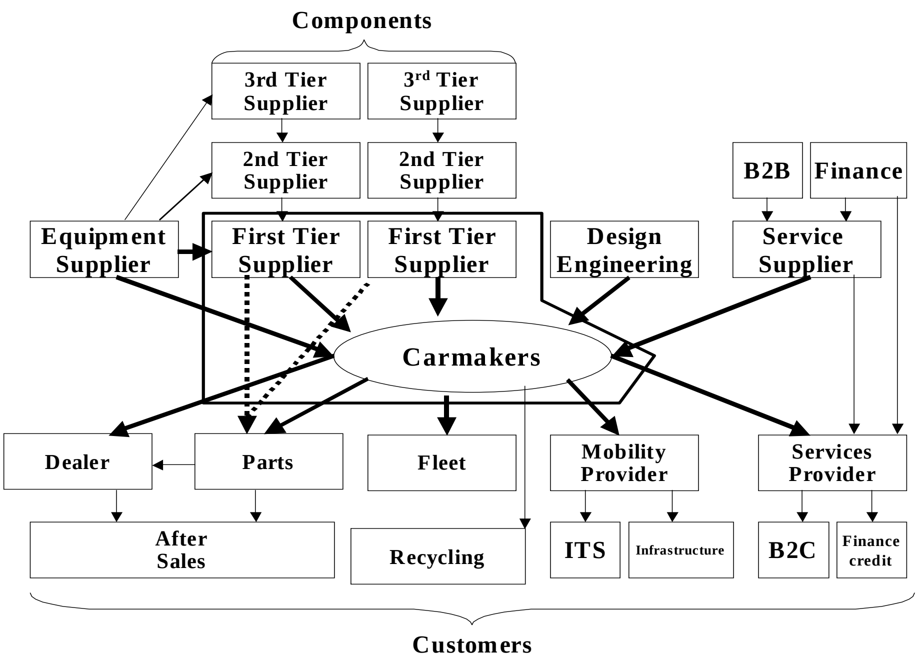
[2] Robert Boyer and Michel Freyssenet: *The Productive Models. The Conditions of Profitability* (Palgrave-Macmillan, Basingstoke, UK and New York, USA, 2002).

During the 20th century the automotive industry was a matrix for all of these models, giving birth to many organisational innovations that would later spread to other sectors of economic activity. Today, the deep-seated and rapid developments that have taken place within this sector underline the need for reactive forms of productive organisation within a permanent innovation regime in which new knowledge necessarily derives from the mobilisation and combination of diversified competencies.

1.2. A systemic approach to the automotive sector

The analytical framework we are suggesting is an all-encompassing one, the idea being that the automobile industry should be analysed at the system level as a whole (Figure 2.). This not only means that suppliers (components makers) should be included in the study (due to their involvement in the sector's supply relationships), but that we should also go beyond a purely manufacturing-oriented perspective that focuses solely on tangible production (design-machining-assembly) and integrate all of the immaterial activities that make such a telling contribution to the dynamics of automobile production, including new car sales financing and ancillary services.

Figure 2. The European Automotive System (EAS)



In its broader definition, a productive system can be perceived as a set of activities that interact closely with one another, and which must therefore be co-ordinated. The very definition of this system, and of its organisation (i.e. the division of labour into its units), depends on technological, economic and institutional factors, and on their dynamics. This helps a productive system to evolve via the emergence of new activities, by the disappearance of old ones, by the redefinition of firm's boundaries and through the restructuring which will ultimately give birth to a new configuration. The intensity of the interactions between the various activities justifies a hypothesis of quasi-decomposability which makes it possible to define the boundaries that characterising this industrial system. But new trends in the internationalisation process (globalisation) have lead to a dismantling of the productive coherencies that the automobile countries had previously developed at a national level. Today, it is at a macro-regional level (Europe, North-America, South-East Asia, etc.) that new coherencies are currently emerging in regional automotive systems[3].

A system's dynamic is essentially determined by the way in which its activities are co-ordinated. Such co-ordination can be organised according to three basic economic principles: the market, the firm (hierarchy) and co-operation. In a permanent innovation regime, co-operation tends to become the main method of automotive systems coordination. As such, analysis should no longer focus on the firms themselves (and particularly on car manufacturers) – instead, it should inspect the system's overall inter-firm relationships.

Over the past few years, a great deal of economic and business literature has focused on the increased number of strategic alliances between firms, and on the development of network forms of organisation. Many authors have scrutinised the concept of firms' boundaries. In so doing, they have tried to identify 'core businesses', or 'core competencies' that correspond to firms' specific technological and organisational capabilities. These capabilities are the products of a firm's history and organisational learning, and they correspond to the tacit - and therefore non-transferable - knowledge that is embedded in the firm's routines. Firms have had to focus on reinforcing their specific resource-based capabilities, and on developing co-operation mechanisms with complementary competencies. The question of how to best share knowledge throughout a firm – that is, between its various departments – then becomes a strategic issue, as is the sharing of knowledge with external organisations which offer complementary competencies.

The dynamics driving this type of system call for much more than a simple and homogeneous "one best way" vision in which actors all pursue the same strategy and hold identical principles. Quite the contrary, they draw sustenance from the presence of a diverse set of strategies and productive models, a diversity that they themselves help to

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[3] Jorge Carrillo, Yannick Lung and Rob van Tulder : *Cars, carriers of regionalism* (forthcoming).

broaden through the search for original productive solutions that are capable of dealing with these new challenges.

1.3. The workpackages of the CoCKEAS project

Respecting this methodological framework, the CoCKEAS research project studied ongoing structural changes in the European automotive system by emphasising five major dimensions thereof corresponding to a workpackage (WP).

- Firstly (WP#1), we analyse the changing relationships between carmakers (OEM) and first tier suppliers (FTS), which play an ever-greater role in designing and manufacturing motor vehicle subsystems. Coordination of OEM-FTS relationship, during both their design and production activity phases, is a key part of the transformations to have affected the European automotive system (Figure 1.).

- Secondly (WP#2), above and beyond this one relationship, it is important to also account for the other actors (lower tier suppliers, engineering companies, distribution networks, etc.) that help to determine the European automotive system's economic performance.

- In addition to these productive transformations, analysis of the automotive industry's immaterial dimensions (and notably the relationship between the world of finance and automobile manufacturing) paved the way for a new research agenda that could be particularly interesting in the light of the current debate on financialisation (WP#3). By examining current automobile utilisation practices, we can supplement analyses that have focused solely on productive organisation efficiency. This could help to renew the representations we hold of the automotive system, which tend to differ from traditional sectorial analyses insofar as in this system manufacturers are often deemed to be "omniscient and omnipotent" actors.

- Workpackage Four focuses on the relationships between these structural changes in productive organisation, and on how they affect the geography of automobile production in Europe: expansion towards the countries of Central Europe and/or on a regional scale; and agglomeration/clustering dynamics.

- Lastly (WP#5), comparing current changes in Europe with automobile industry developments in other parts of the world helped us to identify the specificities of the European automotive system, as well as the competitiveness advantages and handicaps that are associated with it.

Their main conclusions will be presented.

2. The OEM-FTS Relationship[4]

Workpackage One was focused upon the analysis of the evolution of the relationship between automakers (Original Equipment Manufacturers-OEM) and the specific type of suppliers (which are usually labelled Original Equipment Suppliers-OES as a whole) who directly interact with them, also carrying out the task of coordinating a hierarchy of other suppliers which are located upwards in the automobile supply chain. These suppliers, occupying the higher place in a multi-level hierarchy, are labelled First Tier Suppliers-FTS (Figure 1.).

The relationship between OEM and OES in general, and the one between OEM and FTS in particular, have undergone a profound evolution over time. Workpackage One had the task of analysing such changes and attempting to develop some evaluations over the most likely future trends, mainly with respect to the outcome of the deployment of the potential offered by the new tools of Information & Communication Technology (ICT).

2.1. The transformation in the OEM-OES relations after the crisis in the 1980s

2.1.1. The redefinition of the division of labour between automakers and component suppliers

One of the most significant turning points in the complex evolution of the international automobile industry is the 1979 oil shock. Such crisis had various effects, but probably the most relevant one was the coming together of consumer requirements (i.e. need for more compact cars and more fuel efficient engines) and then of the features of the most developed markets which before were characterized by significantly different needs. Suddenly automakers in the Western hemisphere realized they were less competitive facing the challenge brought forward by Japanese automakers. Besides the economic effect generated by the competitive disequilibrium among companies, in the Western world there was a true psychological and cultural shock since the new reality undermined at their roots managerial beliefs and methods, which had been consolidated over time. Hence the start of a stage of profound reorganization both on the managerial methods and on the actual innovation and manufacturing strategies. All eyes focused on the differences between the Western and the Japanese manufacturing approach, seeking explanatory variables for the competitive difference.

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[4] This section is an abstract of the Workpackage One synthesis by Prof. Giuseppe Volpato, Universita Ca' Foscari di Venezia (See VII. Annexes). Detailed references are indicated in this exhaustive paper.

One of the areas in which the different approach between East and West was most evident was supplier relationship. Western automakers were much more vertically integrated than their Eastern counterparts, since they preferred to manufacture a great share of their components themselves. At the same time they had relations with a much higher number of component suppliers. The relationship between OEM and OES were highly competitive since automakers wanted considerable freedom in choosing suppliers, privileging on a case-by-case basis the supplier offering the most attractive conditions (prices, quality, services). Such behavioural model, named "Exit", is based upon the interchangeability of suppliers, depending upon their capability to satisfy the needs expressed in every single case by automakers, and differs from the behavioural model named "Voice".[5] This second approach, which characterized the main approach of Japanese automakers, was based upon a strong interaction between customer and supplier aimed at consolidating their partnership, and to deal with any problem (defects in supply, efficiency losses, etc.) which could emerge over time, through forms of mutual cooperation. As a matter of fact Japanese automakers had developed relations with their suppliers which were much more cooperative and structured. On the one hand every Japanese OEM selected a limited number of first-tier suppliers, with whom to have systematic partnership relations; on the other hand the supply chain of Japanese automakers was organized on a multi-level structure, in which every first-tier component manufacturer was in charge of coordinating a group of suppliers belonging to the tier below.

2.1.2. The importance of supplier contribution to vehicle innovation

Soon the importance acquired by innovation in the automobile product, due first to the oil shock and then to the outburst of the competitive challenge in all main automobile markets, put a marked emphasis on the strategic relevance of the role of component suppliers, and in particular of first-tier ones, since it became evident that the intense innovation effort in the technological content of models, in the reduction of product life-cycles, and in the widening of the product line, could not be pursued without a tighter mutual cooperation.

As a consequence there was a large imitative process, through which Western automakers copied Japanese managerial practices, mainly in the field of supplier relations:

[5] Using the distinction Voice/Exit introduced by Albert Hirschman.

- first there was a marked process of evaluation of technological, organisational and financial potential of first-tier suppliers, followed by a process of selection of suppliers who were most suitable;
- then followed a marked process of manufacturing decentralisation towards suppliers to whom the task of investing into component innovation was more and more frequently assigned;
- one of the most relevant objectives of such process was the concentration of purchasing orders, so that the chosen suppliers could achieve the scale economies needed in order to make the evolution in place economically sustainable. This required huge investments and the acquisition of competences previously belonging to automakers;
- finally new forms of organizational and information coordination were studied, in order to activate supplier cooperation since the early stages of new product design (co-design), so that the speed and the efficiency of the process could be improved, stock levels dramatically reduced, and on-time deliveries (just-in-time) were achieved in assembly activities.

On the whole one can say that, albeit with varying forms and details in each individual case, all Western automakers did base their development heavily upon the Japanese managerial approach, and did adopt the most relevant and effective elements.

2.1.3. The persistence of different partnering models between "Voice" and "Exit"

However, albeit with a coming together of the automaker-supplier relationship models in the two industrial poles, it remained evident that the Western managerial style (and the North American one in particular) were inspired by the "Exit" model while in Japan the "Voice" model had many applications, as a legacy of commercial traditions in that country which did maintain strong partnership relations between companies through groups defined as quasi-integrated (*keiretsu*).

The persistence of behaviours inspired by the "Exit" model was more visible among US automakers. Firstly because all most important automakers (the so called "Big Three") had in the 1980s many component manufacturing activities, and were incline to consider such activities as equivalent to first-tier suppliers, and then to consider less strategic for their development the relationships with other suppliers. Secondly because these automakers, having been involved for a long time in a wide range of markets, were starting a process of international comparison of supply opportunities which were present in the various countries. They started to develop forms of systematic comparison of the efficiency and effectiveness levels of suppliers in the various national markets, aiming at selecting the most efficient ones, and to negotiate with them a sort of exchange with large orders (generating scale economies) in return of more favourable conditions, based also upon agreed policies of systematic reduction of prices for individual components (price targeting).

This tendency was reinforced in the early 1990s by the process of manufacturing internationalisation of the main automakers which was linked, on the one hand, to the tendency to make cars to be marketed in a range of markets (world car) and, on the other hand, to the direct investments carried out in countries usually identified as Newly Industrialised Countries (NICs) which were starting a stage of development of motorization. In substance the development of manufacturing activities in emerging economies (such as Brazil, Argentina, Poland, Turkey, China, etc.) required the installation near to the new markets, both of final assembly managed by automakers, and of component supply plants.

2.2. The transformation in the 1990s

2.2.1. The transformation induced by the process of internationalisation-globalisation

In the mid 1990s the stage of creative imitation (hybridisation) by Western automakers with respect to technical and organizational solutions developed by Japanese automakers, and by Toyota in particular, was reaching completion and a new stage of intense manufacturing reorganization started, triggered by the enhanced process of internationalisation of the automobile industry, and by forms of globalisation of automaker strategies[6]. The breadth of the new wave of internationalisation of activities, linked to initiatives of acquisition, mergers and alliances between automakers, was such to profoundly modify the nature and the forms of the competitive process. At the same time such fast and diffuse worldwide extension of activities of automakers and of their suppliers required forms of coordination between production areas which were deeper and more articulated than in the past. Such need for "organizational and decisional integration" of all the main industrial activities: from purchasing to R&D, from design to manufacturing, from logistics to marketing and distribution, labelled "globalisation" did stimulated new and increased needs to rationalize the activities in the whole automobile supply chain which did manifested with growing intensity since the mid-1990s.

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[6] Michel Freyssenet, Koïchi Shimizu and Giuseppe Volpato: *Globalization or Regionalization of the European Car Industry?* (Palgrave-Macmillan, Basingstoke, forthcoming, February 2003

The analysis of the recent evolution of the automobile supply chain shows that an extraordinary reorganization in the whole industry structure has begun. This reorganization mainly stems from the effort carried on by OEM to develop a new relationship with end customers, based upon a *make-and-deliver-to-order* approach, as opposed to the previous one, based upon the *stock order* approach. This implies a radical transformation in the internal organization of automobile firms, but it also requires a profound reorganization in the component supply chain. As a matter of fact, the component supply chain has been under pressure for about a decade, towards higher efficiency levels, but until now this pressure mainly related to forms of internal firm organization (OEM and OES), and to their work methods. The new feature of the emerging program of supply chain reorganization lies in the strategic dimension of the whole stream, mainly in the forms of interaction between different subjects in the chain: customers, manufacturers and suppliers. This transformation can be seen as *a move from a "production" rationalization of the component supply chain to a "strategic" rationalization*, where by *production* rationalization we mean a rationalization mainly (although not exclusively) based upon innovations applied on component manufacturing processes, while by *strategic* rationalization we mean a much wider process, which can influence the forms of component manufacturing, but which involves the competitive structure of automobile firms, and in particular their way of interacting: from design of whole vehicle to manufacturing and distribution of the final product to drivers. What we want to underline is that while the first thrust towards rationalization mainly applied *within individual firms* in the automobile supply chain, the second mainly applies to the way of *interaction among firms* in the chain, as elements of a more and more articulated and complex system.

The scope and the radical nature of the transformation in progress cannot be immediately grasped in its amplitude, since the objectives of automobile firms have not changed. They still aim at the supply of innovative components, capable of ensuring higher standards to the final product, with lower costs. But this objective cannot be pursued further in an effective and efficient way with the present structure of the manufacturing chain. About one decade ago, when competition triggered a further rationalization process, known as *lean production*, this has translated into a *internal* reorganization of supplier firms (as well as some reorganization within automobile firms), through the definition of higher quality standards: in products, in manufacturing processes, and in servicing. This led to a stage of great managerial and technological effort which has generated considerable results. Now, however, after this stage of intense innovation, the process of production internationalisation on a worldwide scale and the new stage of mergers & acquisitions, rapidly accelerating after May 1998, with the merger between Daimler and Chrysler, has led to a wider competitive confrontation, which requires broader and more complex initiatives than the previous ones, which were mainly aimed at higher internal efficiency within individual supplier firms. This previous line of action will continue further, but with less and less relevant results.

From the organizational model of the so-called *lean organization* the greatest share of the potential for improvement has been extracted. In order to achieve additional important efficiencies of structural nature, and not based upon a continuous improvement process (*kaizen*), significant but marginal, a new and more advanced organizational model must be adopted, where the whole structure of the component supply chain is under scrutiny. The transformations in the last ten years have turned out to be undoubtedly effective, and have led to leaps both in innovation and in cost reduction, but margins of future improvement have become gradually thinner. If one wishes to maintain the trend of improvement expressed over the last decade, one must shift to a new organizational model which encompasses not just the internal structure of individual component manufacturers, but also the whole structure of the international automobile supply chain.

2.2.2. The objectives of the reorganization

As it is known, the pressure towards this profound transformation stems from the quest of automobile manufacturers for higher profitability levels, which during recent years have decreased, along with the growing financial needs generated by production expansion in emerging markets. The "hunt" for higher profitability levels, made more important also by the inter-industry competition in capital acquisition brought by the new economy, lies in a set of dimensions, but it can be summarized as a hunt for larger scale and scope economies, accomplished through forms of mergers & acquisitions, and the focus by car manufacturers on strategic activities which are believed to be capable of providing higher added value. On the whole, the key fact is to outsource all activities which a supplier can perform at a lower cost compared to an integrated production, allowing to reduce total capital investment and increase the net profit of both kinds of firm: suppliers and OEM. The effective development of this scheme would lead to a higher ROE, thus to the possibility to fairly compensate all stakeholders, which represents a necessary condition in order to gain the substantial financial means required by the internationalisation of the manufacturing structure and by the merger & acquisition operations.

This strategy of outsourcing of investments and costs, but not of rates of return which should rather increase, moves through a reorganization of the supply chain to an extent which would have appeared unthinkable just a few years ago.

From a general point of view this transformation process can be synthesized as a twofold evolution of the division of labour between carmakers and component suppliers concerning design and body final assembly. Looking at the design area the new tendency is directed towards the passage from while in which the car makers buy parts manufactured on the basis of their drawings to that in which the components suppliers, following a car makers' press, take the lead of a wider activity of R&D for the proposal of technological innovative components. Even for body final assembly the new tendency is towards an enlargement of the role of first tier suppliers. To them car manufacturers ask the delivery of modules (as a complex of parts already assembled and tested) and a deep work of coordination of the second and third tier sub-suppliers.

It is easily understood that this twofold line of evolution discloses many difficulties in the field of integration and coordination among the players of the supply chain. Furthermore the solutions of the new problems generated by the new structure of the division of labour involve aspects rather conflicting. For example, on one hand car assemblers are interested to maximize the upstream decentralization of part manufacturing because, in the short run, this reduce the total amount of expenses in either areas of R&D and production operations. But from the other hand this evolutions worries the car makers because, in the long run, this could imply for them a lost of relevant competences as far as it concerns the overall design process and the capability to magnify the perceived value of the car brand. As a matter of fact this competence dilution could reduce the bargaining power of car assemblers vis-à-vis their most important component suppliers.

On the whole this articulated delegation from car makers to first tier suppliers of new responsibilities on research, design, manufacturing and assembly came through a wide array of initiatives whose key points are:

- Greater outsourcing, with activities being sold off to specialised suppliers (i.e., foundry or bearings operations) and even a spin-off of equipment making subsidiaries (Delphi for GM, Visteon for Ford, Magneti-Marelli asset sales for Fiat).

- FTS concentration as the OEM began to deal directly with fewer and fewer suppliers whilst delegating ever-increasing responsibilities to them.

- More co-design, with the FTS being associated in the first stages of a vehicle's design, helping to define its subsystems and main equipment by interacting closely with the OEM.

- Shard platforms designed to serve as a basis for several differentiated car models. With the OEM sharing the main components and a common product architecture, the product range could be broadened, due to economies of scope.

- System integration and modularisation, with FTS having to design functional systems capable of fitting in with the vehicle's modules (physical integration) or some of the elements thereof. The twinning of functional and physical integration created difficult interfacing problems that firms tried to anticipate within a general co-design framework.

- The advent of supplier parks and consortiums, with FTS agglomerating in the vicinity of assembly sites in order to prepare their modules at these locations.

- Global sourcing. The search for improved value-for-money gave birth to a global sourcing of components, some of which could be manufactured in the immediate vicinity of assembly plants (and assembled directly into the modules). North American components makers participated extensively in this trend, acquiring European firms or setting up green field plants in Eastern and Central Europe. Reciprocally, European components makers reinforced their presence in the United States, in emerging countries and even in Japan.

All these initiatives, which must be moved further in parallel to the process of geographic expansion in all consolidated automobile markets (USA, Western Europe, and Japan), and more recently in all emerging markets, must then be linked to a scheme of integrated management which can be referred to as globalisation.

2.3. The likely transformations in the next decade and the role of ICT

2.3.1. Towards information integration

Co-design activities, shorter time-to-market, greater manufacturing flexibility, more efficient logistics, higher productivity are all advantages than can be traced back to the increased use of information and communication technology. The Internet has revolutionised the transmission of information, and new application are constantly being found for its use, for example in part procurement or sale and distribution.

At the end of the 1990s a new stage of reorganization has begun with respect to the relations between component manufacturers and automakers, linked to the new potential of information and operational integration brought forward by ICT.

Clearly the ongoing process of supply chain reorganization implies the reshaping of information flows among supply chain contractors: relevant changes are taking place in the way supply chain agents have to manage information flows, not only with respect to the management of technical issues, but with respect to organizational consequences. In this picture, the most peculiar aspect of this move from production rationalization to strategic rationalization of the automobile supply chain is represented by a marked growth in integration needs. As a consequence the new supply chain structure is based upon operations which require:

- downwards, a tighter link of production with automobile demand like the elements of make-and-delivery-to-order previously quoted, increase in product range and shortening of life-cycles of individual models, obtained through the compression of the time-to-market;
- upwards, a stronger cooperation between operators such as co-design between first-tier suppliers and OEM and co-makership between the system integrator and 2nd and 3rd tier supplier.

Then the success of this great transformation is linked to the *capabilities of the actors to carry out system of information and organizational integration*, with higher levels of quality and complexity compared to those reached so far. The control of the system implies the capability to exchange information with a degree of completeness, speed and precision which is largely superior to the one which is presently available. The qualitative aspect of the new information required must be underlined and qualified, since this dimension appears much more relevant than the mere quantitative development of exchanged information. The move from an operations chain governed by *push logic to pull logic*, pulled by a demand which is differentiated and variable overtime, implies a different management of information.

In a pull logic, where the starting point for operations is not governed by car manufacturers, but results from the composition of a large number of individual decisions by consumers, it must be taken as a given (without any possibility to be changed), and any reduction in the chain slack represents not just a cost reduction, but also (and most important) a strategic capability to anticipate the competitor in design, manufacturing and delivery of vehicles which are better synchronized with the evolution of the market. The system should evolve towards a supply chain which does not require only ex-ante coordination of decisions, which in turn is based upon information managed by planning activities, but also a simultaneous coordination of operations, based upon execution information.

2.3.2. From hierarchical links to network links in the whole supply chain

If we look at the relationship between a car manufacturer and its suppliers from the standpoint of information flow management, we could say that until the 1980s such relationship was quite simple. To make a long story short, the OEM was the one who led the whole project; parts and components were mainly designed and engineered by the car manufacturer, while suppliers were asked to manufacture them. In an oversimplified description, one could say that such as relationship consisted in a few key elements:

- The decision making process related to product development – concept, design, engineering, product tests, changes – took place almost exclusively within the car manufacturer's organization; suppliers were more or less asked to manufacture some parts at some cost. This form of coordination is based upon ex ante planning, which has a key requirement: exclusively the final assembler must be fully aware of the whole supply chain operations.

- In such condition the relationship with the supplier is a "market-hierarchical relationship" in its proper sense: the car manufacturers purchases a product (part or component) at a set price.

- Consequently, the information involved in such as customer-supplier relationship mainly consisted in one-way flows of technical details, prices, quantities, billing, terms of payment, etc.

Let's now look at the actual supply chain as far as the customer-supplier relationship is concerned: as previously said, it is based upon an ex ante planning mechanism, thus some interesting asymmetry takes place with respect to the elements specified above. The fundamental aspect of coordination based upon ex ante planning is that any individual operator does not need information on the whole chain of operations. Any chain operator must know only start and end date for a given activity, and must be concerned about precisely meeting its specific deadline. This implies a hierarchical management of information. But forms of simultaneous coordination on the whole of operations, aimed at compressing chain slacks require on line access to the whole sequence of operations, in order to carry out adaptations any time in which downwards demand triggers a wave of change which involves the whole upward operation chain. In other words, this implies forms of network connections among operators.

The decision-making processes related to product development involve both the car manufacturer and first tier suppliers. According to the continuous improvement both in product and process technology, nowadays the competencies that are necessary in order to manufacture a competitive car encompass a wide range of fields of expertise. As a result, critical decisions might often take place in an inter-firm process and thus an agreement among peers could be required.

In such a condition it is absolutely not advantageous to base the relationship with the first-tier supplier upon a mere spot-market agreement. Since the part supplied consists in a complex module which the first tier supplier develops for that specific customer, the idiosyncrasy of the relationship increases in a significant way. The price-fixing process shifts from a bargaining power-based process to a long-term/partnership-based one.

Since the car manufacturer needs a complex module to be developed and integrated in its vehicle, the amount of information exchanged with the first tier supplier is huge. *The vehicle architecture definition is clearly still the core activity of the car manufacturer*, but design and engineering of parts and modules deeply involve first tier suppliers. Consequently, the relationship will not only include the usual commercial terms, but will become a mutual exchange of designs, projects, suggestions, changes and technical details.Two steps are therefore needed in order to implement such evolution:

- a shift from the classic tools of data transmission towards electronic communication tools and standard protocols is needed, that is the adoption of Electronic Data Interchange (EDI) systems, in their broad sense (standard protocols of data sending and receiving). The first step is a move towards *information flow integration*;

- the whole supply chain might gain in efficiency if the internal processes of each firm are planned and scheduled on real-time requests. Significant shortening of cycle times might be obtained through the adoption of Enterprise Resource Planning (ERP) systems, intended as a system (based on software packages) which is supposed to synchronize the resources required to optimise manufacturing and delivery of products, considering constraints such as lack of materials or capacity limits. This second step is a move towards *production process integration*.

2.3.3. The B2B challenge – Towards a single "Exit" model?

At first glance this evolution has been interpreted as an additional push towards a tighter partnership relation between OEM and OES according to the lines of the "Voice" model. However the shift from an information integration based upon dedicated links between a single automaker and a single supplier (EDI - type Odette) to an integration based upon an "open" internet-based network has opened new possible scenarios and new options between the "Voice" and the "Exit" model.

A turning point lies in the establishment by US automakers of information "portals" aimed at managing in an integrated way a range of functions between OEM and OES. In November 1999 there was the announcement by General Motors and Ford of the establishment of the respective web-mediated exchanges named TradeXchange and AutoXchange. But already in February 2000 there was the establishment of a new company, different from the previous two, and participated also by DaimlerChrysler, named Covisint, with the objective of carrying out a single wide ranging marketplace in charge of channelling and managing the multiplicity of information exchanges and of economic transactions among all automakers and suppliers interested to the initiative. From the standpoint of general objectives, Covisint appears as a complex reality in charge of managing a very wide range of relations indicated as Business-to-Business (B2B).

However, the initiatives taken by the company in this first stage have focused mainly on the management of outsourcing through tools such as the reverse-auction which are seen by suppliers as a mechanism aiming at driving supply costs down, in an "Exit" logic. As a consequence albeit we have seen a gradual increase of component suppliers among Covisint stockholders, some of them have raised worried judgements over the mechanisms triggered by the present B2B tools, and over their effects on the type of partnering which will take shape between OEM and OES.

On this topic the analyses available so far come almost exclusively by consulting companies. The picture which their documents tend to sketch tends to be aligned with respect to the direction of the transformation:

- they forecast a wide and general diffusion of integration mechanisms based upon ICT tools, seen as powerful tools for peer cooperation between OEM and OES;
- they estimated that the use of new telematics tools will generated a significant increase in the efficiency of partnership relations, generating wide-ranging economies;

- they imply that, given the scale of the cost savings yielded by the use of the new technologies, the new organizational forms will be shaped by the need to fully exploit such tools, hence they envision an evolution which we could define technology-driven, rather standardized in the structure and in the operational forms, differently from those currently in place, which are rather different from case to case, since they are designed starting from the path dependency of each automaker and its own competitive strategy.

The questions brought along by such approach are manifold. Firstly it becomes evident that both the speed of introduction of telematics technologies for B2B and the capability of such technologies to re-design the partnership relations between automakers and suppliers depends upon the scale of savings which they generate. However not only there is disagreement over the estimates of the cost savings, but it is also quite hard to carry out a comparison since the studies neglect some aspects which are particularly relevant:

- they do not provide a clear definition of the area of activity which they intend to consider within the generic B2B label, hence the cost savings implied do not have a common basis for comparison due to the difficulties to understand their sources and the corresponding areas of application;

- the lower operating costs of the new structures integrated through the telematics B2B tools are not related to the size of investments (hardware, software and learning activities) required by new technologies;

- however, the area with highest ambiguity is the fact that such analyses, aiming in most cases at promoting the use of B2B tools, tend to lose sight of the complexity of relations in place in the automobile supply chain.

In conclusion one gains the impression that the common technology-based approach of such studies developed by consulting companies cannot but derive by the fact that they end up envisioning the automobile supply system (which they know to be extremely differentiated and complex) as based upon the exchange of standardized products sold by the supplier by a catalogue, hence oriented from its beginning towards an evolution of the partnering relations in the supply chain of the “Exit” kind.

2.3.4. Restraints imposed by the nature of components: Supply Segmentation

Aiming at highlighting the most recent tendencies in the relations between OEM and OES and their most likely evolution, we have tried to propose an articulated framework which allows to better grasp the complexity of the relationships in place and the multiplicity of trajectories still open. Focusing on vertical relationship, the forms of partnering would be different, according to the degree of standardization of the product delivered by the supplier. We can imagine a set of situations ranging from one extreme with a fully standardized product which is sold to any potential customer without any change or customisation (completely standard product) to the other extreme with a product designed and developed uniquely for a given customer on the basis of the indications provided by him (completely tailor-made product). We can then differentiate various situations which are gradually moving from one extreme to the other in four product clusters: (1) completely standard product, (2) semi customized product, (3) customized product, and (4) tailor-made product. And then elaborate a classification of the relationships between first-tier suppliers and automakers which mirrors the type of product exchanged. The introduction of ICT tools will have different impact over the different exchange relations.

Hence we propose to highlight the fact, which is absolutely straightforward, that we intend to limit the analysis to B2B relations, by specifying however that even within this limited set of phenomena there are many partnering relations which are deeply influenced by ICT. What one must not forget is that the type of impact of ICT can be different, and even very different, if one considers one activity at the first tier or another, that is if one moves within an activity which lies within the various activities in a lower tier.

2.3.5. ICT Driven Solutions and Industry Competition Driven Solutions

Firstly we must underline that the evolution of partnering relations in the supply chain will not be homogeneous because the differences in the operational conditions are many and such to rule out a common evolutionary path. The information tools will be more wide-ranging and more important to define the aspects of the future transformation, depending on how much they will applied to non-specific realities. Going back to one of the two extreme cases of partnering, in the case of exchange of a "completely standard product" it appears reasonable to assume that we will see an almost exclusive implementation of relations mediated through an electronic marketplace. In such case the identification of the product features (which are rigorously standard, such as the MRO products) appears much easier compared to a tailor-made product; hence all relevant aspects in the transaction (excluding the final physical delivery) can be developed and concluded over an information system, minimizing the times needed to select potential suppliers, and applying reverse-auction mechanisms for the selection of the supplier who, with respect to the individual procurement need, is capable of providing the best conditions for the OEM. This is a form of interaction completely led within conditions defined by the information technology which is used. In other words the minimization of transaction costs needs the application of an organizational solution of the ICT driver kind.

These are partnering forms which will tend to evolve more and more towards "Exit-type" relations, since there is an evident and easy interchangeability of suppliers depending on economic conditions (price and service) proposed to any individual auction. From this standpoint there are some signs indicating that even the firms which in the past were most supportive of "Voice"-type partnering relations (such as Toyota), are evaluating, given the results achieved by the Nissan Revival Plan on the procurement side, the need to introduce the adequate corrections to exploit the advantages offered by the electronic exchange procedures.

On the contrary it appears rather reasonable to assume a different evolution in the partnering relations which involve highly complex operational conditions. Clearly the most evident case involves the supply of tailor-made products. In such case the relations do not end with the "Purchasing" function within the OEM and within the "Sale" function within the FTS. The relationships of exchange of ideas and mutual interaction are much more articulated and, even before the purchasing/sales functions, they originate from contacts between the designers of the two partner companies.In other words the evaluation of the component cannot be split from the evaluation of the competences of the supplier and of the sub-system integrator (when this is other than the supplier).

It then comes straightforward that when one considers tailor-made products, especially those featuring highly sophisticated technology, with high unit costs, there are a limited number of potential suppliers, since there will be only a very limited groups of suppliers capable of supplying the desired product. But it is very likely that the bargaining power, which usually considerably leans on the automaker side, is much more balanced and linked to evaluations which are more complex than those deriving from the mere exchange price. This implies also that the transaction economies which can be achieved through the use of marketplaces are less relevant.

Here there are forms of partnering which cannot be articulated in approaches driven by ICT solutions, whose strategic weight is much more reduced, and will be replaced by solutions of the industry competition driver kind.

The hypothesis which appears most sustainable is that even automakers more incline to "Exit"-type partnering forms due to their traditions and cultural models, will be forced to develop in the future "Voice"-type behaviours in all cases in which they will face negotiations involving tailor-made products, with high unit cost, and with a high technological level. According to the studies carried out, the reason for such need stems from the fact that in these cases the quality of the outcome will be directly proportional to the quality of the partnership developed between the OEM and its FTS.

2.3.6. The coexistence of "Voice" and "Exit" models

By developing the explanatory potential of the model proposed it seems reasonable to assume a vast process of concentration in component supply, in the case of standard products, as a response to the strong and systematic compression in product costs. Such compression appears sustainable mainly for competitors with favourable differentials in scale economies.

On the contrary it appears more likely a marked specialization strategy for manufacturers of tailor-made products, especially those with high technological content. In such case the aspect with the highest competitive advantage is the innovation capability. However such innovation has to be expressed depending on the objectives of the customer (automaker). This is another reason to underline that such outcome can be achieved only through forms of much tighter and prolonged cooperation between the OEM and its FTS. Given the more and more complex nature of the automobile product the outcome to be achieved cannot limit to a sort of relations between the automaker and the individual supplier, but rather a group partnership will be needed, where groups of first-tier suppliers will have to actively cooperate not just with their customer, but also among them to develop functional integrated and high-quality sub-systems.

3. Relationships between the core and the periphery of the European automotive system[7]

The CoCKEAS project focuses on relationships between manufacturers and first-tier suppliers, which are considered to form the "core" of the automotive system, and the

[7] This section is an abstract of the Workpackage Two synthesis written by Prof. Jean-Jacques Chanaron, CNRS-GATE and ESC Grenoble (See VII.. Annexes). Detailed references are indicated in this exhaustive paper.

other players involved in the automotive system, which constitute its "periphery". It therefore concerns all activities, and thus all companies higher up and lower down from the manufacturers and suppliers that play the role of systems integrators.

According to the initial programme proposal, Workpackage Two has three objectives:

- To analyse the impact of modularisation on second and third-tier suppliers and parts manufacturers and to analyse the growing role of design, styling, engineering and logistics businesses, bearing mind the fact that these functions are increasingly being outsourced.

- To study structural changes taking place in activities further down the chain: sales of new and used cars to individuals, and after-sales services.

- To analyse the impact of the Internet on distribution (emergence of new players and the new positioning of retailers) and of sourcing.

It would probably be over-ambitious, and would certainly be premature, to claim to be able to establish a stable analytical framework. It is thus quite intentionally that researchers involved in the CoCKEAS project have given priority to developing partial and provisional analyses, in two ways: analyses based on in-depth case studies; and general reflections arising from a particular issue or situation.

3.1. Activities and players further up the chain

As Figure 1. shows, the part further up from the core of the automotive system covers highly diverse and key players in the value chain. This includes parts suppliers and sub-contractors of equal rank or above the second-tier, independent research and design firms and suppliers of business support services (including financial services[8]).

3.1.1. Second tier suppliers and lower tiers

Experts and researchers alike have up until now paid little attention to those small and medium-sized enterprises which are often family-run and reduced to a role of simple executors of technical and economic instructions transmitted by their clients. However, numerous researchers have recognised their importance in the automotive system, principally in two areas:

[8] These are excluded from the current report because they are dealt with elsewhere (WP#3).

- Recent developments in the strategies of manufacturers and first-tier suppliers, which have been reflected by changes in vehicle design and assembly, notably the modularisation and commonalisation of platforms and core mechanical parts. The changes brought about in industrial organisation, i.e., in the value chain, obviously overturn the situation of second-tier suppliers and lower tiers.

- Due to globalisation, suppliers and sub-contractors of second-tier or higher are also seeing their situation develop rapidly all over the world. Within the CoCKEAS project, case studies on several European (France, Italy, Spain and Sweden) and non-EU countries (Argentina, Mexico, Japan and Thailand) have been presented and discussed have been presented and discussed.

The great majority of researchers recognise that there is a big issue of tier-by-tier restructuring (tiering) in the European automotive manufacturers' sourcing system and, by extension, of the norms and practices used by manufacturers and first-tier suppliers. It is true that these businesses really have no choice but to follow the paths marked out by others:

- In terms of international development, they have either to follow their clients and set themselves up in far-flung regions with very limited financial and human resources, for example in Latin America (Brazil and Argentina) and China, or take the risk of seeing a more dynamic and risk-taking competitor arrive to accompany the OEM in the delocalisation operation.

- In terms of components technology, they have to adapt at any price or see themselves excluded definitively from the range of organisations offering alternative techniques.

- In terms of industrial organisation, and notably with modularisation, they need to accept major repositioning, either with the increase in their value added if their components are to be integrated, and there will therefore be a consequent strengthening and diversification of tasks and competences, or a fall in added value if components are integrated from another supplier.

- In economic terms, they have to follow drives to bring down prices imposed by ever more demanding clients.

- In financial terms, they have to undertake material and non-material investments, notably research and development and training, brought about by the changes decided on and put into practice elsewhere.

With the extensive restructuring of the supply chain reducing the number of first-tier suppliers, and the downgrading of some to the second-tier or lower, the number of suppliers of inferior rank should increase. These businesses, which are mostly SMEs, therefore have extensive training needs.

The constraint of innovation capacities required by the transfer of design responsibilities from the latter to the primary stages, along value chain obviously modifies a great deal the situation of second-tier suppliers and sub-contractors. This is a question of survival and not of profitability or of short-term performance. Unfortunately, not all the small and medium-sized businesses in the sector are able to satisfy such a demand: there is a minimum size beneath which the capacity for innovation is very small.

Although the great majority of manufacturers have transferred the management of their own panels to first-tier suppliers, some also continue to use second-tier sub-contractors to be sure of obtaining the reductions in cost, the standards of quality, and, sometimes, the technological innovations they need. It is thus that Fiat practises "guided growth" for a number of its second-tier suppliers through a consortium called CONSAF created in 1998.

3.1.2. Suppliers of capital equipment

This is also a link which is not very well known in the automotive system, where everything points to the fact that observers consider capital equipment as nothing out of the ordinary, in the same way as they would a commodities market, because it is competitive, open and non-specific, that is to say it has the same nature as any other that is at the top of the order chain.

Nonetheless, three features deserve to be highlighted:

- On the one hand, the high level of involvement of research and design firms and the methods used by manufacturers and large suppliers in designing and developing their own means of production when particularly specific machines requiring "in-house" knowledge and skills are needed.

- On the other hand, the "subsidiarisation", or more often the disengagement of manufacturers from the design and production of standard equipment such as manufacturing workshops and assembly robots.

- Finally, an effect of the previous feature is the emergence of big industrial groups specialising in automotive-specific equipment: flexible workshops for large-scale machining (Mannesmann Rexroth, Comau), electrostatic painting units (Sames-Exel), welding and assembly robots (ABB, Fanuc, Fujitsu, Comau), etc.

It is clear that the capital equipment production and design sector is one of the sub-systems on which thorough research must be developed in the future.

3.1.3. Suppliers of materials

It is usually assume that there has been an alignment of the status of materials suppliers with the first-tier suppliers. This implies a massive transfer of responsibilities, notably with regard to research and development and innovation capacities due to the increasing importance of the choice of materials and the key competences rule.

Steelworkers, aluminium producers and producers of plastics or fibres have seen themselves entrusted with more and more research functions relating to the resistance of materials and alloys, and on the optimisation of structures. These are areas for which the required level of scientific and technical knowledge has been growing since the end of the 1970s to satisfy demand for lighter materials and safety. The transfer of responsibilities went as far as the sub-contracting of the production of structures to steelworks, aluminium works and plastics processing plants.

It was the same for glassworks, whose status in the automotive value chain has gone from being that of a supplier (certainly expert on their material, but at the bidding and under orders from the manufacturers and their partner first-tier suppliers) to being solicited for co-makership and innovation on the basis of research undertaken by them, often at their own initiative. Glass is also becoming an increasingly important feature in the design and supply of new functional applications.

In the case of foundry which OEM externalise largely, workers and toolmakers for foundry workshops must also adapt to co-makership, notably in order to be able to improve their responses to the frequent technical modifications imposed by clients. These suppliers would seem to have everything to gain from this earlier involvement in design and innovation: substantial gains in outlay, higher transfer prices, lower levels of investment for required changes.

3.1.4. Independent research and design firms

It is important to emphasise that the high number of car models offered to consumers owes a great deal if not everything to the design and styling firms – Pininfarina (Italy), Bertone (Italy), EAD, etc. – or to the designers of core mechanical parts – Ricardo (UK), Horiba (Japan), Schenck Pegasus (Germany), Le Moteur Moderne (France), Altran

Technologie, etc. –. Certain vehicles in the design process are exclusively the product of independent research and design firms (Pininfarina P3 project in Portugal, Matra M72).

OEM tend to externalise part of their R&D activities, and these intellectual services have risen steeply in the last ten years, a response to several complementary requirements:

- to deal with increasingly complex and diverse technologies;

- to diversify information and knowledge sources;

- to use new competences, up to now absent from research and design firms;

- to fight against the "not invented here" type of syndrome.

Also notable is the fact that in this highly specific sector of activities, big multinational groups that have imposed their brands (Altran Pininfarina, Bertone) and/or that have diversified into subcontracting the assembly of vehicles (Pininfarina, Karmann, Heuliez) co-exist with very small structures (MIM, Issa, Q, etc.). We can also see that there is a big difference between designers with their own brand (Pininfarina, Bertone and Italdesign), who are capable of imposing it on big manufacturers, and sub-contractors who design to order.

3.1.5. Suppliers of business support services

With the emergence of new information and communication, the growing role of this type of business is beginning to be systematically recognised. It is thus that the first in-depth analyses of e-commerce – business to business (B2B), and business to consumer(B2C) – emphasise the emergence of marketplace managers, ASPs (Access Service Providers), suppliers of software for e-commerce, etc. However, naturally, the phenomenon is at the same time new, very recent, and inherently unstable (see above 2. for B2B).

3.1.6. The main changes in the upper sub-system and the reasons for them

The main changes in relationships between the core and the periphery of the automotive system are as follows:

- *The continuation, and even accentuation of the trend of transfer of competences* to suppliers, and by extension a weakening of the competences of manufacturers and first-tier suppliers in certain fields and technologies, including R&D and design services. This trend is a constituent part of the movement of vertical disintegration which began in the mid-1970s. The strategic model of refocusing on the core business seems to be the dominant one, although not universally adopted, since certain manufacturers and large global component suppliers are pursuing an inverse strategy of reinforcement, particularly Toyota and PSA.

- *The continuation of the trend towards consolidation through mergers and acquisitions among suppliers.* This trend is well established among first-tier suppliers and is today extending to the whole of the sector, including the new business areas such as e-business. It is particularly noticeable in Europe, but also affects all regions of the world, including Japan, Australia, and Latin America.

- *Widespread introduction of strategies of modularisation and commonalisation* of platforms and components. The consequences of this on the peripheral players are still not well understood although they are believed to be significant: hyper-specialisation, downgrading in the hierarchy of components manufacturers and suppliers, change of status from supplier-partner to that of sub-contractor, elimination of local suppliers in favour of the foreign firms' subsidiaries. These strategies clearly provoke major changes in the "focal points", i.e. the centres of decision-making within local, national and/or regional supply systems or networks.

- *The entry of new players into the automotive system*. The increase in the use of new technologies (electronics, ICT) and of new materials (aluminium) has opened the automotive industry up to major players in the design and manufacture of components and sub-systems, even of modules (chassis). New technologies have also enabled new service providers to enter the system, in particular in the area of e-business.

- *The diversification of players and activities as well as an increasingly complex* sub-system of those peripheral players that are higher up in the automotive system. In fact, the division of labour in the value chain still seems to be getting increasingly fragmented. One can analyse this as a continuation of the process of hierarchical organisation or "tierisation", that was initiated in Japan in the 1970s and 1980s. We should also no doubt see this as a manifestation of the strategies for specialising on core competences.

It is important to underline that the beginning of 21st century could be characterised by a new stage in the evolution of the industrial system higher up the chain than the manufacturers, involving here all types of supplier, whatever their tier. This new stage might be marked by *the change from a hierarchically structured industrial organisation*, which was typical of the 1980s and 1990s, *to a network structure/organisation*, with a much greater degree of integration, and a high level of interdependency. Since the

1960s, supply system models of the nature of first-tier suppliers and of industrial organisation have evolved along the following lines: from *sub-contracting* to *simple partnership* (70s-80s), and finally *extended partnership* by the end of 20th century. FTS deliveries cover complete functions or pre-assembled modules. Organisation was transformed into a networked structure, underpinned by information and communication technologies (EDI), in which «everyone co-operates with everyone» within projects or platforms.

The debate on the extended automotive enterprise higher up the chain than the manufacturers is wide open. Co-makership (or co-design) is a widely developed practice today. It is the expression in practice of a new distribution of design and research responsibilities. It is a clear manifestation of the way competences have been redistributed.

In addition, the emergence of the "built to order" model or customisation of orders, which seems ultimately to be inevitable, could call for an extension of the network model lower down the chain from the manufacturers, involving distributors and, at the extreme end, the consumers themselves. It is possible that we would then see an integration of the sub-systems both higher up and lower down the chain, which obviously would not help to simplify the automotive system as a whole.

3.2. Downstream activities

3.2.1. Distribution: the emergence of a new organisation

A majority of network researchers highlighted changes, not to say upheavals, affecting the car sales sector in its widest sense, that is to say including the distribution of new cars, used-car sales, motor trade and repair, as well as the associated financial/credit and insurance services.

These activities became a major strategic issue for numerous players, first and foremost the manufacturers, for whom they represented in some respects the key to their survival because they took place at the interface with the final users/consumers. In a context of increasing competition and struggle for market share, mastering customer relations became crucial, with virtually universal slogans such as customer satisfaction, loyalty, transparency of information, etc.

Control of the networks

The European distribution model has for a long time been based on the model of exclusive and selective distribution, which gives manufacturers almost total control over distributors, not only their subsidiaries, but also the dealers and the agents. When the Common Market was established in Europe, the car manufacturers used their influence to obtain a derogation from the regime of total freedom of movement for goods, which the European Commission advocates and has applied to nearly all areas of activity.

Since 1985, the European Commission has maintained the car industry's special status – known as "block exemption" – and it was renewed for seven years in 1995 under Article 1475/95. It should still be maintained beyond 2002, but with increasingly important changes to the restrictions imposed by the manufacturers with a view to lessening their dominant position.

The most important factor in the evolution of the dominant model of automotive distribution is therefore of a legal and regulatory nature. The European Commission hopes to achieve a strengthening of competitive pressure, resulting in lower prices for consumers or, at the very least, an improvement in the services provided at constant/inflation-adjusted prices. It also hopes for a gradual aligning of prices to a European average, moving away from a situation in which there are wide disparities (up to more than 30%) from one country to another.

However the market itself is also pushing for a change in distribution structures and relationships:

- *The consolidation of traditional players*, which is giving rise to large multi-brand and multi-site groups, the "mega dealers", with a wide financial base, sometimes listed on the stock exchange, handling volumes of several thousand new cars a year, all of which puts them in an advantageous position for their negotiations with the manufacturers.

- *The counter-attack by the OEM, through subsidiary take-overs*; most manufacturers are increasing the number of subsidiaries and branches by buying up dealerships – Nissan, Toyota, Mitsubishi, Renault, PSA, Fiat.

- *The emergence of new players*: supermarkets, on the one hand, which are trying out direct car sales, and e-business/trade on the other hand, which as well as being a new channel of sales for the traditional players is bringing in new firms, supported by financial investors.

- *The growing importance of new distribution practices*, in particular the geographical concentration of brands on a single site, the so-called "*auto malls*", or the creation of town-centre agencies, the so-called "city shops", or again the "mega stores" such as AutoNation, CarMax (in the United States).

- *The gradual evolution of the car* from a symbol-product to a package of services which could mean a whole new ball game involving not only the traditional players but also other activities that have until now been independent, such as for example rental and infrastructure management, etc..

- *Strategies to slim down the distribution function*, adopted by manufacturers since the mid-1990s. It is a matter here of reducing costs in the distribution channel, starting with the assembly plants, limiting the number of vehicles in stock to a minimum, reducing the administrative costs of sales activities, and saving on logistics and transport costs, etc..

- *The gradual introduction of customised orders* (*build-to-order, matching*) which considerably changes the distributors' line of business, especially that of their sales force, who up until now were used to getting consumers to buy vehicles built *ex ante* by the manufacturer, but also those of the players further down the value chain. For example, the very nature of the service provided by transporters of vehicles has been changed from one of managing a delivery in terms of meeting a deadline, to one of managing the actual moment of delivery. These players would see their dependence on, or their interdependence with the manufacturers reinforced, which would lead to a strengthening of the contractual aspects of the relationship. Similarly, the stock management function of dealers, subsidiaries and agents will gradually disappear and be replaced by a role as information collector. Although this new model of manufacturing and distribution is still largely at the experimental stage, it is today being presented by manufacturers themselves as ultimately inevitable.

- Lastly, *technological changes*, which also drive change. On the one hand there is the growing complexity of diagnostic, and maintenance and repair technologies that is required by technical developments on the vehicles, notably with the increase in the number of electronic parts. On the other hand, the advance of new information and communication technologies (ICT) at all levels – taking of orders, forwarding of orders, sales management, customer follow-up, e-commerce, etc..

These changes are part of two fundamental underlying and concomitant trends:

- The overall evolution of the automotive system towards satisfying the needs expressed by consumers, and therefore from a system which was for a long time guided by the supply side (*supply push*), towards a model that is controlled by the market (*demand pull*). This is nothing extraordinary, and only fair in the sense that the automotive sector used to be an exception in this respect.

- The widespread evolution of competencies, which is true for all players. The significant increase in the average size of sales outlets leads to greater professionalism and specialisation, as well as the acquisition of managerial skills that resemble more closely those needed in large industries than those required by a family-owned SME.

These changes are however unlikely to constitute a radical revolution in the exclusive and selective distribution system that has been a feature of the European (and global) automotive system for more than fifty years which appears as efficient, even if changes are necessary.

The digitalisation of relationships

The appearance/arrival of ICT, in particular e-commerce, in the automobile distribution sector has taken two forms:

- Firstly, the digitalisation of business relationships between manufacturers, distributors and garages/repair workshops, between suppliers, garages/repair workshops and retail sales outlets (including supermarkets), falling under the heading of *e-business-to-business* (e-B2B) and therefore of intermediary market relations.

- Secondly, the digitalisation of the commercial relationship between the end consumers (individuals or organisations in the case of fleets) and manufacturers and distributors, which come under the heading of *e-business-to-customer* (e-B2C).

In the motor trade, everyone stresses that a range of strategies can be used, thus refuting the hypothesis of "one best way" in the area of e-commerce:

- *The entry into force of new players* such as AutoWeb, Autobytel, Carpoint, Automall, CarDirect in the United States; AutoPlanet, Autovalley, Car Clic, Caradisiac, Degrifcar in France, which, over and above the impact of their entry into an existing system, change the rules of the game by choosing to focus only on the most profitable operations.

- *Defensive reactions on the part of the traditional distributors* who are creating their own web sites.

- *The extreme caution of manufacturers* who are creating web sites with a high information content but hesitate about offering an online direct sales service, no doubt because they wish to avoid finding themselves in an awkward position vis-à-vis their dealers and agents. They do however indicate their intention not to allow other players to take the initiative.

It is true that e-commerce in the automotive sector is just as unstable as e-business in general, following the collapse of the new economy in 2000. Aggressive automotive e-commerce entrepreneurs did not succeed in imposing a strategic model such as those invented by Amazon.com for cultural products (books, CDs, videos, DVDs, etc.) or by e-Bay for auction sales.

The central question is whether e-commerce is viable as a radical break with the past in an industry that up until now has tended to be somewhat traditionalist in its approach to distribution. We can therefore find two diametrically opposed positions. Certain researchers, who are partisans of technological determinism, evoke its inevitability and defend offensive strategies of the kind "the sooner, the better" since the industry will have to take the plunge in any event. Others, who are more cautious, analyse the obstacles inherent to the automotive system, and in particular the personal relationship consumers have with their car. These researchers tend to dampen the optimism and reduce the Internet to a more humble role, which is that of a simple further means of obtaining information. See the concept of "citizenly distribution", which was already written about by Sloan in 1930, where automotive distributors are considered as key players in the life of local communities, family-owned and run SMEs having specific knowledge and know-how.

The emergence of e-commerce does not, in any case, challenge the traditional organisation of the distribution channel, but allows new intermediaries to emerge between the customer and the car manufacturer. They are providers of information to consumers, on the one hand, and suppliers of online automotive services on the other hand (insurance, price comparison, credit and, sometimes, initial price negotiation).

3.2.2. Motor trade and repair

Manufacturers and suppliers did not pay a great deal of attention to this area until the mid-1990s, when they realised they were losing ground to the new players and that this link in the system was, firstly, crucial for ensuring sales of new cars in the long term, and, secondly, a potential source of substantial profit.

The following major trends have been highlighted:

- *The continuation of the division of tasks within the automotive "trade and repair" system*, under the pressure of players who have opted for functional specialisation:

tyres (Michelin, Vulco, Tyre Plus), suspension systems, exhaust systems (Speedy, Midas), oil-changing, painting (TAC), windscreens (Car Glass) etc.

- *Increasing consolidation among players*. For instance, Speedy (Europe), Tyre Plus (UK), Apples Car (UK), Pit Stop (Germany) all belong to the Scottish group Kwik Fit, which was itself bought up by Ford in 1999 (resold in 2002), and which has a turnover of nearly 1 billion euros for 9,500 employees and 1,900 outlets in 7 European countries; Midas (Magneti-Marelli) has a presence in 21 countries with more than 2,800 outlets in 2001.

- *The sector is structured by the market*, in particular the different categories of consumers (as per income) and users (as per behaviour). The emergence of the traditional supermarkets and superstores selling spare parts and auto DIY material owes a lot to consumer demand as far as DIY repairs and maintenance are concerned. The same can be said for the increase in specialised quick repairs, which has been boosted by the expansion of the total number of vehicles on the road and their older average age, which also means cars are kept for a greater length of time.

3.2.3. Recycling

This is clearly a more recent area of study for the network researchers. They have been looking into the strategies pursued by the various players, first and foremost the OEM, from two main perspectives:

- Public policies, national or European, concerning the management of end-of-life vehicles.

- Manufacturers strategies for the design of new models in compliance with European standards or manufacturers' intentions with regard to "recyclability"; and the organisation of the recovery, dismantling and recycling industry.

The recycling sub-system is therefore affected by three main trends:

- The reorganisation of manufacturers and their suppliers.

- The entry of new players, or the change in status of traditional players, in particular the garages/repair workshops and the scrap-yards.

- Technological changes, in particular those related to new materials such as plastics and composite materials, steel and aluminium.

These issues will play an increasingly important role as far as the manufacturers are concerned, since they are obliged to take account of these questions at the design stage for vehicles and components, but also as far as sales and repair staff are concerned since they are directly involved, and finally also as far as consumers are concerned, who have to contribute to covering the extra costs of recycling, as well as the public authorities without whose intervention very few changes would actually take place.

4. New agendas for auto research: financialisation, motoring and present day capitalism [9]

Within the CoCKEAS project, Workpackage Three was about "intangible" or "invisible" activities. This rubric covers everything except the traditional productionist research agenda about cars and factories, product and process, which focuses on the industry on the supply side, facing the product market. The Workpackage Three proposal promised specifically to focus on two sub areas: first, "the financial dimension of the automobile system", especially the growing pressures from the capital market for higher returns; second, a concern with "motoring vehicle use" which covers demand or all the services and goods necessary to automobility.

To make this broad object manageable, the network concentrated its research efforts on six European assemblers (not the much larger number of component suppliers). Even so, much of this terrain was un-researched so that the network's initial effort went into empirical research analysing the ownership, governance, financial performance and behaviour of the European assemblers firms against their US and Japanese counterparts.

We have analysed what happens when capital market pressures for higher profit come up against firms (like the European auto assemblers) who operate in mature and cyclical product markets where margins are inevitably slim. Can this pressure be diverted or avoided by ownership or governance arrangements? How are performance and behaviour modified inside firms that must now not only reconcile stakeholder interests but also manage competing financial and productionist agendas? How do firms reinvent and reposition after financialisation by changing the products and services in their portfolio, especially in Europe where the car assemblers became credit houses in the 90s?

We've discussed also the motoring expenses. The issue here is not simply about the conflict of interest between consumers and manufacturers on new car prices. What are the cross subsidies and transfers which arise from the pricing of different elements like

[9] This section is an abstract of the Workpackage Three synthesis written by Prof. Karel Williams, Victoria University of Manchester (See •VII. Annexes). Detailed references are indicated in this exhaustive paper.

fuel, service and spares? These pricing decisions raise distributive issues because these products are consumed in different bundles by affluent buyers of new cars and by poorer consumers for whom motoring is the burdensome price of labour market participation. And, in the background, how does corporate capital strive to improve cost recovery by passing costs elsewhere to government, other capitals or consumers?

We do not claim to have exhausted our object, but we open a new research agenda and established some relevant empirics and developed some initial hypotheses regarding:

- the financial results and behaviour as well as the role of ownership in the European assemblers;
- the strategic move into car finance by the European assemblers as well as what's going on inside these firms under pressure for shareholder value;
- the complexities of use analysed from a broader view of distributive conflicts outside the auto firms.

4.1. Financial results and their conditions: an industry case study of the assemblers

4.1.1. The financialisation issue in the literature

Before we turn to report their arguments and findings about the European assemblers, it is necessary to establish some kind of context within which the research contributions of Workpackage Three can be understood. Thus, the next few paragraphs turn back to the more general literature on financialisation and discuss the relation of financialisation to mainstream discussions of governance before considering some of the differences in position within the general literature on financialisation.

The financialisation literature represents a series of critical political economy takes on an object that overlaps with what is more generally and variously discussed as governance. The Anglo-American literatures on corporate governance in the 1990s are voluminous and diverse. But, in sources such as American finance literature or official agencies such as the OECD, the message is that the firm exists for the benefit of the shareholders who own the firm and who should exercise control so that the interests of management are beneficially aligned with those of the owner shareholders around the pursuit of profit.

This narrative of capitalism is already challenged by events since 2000. The pursuit of shareholder value through income and share price appreciation appeared plausible in the decade long economic upswing of the 1990s in USA and Europe which also coincided with a bull market. It looks as though it is now going to be much more difficult to create value in recession in the early 2000s. Furthermore, as US regulators must now admit, the decade-long pursuit of return on capital employed (ROCE) led to corporate accounting finagles which overstated earnings, shifted debt off-balance sheet and hid risk. Meanwhile, the use of stock options to align management with shareholder interests motivated senior management at Enron to enrich themselves while more junior employees lost their life savings in worthless 401(k) schemes.

But this narrative of capitalism also needs to be criticised through careful empirical research into existing patterns of ownership and performance, as well as behavioural differences and correlates inside and outside the firm. Before we report on our conclusions which take up this challenge for the auto assemblers, we must begin by recognising that terms like shareholder value and financialisation have been used in several different senses by authors who advance different definitions of the process and its consequences. Our conclusion must be understood in this context.

- In terms of general definitions of the process of change, one issue concerns the relation between financialisation and shareholder value. Some authors elide financialisation with 1990s shareholder value, the bull market, the new economy bubble and the cult of new issues and equity shares which it sustained; while others are concerned with broader patterns of household savings and corporate interactions with the capital market (bonds as well as shares) so that 1990s shareholder value appears as one phase in a longer, ongoing process.

- In terms of the consequences of financialisation, another important issue is about whether the response to capital market pressure is coherent or contradictory: some authors associate financialisation with a simple behavioural response by corporations; while others associate it with accumulating contradictions and complexities for management.

These differences about financialisation are important in two respects when evaluating the arguments and findings in our Workpackage Three about European car assemblers and the capital market. First, the absence of a simple externally observable mechanical response to financialisation, in terms of increased distribution to shareholders, is entirely compatible with accumulating internal contradictions for management. Second, if ownership arrangements protect under-performing firms, the failure to generate shareholder value from operations is not the end of the matter insofar as firms are caught in a network of relations of dependence on the bond market or banks. The implication of this argument is that, if shareholder value was a contradictory phenomenon of the 1990s, broader processes of financialisation may yet continue through the 2000s.

With these points made we can consider our main finding regarding:

- the financial performance of Europe's assemblers against their Japanese and North American counterparts in terms of ROCE and share price over the decade of the 1990s;

- the trend of employment and distributions to shareholders in these firms;

- the ownership arrangements of the world's major assemblers.

4.1.2. Financial performance of European car assemblers

The analysis of financial data show that shareholder returns in all the world's major auto assembly firms in the 1990s came mainly from the (undiscriminating) expectations of the stock market, not anything that the assemblers were doing internally in terms of operations. Many car firms track or outperform their relevant national index of large cap stocks in the 1990s because (most, if not) "all boats rise and fall with the tide". If BMW manages this in Europe, so does Ford in the USA or Toyota and Honda in Japan over the 1990s.

But, as a group, the assemblers have under-performed financially, in that their post-tax ROCE over the decade of the 1990s is well below the 12-15 per cent level then required by the US stock market. Excluding flash in the pan performances by firms, like PSA or Chrysler, whose products are temporarily in demand, we prefer to consider performance over the whole decade. On this basis, European assemblers like BMW, Fiat, Daimler/Chrysler, PSA and VAG all have post tax ROCE's in a range from 3.7 to 7.0%. This is much the same as that achieved by their North American competitors who are under pressure to deliver shareholder value and their Japanese counterparts who are not.

This basic empirical finding about ROCE from Workpackage Three is of considerable importance in two respects because it challenges what many have believed. First, it displaces the old 1990s preoccupation with explaining the exceptional success of one or few assemblers: in terms of financial results, the explicandum must be the general under-performance of all the assemblers. Second, in terms of post tax ROCE, there are no significant inter or intra regional differences because assemblers headquartered in Europe do not generally earn higher or lower ROCEs than those headquartered in Asia or North America: in terms of financial results, some common condition or cause reduces all assemblers to the same mediocrity where they are operationally viable but financially incredible.

Looking back from these results to the more general literature on financialisation, we can see that the assembly industry evidence confirms the supposition of those who argued generally that the results would be contradictory and incoherent because the stock market is unable to enforce higher returns. The principle that governs the rate of return on capital employed is not what the capital market rather ambitiously requires, but rather what the activity characteristics and product market allow: the problem of global car assembly in the 1990s was the group behaviour of the assemblers, with too much direct competition in most product market segments eroding margins in all the mature Triad markets. The water of generally intense product market competition drowns the whisky of specific firm competences (or regional and national institutional differences).

Put another way, under competitive conditions, organised capital and labour cannot set their own rewards. The stock market in the 1990s did no better than organised labour in the 1950s and 1960s, when labour played a leading role and had to be conciliated though it was, of course, always unable to get everything it wanted. Indeed, in many ways, the story of the assemblers is that, the 1950s and 1960s continued into the 1990s and beyond because these are firms where the claims of equity shareholders are subordinated to those oflabour. This is no doubt an oversimplification because the crises of the 1970s and the 1980s did have some effect in Europe. But, if we consider the European assemblers in the decade of the 1990s, the evidence suggests that, whatever the rhetoric about shareholder value, national social compromises have not been renegotiated in car assembly even if they have been renegotiated in other sectors. This could be demonstrated empirically by presenting data on employment and distribution to shareholders in world's leading assemblers since 1989.

4.1.3. Employment and distribution to shareholders

Employment totals are ambiguous because company boundaries change, especially in the case of GM which contracts by disposal, but also in the case of VW and BMW which grow by acquisition. And a time series for the European assemblers in the 1980s would show significant reductions in the 1980s when the European producers of small cars were under pressure to reduce hours per vehicle towards international norms. Nevertheless, the world's car assemblers (with the exception of Chrysler and Fiat) maintained or increased auto employment over the 10 year period 1989-99 in the decade. The response to recession after 1989 is very muted with employment maintained or marginally increased in most companies and 10% reductions at Ford and Chrysler. The inability to shed labour in recession is of course a long standing characteristic of the global assembly business not a peculiarity of the Europeans and helps to explain periodic profits collapse which is a long standing characteristic of firms which operate in cyclical product markets. Whatever the rhetoric about productivity increase and taking labour out, in car assembly this does not translate into labour shedding even under the pressure of profits collapse in turn down. And, in this respect again the European assemblers are no different from the rest.

An analysis of dividend distribution gives us another view of this old fashioned pro-labour and anti-shareholder weighting of stakeholder interests amongst Europeans and the rest. Cyclicality makes distribution very variable and complicates matters because most car firms distribute most of their profit in cyclically bad years. But if we look for secular patterns, we find that dividends as a percent of sales are higher in the US, but dividends as a percent of profits are in a normal range of 20-40% in the US, Europe and Japan. This 20-40% range covers BMW and VAG or Ford and GM or Toyota. Shareholders do not get higher distributions in the USA where pressure for shareholder value is long established, distributions are not clearly rising in Europe where the pressures are more recent nor are distributions consistently much lower in Japan.

What we see in the 1990s is the stability of traditional employment relations and distribution patterns in all the three major regions, including Europe, where the pursuit of profit for capital is generally undermined by industry specific factors in the product market and by the strength of organised labour inside the factory gate. One of the questions arising is why the industry does not restructure so that the leading firms acquire the market power that generates higher returns.

4.1.4. Ownership of assemblers and the role of friendly shareholders.

Analysing the structure of capital and ownership of 16 major assemblers, we concluded that most assemblers, including most European assemblers, are only partly exposed to the stock market when their ownership protects them from the wrath of value investors and from hostile takeover. We already knew that one founding family still holds a controlling interest at Peugeot, BMW and Fiat as it does at Ford and maybe Toyota; while national or regional government protects incumbent management at Renault and VW. Especially in Europe, a "national logic" of ownership prevails in what is often described as a globalised industry: 89 per cent of French institutional investment in autos is in French firms, while the corresponding figure in Germany is 98 per cent.

Most European auto assemblers are not for sale and friendly ownership protects financially under-performing assemblers from external stock market pressure. That's why

European (and other) assemblers survive despite their failure to deliver value for shareholders from their operations. But the absence of mechanical response still leaves unanswered questions about management moves and what's going on inside the firms.

4.2. Governance, strategic moves and the management of operations

4.2.1. Diffusion of shareholder value principle and financialisation within the European car companies

From a governance perspective, the findings of the CGEP project[10] on four European assemblers "under pressure from capital markets" have been presented and discussed. Governance is necessarily about regimes of accountability to shareholders or other stakeholders, and the question is whether there was a re-weighting of stakeholder interests in the 1990s which was subsequently reflected in improved financial performance or different behaviour. The research did not focus on the use of debt to finance the expansion of car credit at these companies and the analysis of VW, Renault, PSA and Fiat is effectively confined to interaction with the stock market. This interaction is considered under the special conditions of family ownership at PSA and Fiat and state protection at VW and Renault. These ownership conditions, in combination with weak financial performance, make issuing more shares unattractive to the existing owners who would dilute their controlling interest and already meagre returns with new issues.

If these ownership conditions also protect from threat of hostile takeover, nevertheless, all four European assemblers in the later 1990s rhetorically at least espoused a "shareholder value policy" of one kind or another as new languages, targets and financial incentives were driven down the organisations, with varying emphases. Any analysis of the consequences of this change in priorities is complicated because the industrial strategies of the four European assemblers were so different: Peugeot was moving further into autos while Fiat was part of a diversified conglomerate where the Agnellis were preparing to exit autos and have sold GM a put option on their cars business. The consequences of shareholder value policies under these diverse conditions are, as yet, unclear. But, the interim conclusion is that shareholder value appears to appeal most strongly to the underprivileged: the leading convert to value is Fiat whose market position and financial performance is currently very weak so that the possibilities of transformation are limited. Behind the shareholder value rhetoric, the governance approach discerns a predictable stand off between the stock market and companies that

[10] *Corporate Governance, Innovation and Economic Performance in the EU (CGEP),* a research project funded by the TSER Programme of the European Commission under the Fourth Framework Programme (Contract no.: SOE1-CT98-1114, Project no.: 053), coordinated by William Lazonick and Mary O'Sullivan (INSEAD).

are under little effective shareholder pressure to do what the product market in any case will not allow.

Nevertheless, financialisation is not an objective imperative but an object of negotiation inside firms, and it is interesting to analyse how and why this is so inside auto assemblers. A case study on German assemblers illustrates arguments about the limits of financial control on operating systems when financial targets are about what is required (not how it is to be delivered) and when car development and production depends on organisational learning and complex systems of action. Thus, auto assembler operations require some "room for manoeuvre" to draw on competences and co-operation for complex tasks. If this room for manoeuvre is being eroded by pressure for financial results in German auto assemblers, much now depends on whether "actors at the operative level" can provide the necessary "counterweight to the top management's primary orientation towards financial parameters".

Such an approach raises questions about whether and how the German assemblers can continue to mobilise their competences to make the mid and upmarket cars on which their industry's international success has hitherto been based. Social agency and actors become more important as the firm is increasingly the unstable amalgam of conflicting agendas and imperatives, as old distributive conflicts take new forms. The sociological study of industrial relations is not displaced, but instead renewed in a broader context which we'll analyse.

4.2.2. The strategic move to car finance

Drawing back from operations to examine corporate strategy on activity mix under pressure for increased profitability, the key development, in terms of strategic moves, for European assemblers in the 1990s was their push into car finance. In those European assemblers, principally Fiat, BMW and VW, where we can track the number of vehicles financed over 10 years, the percentage of new vehicles financed rises over the decade of the 1990s: the rise is from 10-27% at VW, or from 16 to 35% at BMW excluding leased vehicles. By the end of the 1990s, the European norm is that 25-40% of new vehicles are now financed by a credit subsidiary and, if we add in leased vehicles, the percentage is higher. In the 1990s, the European assemblers all became *hybrids who mixed assembly and car finance*. This strategic move aligns the European assemblers with their Us counterparts (Ford and GM) whose long established credit businesses account for 50-70% of their assets and differentiates the European assemblers from their Japanese counterparts (Toyota and Honda) whose finance businesses are much smaller.

Was this shift into car finance a shrewd strategic move? As the incoming chief executive of VW explained at the 2001 Frankfurt show, European assemblers believe that car finance could make the difference between success and failure in terms of assembler profitability. Against this, we suggest that finance was a double edged sword, which raises questions about whether the shift into car finance has taken European assemblers beyond their established competencies and increased assembler exposure to risk. Car finance was attractive because it promised non-cyclical, solid profits. But these profits required the car assemblers to first borrow what they lent on to retail customers so that they had to expand their capital base which deteriorates their ROCE. The shift into car finance also voluntarily ended the assemblers' self-financing status and generally made the European assemblers dependent on bank borrowings or bond sales. This exposed them to interest rate variation in cost of capital on a spread business where the profit is made by borrowing cheaply and lending dear and where the ability to borrow cheaply increasingly depends on credit ratings. The crisis at Chrysler in the early 1990s, when Chrysler's bonds were downgraded to junk and Chrysler was effectively forced out of the car finance business, is a salutary reminder of how things can go wrong for firms which are dependent on car finance. While the ongoing crisis at Fiat provides further evidence of how the future of finance operations and the threat of re-rating now drive crisis in cars

The review of management moves by CoCKEAS network researchers suggests some interesting provisional conclusions. The financial performance of the European assemblers is stubbornly (and predictably) untransformed by all this fuss about shareholder value. But the new pressure for profit has stretched competences in the organisation of development and production in Germany; and at the same time the push into car finance has produced hybrid firms (assemblers and credit houses) who have a different kind of exposure to risk which can no longer be simply reduced to the vicissitudes of product market cyclicality.

4.3. Distributive issues: consumer against consumer, capital against capital

The analysis of motoring demand and use was an important objective for Workpackage Three because it broadens out the analysis of distributive conflict. In the old auto research agenda, distributive conflict was considered only at the site of the car factory where management and workers bargain about wages and effort in an explicit way. But, the new research agenda considers distributive conflict at many other sites including the car dealership and the legislature where product margins and business regulations are set so as to pass costs and benefits between different groups of consumers and different fractions of capital in ways which have hitherto not been socially recognised and debated.

If many distributive transfers and conflicts were invisible in the old auto research agenda, that was mainly because the old agenda of the 1990s rested on a kind of hypostasis of the consumer so that the only consumer who mattered was the new car buyer at the end of the production chain. Researchers simply ignored the fact that most motorists never buy a new car and that most of those who buy new cars come from upper income households. Or anyway, researchers could not use these facts inside their analysis because they lacked a broad concept of demand and the motoring sector. The preoccupation with new car buyers inevitably encouraged the recognition of only one conflict of interest (outside the factory) between the manufacturer and the buyer of new cars whose interest was in low prices at the expense of assembler margins.

In practice, the conflict over new car prices is too narrow to make an interesting research object and in present day capitalism the conflict over prices of new vehicles (or fuel) so far makes for strong tabloid headlines and weak political interventions. The recent EU review of block exemption unsurprisingly confirmed the basic principles of the existing European distribution system. Assemblers, whose margins are modest, have once again been allowed to control (or anyway dominate) systems of exclusive distribution by franchised dealers who restrict competition between car wholesalers and retailers in all the advanced countries. Protests about fuel prices by truckers and other small businessmen may have influenced Treasury attitudes to raising fuel taxes in France and the UK. But, policy makers show little interest in the idea of motoring as a regressive burden on low income consumers which results from fiscal decisions on fuel and vehicle taxes, as well as pricing conventions and regulations about spare parts costs and road worthiness tests.

Against this background, exploratory researches done within the CoCKEAS framework register a series of points on the British and French cases which can serve as the basis for further inquiry into important and under-researched issues about distributive conflict and cost passing.

The concept of "the motoring poor" is hardly nonsensical or paradoxical when the UK has one car for every employee in the workforce and more than half of poorer waged families in the UK run a car. Nevertheless the problem remains for those with low incomes who live in areas with poor and expensive public transport, such as outer London: these are the "motoring poor" who need a car to get to work in a non-local job market and must make sacrifices in other areas of consumption to run an old, thirsty and unreliable car.

The car-job nexus is such that the car is needed to obtain a better job that, in turn, precariously funds the cost of motoring; then, at the end of a working life, pensioners have to make heroic sacrifices to remain mobile and retain their social lives. This is a world of constraint and sacrifice for mobility very different from that of the (new) car adverts, which identify motoring with freedom and self-expression. As the UK Family Expenditure Survey shows, in the bottom quintile of households by income, one in three households run a car and those that do run a car spend 29% of their disposable income on motoring with fuel alone accounting for one third of the total.

Using French evidence to highlight cross subsidies between the two groups in France, it appears that, for French dealers, service and spare parts generate the profit that covers the expense of selling new cars which are effectively sold at cost. The spares and repairs are disproportionately consumed by poorer owners of older cars, while richer purchasers are able to buy new cars more cheaply. The end result is "a system (of use) in which it can broadly be claimed that the poor are paying for the rich". Thus, the world of motoring not only includes transparently regressive burdens on the poor such as fuel tax; it also includes a variety of hidden transfers through spares prices and such like which increase the burden.

Many researchers will choose to concentrate on one aspect of the new agenda: those who are interested in capital markets will often not be interested in the motoring poor or vice versa. But the two aspects are of course interrelated and their connection defines present day capitalism as a non-system where distributive conflict intensifies whenever cost recovery falters.

The new agenda suggests that the underlying problem is a general one about corporate cost recovery right across Europe. In this sector, the car assemblers set the rules and transfer prices for consumers and other capitals so that they buttress the profitability of new car manufacturing. But, the assemblers also compete directly so that they give away their gains to new car buyers and the end result for all the assemblers is no more than mediocre profitability, cyclical risks and threats from other actors such as banks and supermarkets who could attack sources of profitability.

The old paradigm of auto research in the 1990s jettisoned a vision of the possibility of generalised prosperity and preferred instead to envision islands of partial national or corporate success. Instead the new agenda hypothesises that general unsuccess in generating profit encourages cost passing which, in turn, intensifies the inherent conflicts between groups of consumers and different capitals.

4.4. Conclusion

The narrative of capitalism built around shareholder value in the 1990s promised increased performance and general advantage. As this issue shows, the reality in European car assembly is untransformed performance and increased distributive conflict and the papers produced for the Workpackage Three therefore convey a distinctive message about present day capitalism and its accumulating (non fatal) contradictions and incoherence.

At this stage, it is possible to sum up what we have learnt from the new agenda research undertaken for Workpackage Three:

- The empirics on the financial results of European assemblers (contrasted with US and Japanese competitors) do not fit preconceptions about exceptional success or regional differences. The good news is that European assemblers perform no worse than their global competitors. Though, that is hardly call for celebration when all the world's assemblers are reduced to the same mediocrity by their competitive behaviour in mature product markets.

- The empirics on employment trends and distributions to shareholders again fail to establish any basis for differentiating European assemblers from the rest. In Europe, as elsewhere, whatever the rhetoric about generating more for shareholders, there was in the 1990s no massive reworking of the social compromise against labour and for equity shareholders. To that extent "shareholder value" was a damp squib and the old social compromises may have been strained in the 1970s and 1980s but survive in this one industry.

- The broader processes of financialisation have however influenced the management moves of European assemblers inside their assembly operations and strategically through their 1990s push into car finance. The end result is new sources of strain at the operating level plus a transformation of European assemblers into hybrids (part manufacturers and part credit houses) whose reliance on car finance creates new risks. It is uncertain whether the European assemblers have the competences required for the next phase of managing operations and balancing risk.

- Analysis of car use discloses a broadening sphere of distributive conflict outside the car factory. This is part of a new world of cost passing which sets capital against capital and consumer against consumer. All this takes place against a background of feeble cost recovery by assemblers for whom cost passing is way of buttressing profitability.

The old research agenda on autos claimed attention because it was widely believed that car manufacturing was part of the reason why the capitalism worked during the long boom (30 glorious years). The new agenda on motoring and financialisation should claim attention because it shows us how and why our economy and society cannot work to generate stability and a wider diffusion of prosperity: restoration of economic coherence is impossible because, although vicious economic recession may be avoided, corporate profitability cannot be raised at the behest of the capital market and, whatever is socially achieved through maintaining employment inside assemblers, car usage ensures social prosperity is unequally divided rather than widely distributed. Such agenda leads to new questions with regards to social cohesion in Europe.

5. The Changing Geography of the European Automobile Area[11]

A great deal of attention is being focused on the geographic organisation of the automobile production system in Europe, i.e., on the distribution of car and car component design, manufacturing and assembly activities. On the market side, the European integration of the automobile market is an on-going process: products (vehicles, product range, components) are homogenous, and the institutional supervisory framework throughout the EU-market is progressively harmonized and coordinated by the European Commission, which try to accelerate the prices convergence (even if significant divergences remain). On the production side, the spatial division of labour on a European scale is nothing new (this has in fact been building up throughout the second half of the 20th-century), but the continent's automobile production geography has been affected in recent times by a number of factors that the CoCKEAS Workpackage Four has analysed.

Changes in the EAS carry a threat of delocalisation (from the South to the East for labour-intensive activities) and give birth to new spatial dynamics driving the agglomeration of activities and the redistribution of the division of labour within the European area. This raises questions about the fact that the automobile system's extension towards new areas (and its reconfiguration of its existing relationships) has undermined the spatial organisation that had prevailed in this industry as the 20th-century came to a close, marked as it was by a clear hierarchical layering between core European countries and their peripheral zones.

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[11] This section is an abstract of the Workpackage Four synthesis written by Prof. Yannick Lung, IFReDE-E3i, Montesquieu University, Bordeaux (See VII. Annexes). Detailed references are indicated in this exhaustive paper.

This split between the centre and periphery provides us with a benchmark that we can use to characterise a mode of geographic organisation that has been validated by historians (Braudel, Wallerstein), geographers (Dollfuss) and economists (Krugman). It shows that centrality is the permanent feature of a geographic organisation that is based on the spatial concentration of its most complex activities, meaning competencies that mobilise economic factors (i.e., decision-making powers) and technological factors (i.e., design and production activities invoking a higher order and diversified type of knowledge) which are significant. Inversely, in the peripheral areas, activities remained largely dominated by impulses that are being transmitted from the central areas, and the competencies that are being mobilised are comparatively smaller. Their contours can change depending on the opportunities that the firms are encountering, and because of learning and developmental dynamics that will cause such areas to modify their positioning in the overall configuration. Between these two extremes exist intermediary (pericentral) areas covering various types of activities. This latter category exists because the gap between the two extremes remains a relative one, after all, and also because developmental dynamics are still no more than progressive in nature.

As such, our analysis of the European automotive area will be developed in two dimensions, meaning that we will be apprehending it both as an extension of a production space (i.e., a search for new peripheries) and also as a reorganisation of a spatial division of labour, a trend that has been marked by the intensification of intra-branch trade and by the localisation of intra-European investments.

5.1. The European Automotive System's Enlargement Towards New Areas

During the latter half of the 20th-century, the European automobile industry was marked by a multi-phased decentralisation of production towards new areas, once the first opportunities for European integration had let themselves be known. Concentrated at first in a few large agglomerations (Paris in France, Turin in Italy), this decentralisation trend was first felt by the countries that had signed up to the 1957 Treaty of Rome. For example, from the 1960s onwards, Belgium became a special host region for carmakers seeking to maintain a presence in Europe.

Starting in the 1970s, the outlook for Community expansion encouraged the automobile industry to grow into the Iberian Peninsula, mainly into Spain where several of the major OEM set up assembly plants. More recently, new investments have tended to be made in the Central Eastern and European Countries (CEEC) – without necessarily implying any weakening of the automobile industry's position in Europe's central regions. Quite the contrary, we should look at the way the industrial heartlands have resisted this move, before studying the modalities of the enlargement that has taken place towards the new areas in the East.

5.1.1. The resistance of Europe's industrial heartlands

Some of Europe's traditional automobile regions have been hit by the closure of a number of historical assembly plants – France (Paris region), Italy (Piedmont) or England – and a more limited number of more recent plants (as Renault-Vilvoorde, Belgium). Yet Europe's industrial heartlands continue to draw strength from their advantages, even as new assembly sites (including for the assembly of small cars) are being opened in the automobile countries' pericentral regions. The decision to locate new small car assembly plants (Mercedes A Class, MCC Smart and Toyota Yaris) in the industrial heart of Europe's automobile landscape attests to the attractiveness of these pericentral regions, which offer favourable workforce-based competencies; good supplier networks; market proximity; nearby (assembler and supplier) design and decision-making centres; and possible greenfields sites, i.e., spaces that have not yet been structured by the automobile industry.

Automobile production has risen continually in the EU member states, and the opening of Central and Eastern Europe has not broken this trend. The EU countries' automobile output rose for example by more than 1.9 million units between 1990 and 2000, with Germany and Spain having been the main beneficiaries of the extension of productive capacities.

Despite the fact that generic (standardized) components production was delocalised on several occasions towards the peripheral countries, the European industrial heartlands continued competitiveness in vehicle production and assembly is in fact a reflection of an automobile production that has been renewed, in the sense that it has become more complex. The accelerated introduction of technological innovations (electronics), the reinforced links between design and manufacturing, the broader basis of the recurring interactions between carmakers and suppliers during the design (and/or manufacturing) phases, without forgetting the proximity of the final market - all of these factors have consolidated the attractiveness of regions that offer firms advantages such as a non-price innovation-based competitiveness: product differentiation; and quality.

In a context of intense territorial competition, this attractiveness has also involved an overhaul of the sector's previous employment relationships. In actual fact, the threat of delocalisation is a powerful vector that enables firms (manufacturers and parts makers) to pressure EU labour unions into making concessions. For example, Volkswagen's 5000x 5000 project was negotiated in Germany with the implicit threat hanging in the air that this new production could be allocated to Portugal or to the Czech Republic, if need be. Often the immediate price for the maintenance (or expansion) of activity levels in Europe's regions is that workers are being forced to make concessions on pay and/or accept an intensive and flexible work organisation. Of course, this raises questions relating to the long-term sustainability of such practices: the increasing precariousness of actors' professional status (the outcome of externalisation, of precarious forms of work, etc.) may well be limited by economic and social factors.

5.1.2. The enlargement of the European automobile area

The opening of the CEEC and the perspective that they might join the Europe Union has induced a number of car manufacturers and parts makers to set up operations in these new spaces, with a view towards their ultimate integration.

The opening up towards Central and Eastern Europe

As was the case with the operations they had once set up in Southern Europe (and specifically in Spain), the carmakers' main purpose in moving into the CEEC has been to build new sites for the assembly of smaller vehicles. The attractiveness of these regions stems from a combination of factors:

- the move there is made easier by the fact that the products involved feature relatively lower levels of technological complexity (small cars, light commercial vehicles) and the generic components are based on technologies that are already well under control;
- labour costs can be relatively low (compared with the EU), even though the workforce is capable of offering solid technical competencies;
- the market's proximity explains the area's specialisation, since bottom-of-the-range vehicles are the only ones to offer a market volume that is sufficiently large for producers to be able to benefit from economies of scale. For instance, Ford and Opel closed some of their CKD vehicle assembly sites only a few months after opening them.

Unlike the Iberian Peninsula scenario in the 1970s and 1980s, learning processes are quicker now. This means that carmakers can move nowadays into production regions that are relatively complex (i.e., Audi with its TT assembly plant, production factory and technical engine centres in Hungary). Two factors explain why these countries' learning curve has accelerated:

- on one hand, the workforce's technical competencies and overall availability have created conditions that should make it easier for manufacturers to move up to a higher quality segment in the product range;

- on the other hand, automobile sector competition being what it is, it is impossible to reproduce scenarios that are based on a simple transfer of mature products and technologies into the peripheral spaces.

First of all, a market that opens up to international trade will soon experience an increase in competition that can lead to a relative extension of the local product offer. Consumers begin to expect high-performance utilisation qualities and will no longer be satisfied with obsolete products.

Secondly, as part of their shared platform policies, OEM renew their models frequently. Platform renewal rhythms determine the type of vehicle that is to be produced in light of the opportunities that are created when new sites open up and when models are replaced. This is how the Skodia Octavia and Fabia, for instance, became the first models to have been designed and produced in Czech Republic on the VW group's new shared platforms, and to have also been broken out into a diversified product range for the group's Volkswagen, Audi and Seat brands. The quality of the local workforce and the efficiency with which parts makers can be monitored are both factors that encourage this type of situation.

Still, certain countries' breakthrough (i.e., Poland, Hungary, Slovakia and the Czech Republic) should not hide the fact that disparities do persist. Nor should we forget the disintegration of the auto industry in certain nearby countries, such as Ukraine[12].

A competition between the South and the East?

This opening up towards the CEEC has raised issues relating to the role of Europe's other pericentral and peripheral areas, i.e., whether there should be a shift from the South to the East. More specifically, we should analyse the positioning of the Iberian countries that could become the main victims of this relocation of standardized (component and vehicle) product production and assembly activities towards these new frontiers.

[12] In 2001, three partners of the CoCKEAS consortium (IFREDE-E3i, GERPISA and GATE) have been involved in the study of the *Development of the automobile sector in Ukraine* for the Ukrainian-European Policy and Legal Advice Centre (UEPLAC), a joint European Commission and Ukrainian government centre supported by the TACIS programme.

The closure of Renault's assembly plant in Portugal and the concomitant development of the French carmaker's establishment in Slovenia may have raised the spectre of a general relocation, but this seems to have been an exception to a general trend defined by a strengthening of the automobile industry: 3.3 million vehicles were produced in Iberian Peninsula assembly lines in 2000, 1.1 vehicles more than in 1990. Spain consolidated its position by becoming the third-largest automobile producing country in Europe, behind Germany and France, as well as the continent's leading producer of commercial vehicles (with a quarter of total European output). It may well be that no new plants were built in Spain, but all of the carmakers maintaining a presence there modernise and expand their operations regularly, facilities that are very competitive at a European level.

Damaged by Renault's closure of its factories in 1998 and by Ford's closure of its CKD assembly plants two years later, Portugal's automobile production has become very dependent on the AutoEuropa plant that has been producing minivans under the VW, Seat and Ford brand names since 1995. Initially a joint venture between Ford and VW, AutoEuropa has been a 100% subsidiary of the German manufacturer since 1998. It is destined to only produce models under the name of the group's brands, since the other carmakers with a presence on this site are only involved in limited, but sometimes growing CKD vehicle assembly activities.

The design and the technological and organisational innovation competencies of both of these countries have developed as a result of a consolidation of their design and innovation capabilities. For example, Ford's Valencia plant was the first in the group to experiment with the idea of setting up a suppliers park; the design and engineering functions were consolidated by VW in Barcelona (200 employees) in an attempt to develop products for the VW group's sports car brands (Seat and Audi). In Portugal, the P3 project (Metrocubo) supported by national authorities results from the upgrading of local suppliers capabilities.

Looking beyond the Iberian Peninsula, there are further questions as to the Mediterranean countries' future role given their free-trade association with (or possible integration into) the EU. Asides from Turkey, the positioning of the countries in North Africa should also be discussed. Parts makers have had no qualms about setting up labour-intensive activities in the Maghrebi region with a view towards the production of certain components (i.e., wiring harnesses) but whether an actual automobile production activity remains here, mainly in Morocco, will depend on to what extent borders stay open.

The conditions in which new facilities are being established

The CEEC are still economies in transition, meaning that their automobile markets will continue to grow in a highly unstable manner. For example, new car sales in these regions can shrink by 40 to 60% within a matter of months. This volatility explains some firms' reluctance to set up operations in these countries, and it means that the carmakers who localise there will be searching for flexibility solutions that will allow them to come to grips with the significant economic risks they incur due to the impact their high breakeven points can have on corporate profitability. To reduce these risks, three solutions are possible: operations can be set up on a step-by-step basis; sales can be decoupled from the local market; and the sunk costs associated with entering such markets can be cut.

- Setting up operations on a step-by-step basis means following a standard approach: first a commercial presence; then a low-volume CKD vehicle assembly activity; and then maybe a more substantial investment, with the creation of an assembly plant. In the early 1990s, several car manufacturers (notably GM in Hungary [1990] and Ford in Poland [1995]) began to follow this cautious approach by setting up assembly activities that were good for a few thousand vehicles. The shift to the third phase never took place and these units were closed.

- The decoupling of sales from the volatility that is endemic to an emerging market presupposes a strategy based on exporting vehicles back to the more stable markets, and to the EU countries in particular. This is similar to the configuration that views such countries as peripheral bases to be used for exports back to the system's central markets (i.e., Audi's TT complex in Hungary) and also as loci where systematic efforts can be made to orient bottom-of-the-range products towards entry-level vehicle segments (i.e., the third family car in the industrialised countries, or else the first new vehicle for a young household).

- The lowering of sunk costs is part of an attempt to develop modular production, with OEM passing the modules' design and production costs on to their FTS (thereby syndicating risks). The social environment is also amenable to the introduction of modular production, since this involves a delegation of the modules' design, production and assembly activities to the suppliers. VW's Skoda Bratislava factory is for example one of the first sites in this group to experiment with a system in which FTS employees mount modules directly on the manufacturer's assembly lines. Renault's attempt to co-operate with Dacia in Romania to make a €5,000 car also involves passing much of the investment risk that is linked to the new design, and to the new factories being built, on to the parts makers who are associated with the project.

Such areas therefore become loci for experimenting with new forms of productive organisation and/or with technological innovation (i.e., when new models are launched). Does this undermine the current spatial hierarchy of automobile production in Europe?

5.2. The Geographic Distribution of Automobile Production in Europe

The location of automobile production activities in Europe has been affected by a double trend:

- specialisation, reflecting actors' desire to benefit from the opportunities offered by the markets' greater openness and by enlargement towards new zones;
- the spatial agglomeration of activities (clustering).

5.2.1. The dynamic of specialisation

The regional automobile system's integration process has led to increased international and interregional trade within Europe by encouraging a greater degree of production specialisation. This latter factor is particularly apparent when we analyse car manufacturers' assembly plants, both because of the platform strategies being pursued, and also because of the way in which carmakers choose their locations in light of a given host area's particular characteristics. It remains the spatial hierarchy that is the product of this process is not written in stone.

Platform strategies and specialisation

The platform strategies that all the major OEM started to announce in the early 1990s represent an attempt to come to grips with these different constraints.

Several OEM (especially multi-brand groups such as PSA and Fiat) are more inclined to allocate the production of the various models that are derived from one and the same platform to a limited number of assembly plants. By so doing they are focusing their flexibility efforts on producing an ever-increasing number of model variants. PSA for example gave up on its old idea of specialising each of its surviving factories by brand (Peugeot vs. Citroën), deciding instead to dedicate its French plants to one of the three platforms its two brands use.

This trend towards increased specialisation also applies to the sector's single brand groups (such as Ford, Renault and GM), firms that have been creating model variants in such a way as to be able to target different market segments using one and the same platform. Renault for example will be producing three vehicles using just one platform at its Sandouville plant, although these are cars that are meant to attack different market segments (medium-size, full-size and minivan). This regrouping can be explained by the difficulty of managing a constantly growing internal variety for variants such as body (3, 4 or 5-door, estate/station wagon, coupe, etc.). The difficulty also stems from the co-ordination problems that have arisen due to the fact that the modules' preparation has been externalised to suppliers who are located right next to the assembly sites (suppliers park).

This specialisation means that in the central regions certain carmakers will no longer have more than one supplier plant for their medium-volume models (top-of-the-range vehicles and minivans), whereas the production of high-volume (midrange and lower range) vehicles can still be spread out over several sites.

Although there has been a clear move towards greater specialisation, it is not the only trend worthy of mention. In certain instances where variety has remained relatively high (2 to 3 platforms or even more), this corresponds to different types of configurations, involving for example historical production centres whose size allows for an assembly of several models at once (i.e., Fiat at Mirafiori). Inversely, this can also involve assembly plants that are located in the peripheral regions (especially Poland) whose greater flexibility makes it possible to smooth out variations in the demand mix for one product or the other. Lastly, Japanese foreign carmakers Honda and Nissan only have a single passenger car production plant, so this establishment ends up assembling several models.

Elsewhere there is the example of VW which, after having experimented with regrouping the production of all of the brand model variants that it manufactures using a single shared platform located on one site, seems to have given up on specialising its plants by platform, preferring instead to maintain brand specificity: Seat production is essentially concentrated on the group's Martorell site whilst Skoda assembly takes place in the Czech Republic. The VW group's modification of its strategies for allocating production spatially (specialisation by brand instead of its incipient specialisation by platform) raises many questions. The change means that the group has to transcend a pure platform strategy (where its four brands' model variants would be split amongst four shared platforms) to move towards a combinatory logic that is based on commercial positioning (Audi and Seat for the sports car niche, VW and Skoda for technical cars) and modular strategy.

Nevertheless, the trade-off between specialisation and flexibility could lead to some reversal in such trends which are not irreversible. Reducing their overcapacities, OEM reinforce their assembly plants' flexibility to be able to reallocate rapidly their production depending on the commercial success (resp. unsuccess) of their various models, and strengthening their bargaining power with local unions or authorities by the threat of delocalisation (see the recent announcements of a two platforms by plant orientation for Ford Europe and of the assembly of some Seat products in Czech Republic for VW).

The assembly plants' dual localisation

The contrasting localisation of the assembly plants that are being used for top-of-the-range models or else for lower range models indicates a clear hierarchy within the automobile industry. The top-of-the-range models, characterised by a high level of technological complexity that mobilises specialised competencies and types of knowledge in an attempt to satisfy quality expectations, have been located in the traditional automobile countries' industrial heartlands, near their European markets (i.e., excluding their extra-European exports). Asides from Sweden, which has specialised since the very beginning in top-of-the-range products (Volvo, Saab), all such plants are located along the "blue banana", with (Southern) Germany, Italy and England dominating for deluxe and sports cars – vehicles that are hardly represented at all on the European periphery or in its pericentral regions (with the few presences of this ilk that are to be found here generally involving CKD assembly).

Inversely, small car assembly plants are much more dispersed throughout Europe. The search for economies of scale leads to higher volumes and to locations that are closer to the different marketplaces. It also induces actors to try to lower the costs that are associated with products whose level of technological complexity, whilst remaining high, is nothing out of the ordinary (given that the technologies incorporated therein are basically already well under control). As the new automobile countries are and will be entering the market with bottom-of-the-range products, the dispersed nature of Europe's small car assembly plants is a reflection of the historical development of its automobile industry. Note that these plants are still being maintained in the central regions, and that no real delocalisation per se has taken place for this type of output. Any extension thereof will therefore reflect the growth of a new market. Light commercial vehicle assembly, which is often derived from these same platforms and therefore carried out on the same lines, has tended to be mainly located in peripheral plants.

A function-based hierarchisation, renewed within a regime of permanent innovation

Design and engineering activities have been concentrated in the central areas of Europe's industrial heartlands, i.e., in metropolitan areas or specialised regions that not only agglomerate carmakers' development centres but also parts makers' and design and engineering firms'. Inversely, manufacturing activities, specifically when they involve standardized components and technologically stabilised products, have tended to be more readily localised in Europe's pericentral regions or peripheral countries.

The delocalisation of mechanical and electronic component manufacturing activities towards these regions seems to be a fact now, although we should not forget to analyse this in the light of the hike in production capacities that has resulted from the new markets' growth. However, the deterioration in trading conditions from 2001 onwards, marked by a slowdown in the growth of sales volumes and by increased pressure on costs, has tended to increase the vulnerability of those establishments that are located in the central regions. This includes any factory (often the oldest ones) that has turned out to be less competitive than the more modern recently built units located in the Europe periphery.

Nevertheless the reinforcement of technological capabilities in Europe's Southern and Eastern countries also encourages the localisation and development of design and engineering-related competencies. The confirmation of the activities that the VW Group's Seat and Skoda subsidiaries have been carrying out in this area, the emergence of a design pole in the Barcelona metropolitan area and parts makers' decision to localise their technical design centres in Eastern Europe (Audi's technical engine centre in Hungary), all are developments that translate a collective learning dynamic which has converted these regions into areas of technological and organisational innovation.

The hierarchy of the European automobile area has tended to reproduce itself, even though it has also assumed other forms as part of the regime of permanent innovation. This is due to the fact that the reinforcement of technological and organisational competencies in the peripheral regions, which derives from the collective learning processes that are associated with automobile production, has not reduced their lag behind central regions that remain the real movers of the "technological frontier". This hierarchisation predominates as a result of the complex arrangements it entails. There is room for innovation in the peripheral countries, but this no longer takes on the form of a continuous "spatial extension of the branch". The real schema is closer to that of an "archipelago" economy featuring an interconnection of innovation areas, each of which is characterised by a local innovation dynamic that is capable of assuming specific configurations.

5.2.2. Spatial agglomeration

Against this backdrop of permanent innovation, the different activities' clustering behaviour at each step of the automobile production process has tended to strengthen due to the complexity of the automobile product. This implies a co-ordination (and ongoing adjustment) of the many participants who take part in its various organisational structures. This clustering effect unsurprisingly impacts automobile product design activities, but it also affects manufacturing activities due to the polarisation to which the assembly plant configuration lends itself.

Concentrated design activities

Design activities represent a major competitive challenge for car manufacturers who are being forced to develop an increasing number of ever-more frequently renewed models, introduce new technologies, control quality and costs and shorten design-to-market lead times. Far from being a simple technical problem, the design of a new vehicle is a true "exercise in social relationships". Interventions by a wide array of different actors need to be co-ordinated: different departments within the firm (Styling, Product development, Manufacturing, Purchasing, Marketing, Finance, etc.); different specialists within the same department; the parts makers that will be designing and producing more than 50% of the vehicle's value (through co-design), etc.

Co-ordinating this diversified set of actors means developing a proximity relationship that is multidimensional in nature, i.e., it is technical (membership in a given profession), social (networking between various engineering schools), cultural (shared values-objectives regarding the product that is to be designed, identification with the company's plans), organisational (a shared history in the field, a shared experience with the different procedures that govern the product's development and industrialisation) and of course physical.

Firms therefore have to build up this proximity in order to optimise design organisation. For technological knowledge to be created and accumulated, temporally and spatially localised procedures must be in place. However, these procedures can also shut the organisation off from other modes of innovation management. The difficulty lies in managing internal interactions without cutting one's self off from the surrounding environment. Access to external resources exerts a major influence on the design process's functioning, due to the fact that interactive learning features a dimension that gestates outside of the design centre itself (access to production-related competencies or to more generic types of competencies such as basic research). The design activity lies at the heart of an interaction network that is both internal to the firm and also external to the firm.

As such, the carmakers' remoulding of their design organisation over the past few years has been explicitly geared towards a spatial concentration of their product design resources. The rationalisation of previously dispersed design activities is based on a co-location concept that the French carmakers Renault and PSA Peugeot-Citroën have specified at a "plateau" level.

Although every firm in the sector has already applied this general principle at some time or the other (each with its own specific modalities), most OEM have also committed themselves to building new design centres which are to be equipped with an architecture that will allow them to implement this modus operandi. For example, the Renault "technocentre" at Guyancourt should bring more than 6,500 persons. The same trend towards a regrouping of design activities can be witnessed in the components industry.

This clustering of carmakers' design activities has happened in urban agglomerations offering a cornucopia of qualified workers (presence of young graduates, proximity of laboratory, inter-firm mobility for engineers) plus access to diversified external resources (diversity of the various types of knowledge and competencies that are mobilised during the vehicles' design). This starts with the presence of parts maker and supplier technical centres, and includes easier connections to other design sites.

Technological districts represent another configuration used in the spatial agglomeration of design activities. These are regroupings of diverse sets of actors who find the complementary competencies that they need in the local environment, within the relationships that they entertain with other specialised establishments and with the local institutional infrastructure.

A number of these firms have developed engineering-related competencies that allow them to play a major role in a new model's design, or even in its vehicle assembly activities, especially when production runs are small (as is the case with coupé and roadster versions, or niche vehicles). It is within this same environment that we also find the small deluxe sports car manufacturers who maintain close relationships with the world of sports. This remarkable density is based on a fabric of highly qualified suppliers and subcontractors, notably in the region of Emilia-Romagna (Italy) and in Oxfordshire (UK) for Formula 1 motor car racing.

The assembly plants' new polarisation

The diffusion of modular production that has accompanied the move towards ever-greater externalisation has created a new form of polarisation for car assembly plants. The assembly site can cluster a whole group of workshops around the vehicle assembly lines, these being the places where parts makers can produce and prepare the modules that are going to be mounted on the vehicle. There should be no discontinuity between these workshops – they are to be just as integrated as if the firm were managing them internally.

In extreme examples of this configuration, suppliers establish their operations directly inside the transaction principal's plant (i.e., Micro Compact Car at Hambach, where the Smart is made), employing more than 60% of the on-site workforce). In Europe, where the development of a modular logic has led to a greater spatial concentration of automobile parts makers and manufacturers, this clustering has taken on a weaker form with the development of suppliers' parks located right on the assembly lines' borders. Nevertheless these supplier parks do correspond to heterogeneous modalities.

Modular production has therefore been the driver behind a polarisation dynamic that is based on an agglomeration around assembly sites which the FTS (the modules suppliers) are running themselves. Regarding modular production, spatial agglomeration offers three main advantages: (1) the management of logistical constraints is easier; (2) it allows to resolve in real-time the daily dysfunctions that companies firms have to contend with; and (3) it reinforces the interdependency between OEM and FTS.

Moreover, this form of spatially organised production activity does not occur in a vacuum. An initial stumbling block is the management of the employment relationship considering that disparities would be difficult to manage and would increase dysfunction risks in a system that has been rendered vulnerable by the multitude of interactions whose co-ordination has become necessary. A second stumbling block is related to actors' desire to create a modicum of coherency between the various actors' technological and organisational competencies. In modular production, the management of inter-firm relationships becomes a major strategic issue inasmuch as co-operation turns into the predominant mode of co-ordination for such relationships. Proximity in and of itself is not enough to resolve the problems caused by attempts to create a modicum of coherency between technological principles that are quite distinct from one another.

Such proximity configurations will vary, depending on activities they encompass. Modular production infers the existence of spatial concentration dynamics in a variety of locations. This mainly means a co-location in the central regions during the products' design and development phase, as well as a co-location at the point of assembly. The disjunction between the design area and the production area remains the rule, thus weakening the requisite interaction between design and manufacturing. This separation is likely to reveal certain dysfunctions, given that the automobile product is still characterised by a high degree of systematic coherency, one which assumes that close interactions exist between these two moments. The fact that the increasing remoteness of the design-manufacturing link is a product of the design activities having been regrouped into large centres provides a partial explanation for the industrialisation problems (delayed launch of new models, quality issues) that the automobile industry has been experiencing with some of its recent products.

6. Characteristics of the European Automotive System: Is There A Distinctive European Approach?[13]

The European car industry has had a strong start into the new century. After three problem-ridden previous decades, this is somewhat surprising. Only ten years ago, the Japanese auto industry had seemed to be invincible, the 1980s saw the French and Italian car industries on their knees, and in the 1990s the German car companies had to scramble to regain competitiveness. By the year 2000, the Europeans seem to have re-invented themselves and they were the ones to open the new round of mergers & acquisitions. Admittedly, it is not all roses with the European car industry, as the increasing difficulties at Fiat show and some of the European resurgence may be owed to protectionist factors, but some of the credit can be ascribed to good decision-making of European management and to differences in the approach the Europeans have taken vis-à-vis the restructuring of the automotive system. What might some of these differences be that set the European industry apart from its North American and Japanese rivals?

There certainly are characteristic features, specificities which support the hypothesis of a European distinctiveness:

- institutional conditions, industry policies of the EU and its member states (national flagships), industrial relation systems, tax policies, environmental regulations;
- the customer structure in terms of social characteristics, income, tastes reflecting for instance geographical particularities, structures of urbanisation;

[13] This section is an abstract of the Workpackage Five synthesis written by Ulrich Jürgens, Science Centre Berlin for Social Research, WZB (See VII. Annexes). Detailed references are indicated in this exhaustive paper.

- the industry structure in terms of OEM supplier, small and big company configuration.

On the other hand, a number of factors speak against the hypothesis of a distinctive European approach:

- For a long time now, American companies had a strong presence in Europe. The Japanese automakers have followed, and since recently stepped up the pace to increase production inside Europe. Thus, today around 1/3 of the automotive activities are being governed from outside of Europe. At least for the American manufacturers, however, it is also true that they have been part of the European automotive system for such a long time that their factories and practices in many respects more resemble European competitors than their own organisation in the USA.

- Many of the paradigmatic concepts in the automotive industry are of non-European origin. This is true for Fordism as well as Toyotaism and for all areas reaching from production organisation, to supplier relations and product development.

We discuss pro and cons concerning the hypothesis of a distinctive European approach regarding its automotive system, developing an international comparison of the structural changes occurring in the European automotive system as analysed in work packages 1-4 of the CoCKEAS programme.

Considering the size of the European Union, and even Europe, as a whole, certainly is a daunting assumption. There will be no attempt to define “European ness” in general and to average out differences between European companies which, in many cases, these inter-firm differences have shown to be bigger than the differences between European and Non-European companies in some cases. There are certainly huge differences between the European countries and the high degree of “diversity” itself can be seen as a distinct European characteristic.

Finally, the interest is not to develop a new (European) model. Rather the question is what is specific about the European approach from an international perspective. Is there a specific approach to co-ordinating competencies and knowledge? If this is the case – which measures should be taken to foster trends, modify elements of the approach, provide supports and enable actors?

6.1. European Level Automobile Policy

It is only since the mid-1990s that one can speak of a coherent European-level automobile policy. In its strategy paper on the automotive industry (cf. EU bulletin 7/8-1996) the Commission stated its intent to create an appropriate framework condition for the improvement of the competitiveness of the European car industry by:

- supporting R&D and training measures (a research programme on the "car of tomorrow"), the role of the car in a multi modal traffic system, the support of telematic applications, the programme of occupational training, etc.;
- strengthening the European motor vehicle industry's market presence vis-à-vis third countries;
- type approval of motor vehicles and their components;
- a modernising of the regulatory framework, the areas of taxation, safety and emissions;
- setting up a "dialogue group" of representatives of the manufacturers, suppliers, trade unions, users and European institutions.

Promoting internationalisation rather than Europeanisation, the EU policy mostly had a neo-liberal agenda: reducing state subsidies and opening up the European markets. This was accompanied by the support of R&D projects of the industry and measures regarding social and labour aspects.

The sector policy orientation which had emerged has been de-emphasized by the EU in recent years. The automotive industry, however, has always been a major "customer" of the various generic support programmes of the EU in the areas of training (FORCE, LEONARDO, etc.) and the various Framework Programmes for Research and Technological Development (RTD) from 1984 onwards.

In 1995, the Commission had installed a taskforce for the "car of tomorrow". A specific concern of the Commission was to foster inter-European research co-operation. The European Parliament in a resolution of 1997 urged the commission to extend the role of this task force to a strategic function dealing with problems of industry competitiveness as well as the environmental and safety issues. A point which is particularly stressed was that the Commission should pay more attention to social aspects and in this context the need for an increase in vocational training, more information and consultation of employees as well as protection against mass dismissals. EUCAR, an industry consortium, representing the research and development organisations of automotive manufacturers in Europe was established as part of ACEA in 1994. Two years earlier, in 1992, USCAR had been formed for pre-competitive research collaboration between the Big Three in the USA. While USCAR and the related partnership for a new generation of vehicles (PNGV, an industry-government research and development alliance established in 1993, succeeded by FreedomCAR in 2002) clearly focussed on new product technologies, EUCAR developed a more broad approach recently. Thus, in view of the sixth EU R&D framework programme (FP 6) EUCAR recently came out with a proposal on "road transport research" focussing on the three dimensions of environment, energy resources; safety for road users; and mobility and transport.

In assessing the impact of the EU level policies, it is important also to take into account the various programmes on aspects related to the "social dimension" (Delors) of the EU and measures in the area of labour and industrial relations.

The European works councils (EWC) are considered as the most striking example for a policy orientation which seeks to balance interests between capital and labour and between plants in different regions of the EU. EWC "help to foster exchanges of views and discussions which are essential for the development of multinational understanding of industrial relations. In years to come, these Euro work councils could provide the proper forum for addressing issues such as mobility, transferability of rights and equal opportunities".[14] The EWC constitute a supplementary institution for the representation of the workers interest. They do not replace already existing elected bodies in the member states. Their competencies remain rather low, they are limited to information and consultation, and only in recent agreements (signed after 1997) has the need for the timely provision of information and consultation been stipulated in the texts.

More than 1,200 companies operating in Europe (15 million employees) are covered by the legislation. About 500 companies had reached EWC agreements by early 1999. Most of them were concluded on a voluntary base in the early 1990s. Voluntary EWC agreements – with less binding obligations – remain in force, even if they do not fully meet the conditions set by the European Directive.

Extending the idea of a Europe-wide works council system a few companies such as, for example, Volkswagen have established world works councils on a voluntary basis. Carrying this development a step forward a first global code of conduct (declaration on social rights and industrial relationships at Volkswagen of June 2002) was signed

[14] CEC: Report Industrial Relations in Europe– 2000, Brussels (p.6).

between Volkswagen, the new VW world works council and the International Metal Workers' Federation (IMF). The VW-IMF code is largely based on ILO core labour standards.

The social dialogue at the supranational European level is the counterpart of the EWC. A voluntary bipartite dialogue process is currently being developed in 24 sectors. The initial dialogue is geared to identifying relevant problem areas for the social dialogue and trying to develop common "vocabulary". This explains why, at the present stage, commitments resulting from the sectoral social dialogue are still thin on the ground. A trend towards common policies, however, should not be confused with a trend towards a common system of industrial relations.

The goal of preventing negative social consequences of industrial change can also be clearly seen in the statements of the Commission concerning the organisation of work. The support of human oriented work systems has been an important element of all RTD framework programmes. Thus, the FAST-Research Program, set up by the European Commission in 1992, promotes the idea of an "anthropocentric production system". It is considered as an advanced manufacturing system which depends on the balanced integration of human skills, collaborative work organization, and adapted technologies.[15]

Designing the next steps, the Report on Government Support Programmes for New Forms of Work Organisation recommends that the programs should foster the introduction of holistic "high performance work systems" and the introduction of new performance measurement and reward systems.[16] High-performance work organization, according to this report encompasses new organizational structures (market and process orientated business units and semi-autonomous work teams); more flexible and less hierarchical working methods (flexible working hours, multi-skilling and job rotation); new business practices (quality management, continuous improvement); new corporate cultures (high-trust relations, increased participation, greater personal autonomy and accountability); increased investment in education and training; new performance measurement techniques and new reward systems (performance orientation, bonuses, profit sharing).

We can indeed observe a distinct European concern to align industrial policy aiming to increase competitiveness and foster ecological goals with elements of a social policy,

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[15] FAST (Forecasting and Assessment in Science and Technology) – Monitor: *APS Anthropocentric Production Systems. Modernizing European Industry*, Brussels: Commission of the European Community. DG XII – Science Research and Development, 1992.

[16] CEC: *Government Support Programmes for New Forms of Work Organisation.* A Report Prepared by Business Decisions Limited for DG Employment & Social Affairs, Brussels, 2000.

aiming to increase social cohesion, social dialogue, and a human oriented system of work with worker participation, a high emphasis on skills and trust relationship. There is nothing equivalent to this approach in the other two regions of the Triad. One may argue that this social element of the equation is too weak and mostly symbolical. It certainly has not prevented "unsocial" measures such as relocation of plants following cost differences within the EU. And certainly the reality in many cases is different from the EC's discourse and high-flying goals proclaimed in the various documents. One has to note, however, that there has been no comparable move towards the "low road" development model (seeking advantages of low cost production sites), like in the case of USA-Mexico. The European Works council provides a platform to co-ordinate interests and prevents whipsawing between plants within the transnational production system of companies. In this sense, a recent report on industrial relations and change states: "Industrial relations can make an important contribution to good governance and push forward the European strategy, fostering modernization based on a new social contract, exploring new ways to strengthen competitiveness with social cohesion, creating better prospects for employment and improving living and working conditions".[17]

6.2. Market Characteristics

The EU goal of achieving socio-economic harmonization between the European countries is still far from being realized even if we leave out the situation of the new entrants from Middle and Eastern Europe. The average purchasing power shows that there are deep socio-economic disparities in particular between the Northern and the Southern European countries.

Europe (EU member states and the Central and Eastern European Candidates) can be considered as a "semi-integrated market" if one takes into account the following dimensions:

- Product (vehicles, product range, components) are homogenous: small cars and lower middle range cars represent in the European average 60% of the EU-market.
- The institutional supervisory framework throughout the EU-market is harmonized and coordinated by the European Commission (technical and environmental norms, distribution regulations, competition policy).

[17] European Commission, Directorate-General for Employment and Social Affairs: *Report of the High-Level Group on Industrial Relations and Change in the European Union*, Luxemburg, 2002.

Intra-European heterogeneities (including price variations) are very small when compared with the differences between the European market and the world's two other major industrialized markets.

In view of the question of European distinctiveness, three particularities shall be addressed in the following: The high degree of brand loyalty in Europe, at least when compared to North America, the sports car and racing car tradition, performance car orientation and, thirdly, the Diesel niche.

(1) A fundamental difference between the North American and EU market in terms of customers is the number of cars per household. The average American new-car buyer is actually a "fleet manager", adding and subtracting cars from the roughly 2.5 vehicles per household. In Europe one is much more likely to own the one car. It seems plausible that brand loyalty is greater when one is replacing the one vehicle every five years or so, versus the American model of updating a unit within the fleet every two years or so. At least one is more emotionally invested and thus less price-sensitive if one just has the one vehicle.

(2) Sports and racing cars together with luxury cars have been a European specialisation since the beginning. While the enthusiasm for these cars is not Europe-specific, Europe has remained the lead market for performance-oriented customers meaning that technological improvements in the upper ranges diffuses more quickly into the other car categories. Europe also remained the world centre in the design and assembly of sports cars.

(3) Regulation has helped to shape and deepen consumer preferences, and this is true for all three Triad markets. In the course of the 1990s there is a clear tendency of divergence between the three main world regional markets.

- In Japan it is the rise of the mini cars (cars below 660 cc) which have doubled their market share from below 16% to over 30% (from 1990 to 2000); cars of below 2,000 cc made up 82% of the Japanese market in 2000.

- In North America it is the story of light trucks which make up about 50% of the total market today from around 30% in 1990.

- In Europe it is the Diesel story. The share of Diesel-engine cars increased from 19% to 42% between 1990 and 2001 while in Japan, and in the USA virtual nil.

Thus, the differences between the Triad markets have deepened in the course of the 1990s and the trend of divergence seems to hold on. Market structures, in particular since recently the "carving out" of the European market segment of Diesel-powered cars has contributed to the European resurgence considerably. Government regulation and the co-ordination of competencies and knowledge via research support programmes have played a crucial role as the Diesel experience has shown.

6.3. The Quest for an Alternative "European" Production System

This is an area where numerous attempts towards developing a European approach have been made by European actors. Since the days of George Friedman, the critique of Taylorism was the common denominator. The Tavistock Institute, the socio-technical systems approach, the industrial democracy and humanisation of work programmes carried out in various combinations of partnerships between employers, trade-unions and the state could be listed here. Beginning with the New Factories Movement in Sweden, alternative forms of production organisation were implemented since the 1970s, in particular the 1980s.

The Swedish work reforms triggered a debate in European countries. The "Swedish turn" of the production system debate was of short duration, however. At the beginning of the 1990s a shift into different directions took place. The Swedish-oriented alternative required far-reaching changes in the technical production structures, in particular a shift from the assembly line to a stationary assembly. A completely new process layout like at Uddevalla was not adopted by any of the European carmakers. But even the more modest versions of a Swedish-oriented approach such as stationary assembly of certain modules or the hybrid process layout of the Mercedes-Benz plant at Rastatt did not survive the U-turn.

One driving force in work reforms in the late 60s and the 70s – tight labour markets, the quest to make industrial work more attractive for workers. This driving force has disappeared in Europe. However, a strong orientation towards concepts of "good work" which had been developed in the course of the debate about alternative work concepts is still 'alive and kicking', in particular within the labour unions in some countries. A recent example is the concept of "The rewarding work organisation"© (ReWO©) in Sweden. Another example is the 5000x5000 plant now being set up at the Volkswagen Wolfsburg site. Nevertheless, the general impact of the alternative work design movement on operations management in European plants remained limited.

In an unplanned way, however, a link exists between the "new production concepts" and modularisation concepts. And as "modularisation" is a strong candidate for European distinctiveness in the present discussion, these concepts are still quite pertinent to our topic.

Modularisation concepts came up in the late 1970s/early 80s. They were a European particularity at first, even though the basic concept was developed much earlier and in different industry contexts. In these years, almost every European carmaker experimented with some kind of alternative to the assembly line by installing production cells, assembly islands etc. These modularisation concepts were OEM-centred, production-oriented, and driven by increasing product complexities and by automation projects. While some companies developed "modular areas" aiming at the improvement of working conditions, in particular in assembly plants where part of the assembly areas such as for doors, cockpits, seats were turned into stationery production areas with relatively long cycle times and some degree of job enrichment, other companies were more interested in designing a process which allowed a maximum degree of automation (VW experiment at Wolfsburg in site in the early 80s). This leads us to supplier relations as another area of European distinctiveness.

6.4. Supplier Relations

6.4.1. The structure of the supplier industry

The structure of the supplier industry, traditionally, had been quite different between the Triad regions. Characteristic for Europe was the large proportion of suppliers which were independent from OEM and had multiple OEM customers. There were three types:

- big multi-technology suppliers like Bosch;
- medium-sized, family-owned suppliers of modules in the pre-modularisation sense;

and

- suppliers of components, mostly small firms.

Only a handful of these supplier firms are publicly listed.

This structure differed fundamentally from the situation in the USA and in Japan. In the USA, after spinning off their in-house supplier operations to huge semi-independent supplier companies, namely Delphi and Visteon, and these companies due to their size and aggressiveness initiated a round of mergers and acquisitions. In Japan, since the 1990s, the dualisation between the Keiretsu approach which is pursued further by Toyota and an independent supplier approach which has been pursued by Honda and seems to be adopted by Nissan now, has been deepened.

The restructuring of the 1990s made the European supplier landscape a particular hot spot: firstly, many of the existing companies were too small to cope with the requirements of OEM regarding modularisation and globalisation and, secondly, with the Big Three US companies, as well as Fiat in Europe, spinning off their internal supplier base companies hungry for new customers were created which could only be found in Europe. The companies aggressively acquired European firms to gain access to OEM and to specific technologies. Other American companies, most of them publicly listed, followed benefiting from favourable stock-market conditions in the USA.

So we have a specific traditional structure coming under strong pressures for change – a situation which required and allowed new solutions. To what extent can they be regarded as a distinctive European approach? This seems to hold true for three areas: Firstly, modularisation and systems-supply capabilities; secondly, supplier parks and OEM/supplier plant consortiums, and thirdly the formation of regional networks of SMEs.

6.4.2. Strategies towards Modularisation

The assembly islands for cockpits, doors etc. at OEM mentioned above have, in the meantime, become a major business for suppliers. Facilitating this transition was one of the major functions of the crisis of the early 1990s. The tiering of the supplier industry received a particular thrust under these conditions: The suppliers of systems and modules would be the natural candidates for first-tier suppliers receiving sub-modules and components from the second-tier suppliers and they in turn buy their parts from third-tier suppliers and so on. Defining the modules in view of the various requirements in terms of developing a new product architecture, aligning the different needs and viewpoints of design, manufacturing, logistics and after-sales services has been a cumbersome process requiring an enormous engineering effort on the side of the OEM, and on the side of the suppliers which wanted this business, enormous efforts were necessary to acquire the engineering capabilities. Too often, an assembly module does not "match" the system's module (e.g., a cockpit is a physical junk encompassing structure, appearance, safety (airbags), and HVAC functionalities): the best rare exception is the seat, whose physical structure and conceptual function perfectly overlap.

This was to a large extent a European effort, less so in the USA, and much less in Japan. But it did not involve only European suppliers as was already mentioned. In the meantime the US carmakers had caught up and also the Japanese companies have opened up to the idea of modularisation.

In terms of numbers of suppliers for modules (and systems) the greatest concentration however still is in Europe. Thus the structural change in the automotive supply has been greatest in Europe. The trend toward modules and systems provides strong support to the trend towards "mega-suppliers". This set of capabilities required can only be provided by only a small number of players worldwide and the consolidation led to oligopolies of seven to eight top suppliers per module and system in 2000.

In an international comparative perspective, two different strategies of modularisation can be discerned:

- The Japanese OEM's, in particular Toyota and Honda, give their preference to functional modules with standardized interfaces and prioritise the optimisation of the vehicle global design. Out-sourcing is only one of the available methods to reach such goals. They prefer affiliated suppliers (Toyota) or suppliers with long-term relationships (Honda).

- The European and American OEM's give their preference to structural modules within a global coherence at the assembly level. They prioritise cost reduction through externalisation of supply and resource allocation to a limited number of core competencies. Suppliers should have R&D and innovation capabilities: therefore, they are large and global corporations.

6.4.3. The trend towards specialisation

Parallel to this development is a segmentation of the value chain and an increase in specialisation on specific functions. While the OEM largely controlled the "pyramid" from elementary parts and technologies over components, systems and modules up to the whole car integration and assembly in a direct and indirect hierarchical manner, we can now find a group of companies specialising on specific parts and technologies (for example KS, Mahle, GKN, Meritor). Another group specialises on systems and modules (examples are Visteon, Lear, Johnson Controls, Bosch). A third group specialises to become whole-car integrators with capabilities to assemble cars more or less the same way as the OEM do: for example Karmann, Bertone, Matra Pininfarina, Magna, Valmet, etc.). The existence of such a large group of independent specialised whole-car integrators can well be regarded as a distinct European particularity. To a greater or lesser degree these companies have also developed the engineering capacity to develop whole cars stopping short of the point of becoming brand name companies themselves. As a result of this tendency of specialisation the model of the "pyramid" seems less and less appropriate to describe the new configuration of actors. The networks model seems more appropriate. In any case, OEM will less and less be able to control their relations in a (quasi-)hierarchical manner as it lacks the competences to specify and control the work of suppliers in the way it used to do in the traditional system. The process of specialisation is continuing and, as a consequence, the roles of the various actors are changing.

The trends concerning the restructuring of the supply base deeply affects structures and strategies of all actors in the automotive sector. Deverticalisation of the OEM and the tiering of the supply industry means that suppliers have to cope with an increased volume and scope of work. At the same time they have to find their places in a changed configuration of actors. Most supplier companies no longer have direct contact to the OEM and, as a consequence, also lose the personal and informal contacts which in the past often had been the source of learning about new business opportunities and future directions discussed at the OEM. At the same time new technical concepts like modularisation require new capabilities to integrate different technologies and new capabilities to cooperate within supplier networks and with the OEM. This development leads to three types of challenges of co-operation across company borders.

6.5. Challenges for Cross-company and Inter-organisational Cooperation

6.5.1. Cooperation at the point of assembly

Related to the theme of modularisation but also induced by considerations of scarcity of capital, new concepts for integrated production sites have been developed during the 1990s. The "Europeanness" of this approach has to be relativised in view of the fact that Ford/US and GM/US pursued this approach also in planning for new factories in South America and in view of the fact that Nissan's European assembly plant in Sunderland played an important pioneering role in this regard. In North America resp. Japan, however, the car manufacturers proceeded much slower resp. failed in their efforts to implement similar programmes (the prominent example is the Yellowstone project of GM). Western carmaker in many cases also used new plants which were set up in the emerging markets as experimentation grounds in the 1990s (this is particularly true for Brazil).

There are different variants of the approach of modular supplier-integrated production sites:

- Supplier parks (Fiat Melfi, Ford Saarlouis, Nissan Sunderland, Renault Sandouville and many others).
- OEM/supplier Condominia (suppliers under the OEM roof) – Skoda, etc.
- the consortium approach – Volkswagen Resende (Brazil); MCC-Smart Hambach.

Albeit not most far-reaching the *supplier park* model has turned out to be the model most widely followed. In order to reap the benefits of just-in-time supply and proximity with their major first tier suppliers, many OEM have made arrangements with the local community to create such supplier parks adjacent to or at least nearby their assembly plants (see above).

The *condominium approach* goes a step further. In this case suppliers operate under the same factory roof as the OEM. Due to outsourcing and deverticalisation OEM often do not need the gigantic spaces of their legacy factories any longer and therefore offer part of their factory space to suppliers. Examples for this approach can be found, for instance, at Skoda in its huge factory in Mlada Boleslav. In view to industrial relations problems of keeping workers with different pay and representation structures under the same roof this approach has remained the exception, however. While the condominium approach can be found in Japanese plants, such as Nissan's Tochigi plant in Japan, union representation issues set limits to this approach in Germany and also in the USA.

The *consortium approach* goes a step further still. This approach has been taken in some cases where new factories were set up with suppliers sharing the initial investment for the plant and operating part of the plant under their own responsibilities while, operationally, being fully integrated with the other "systems partners" running the plant. Examples for this are Volkswagen's truck plant in Resende, Brazil, and the Smart assembly plant in Hambach, France. The "modular consortium" in terms of employment leaves the OEM in a minority position. The Achilles heel of such a set up lies in the production system of the suppliers and their control over quality and delivery from their own suppliers and in the industrial relations situation.

The integrated production-site concepts can be regarded as a European response to the Japanese supply concepts, the principles of which (just-in-time, in sequence etc.) have been adopted before already. While it has been developed by European carmakers – and implemented often with strong support by the regional state authorities, the implementation in many cases was first in new plants in emerging markets. With the new concepts logistical and operational management aspects learned from Japan could be implemented to a large extent while, economically, risks of lock-in effects could be avoided. The need to develop closer cooperation at the point of assembly leads to new requirements of cooperation across company borders and with new ways of risk sharing. In the view of the new approach the automakers have to develop capabilities to manage their extended modular enterprise.

6.5.2. Cooperation at the point of product development

The "model-offensive" of European carmakers in the 1990s – with the multiplication of niche cars mostly in upper price ranges – could not be facilitated by the OEM alone. Parallel to outsourcing components/modules design to FTS, a growing outsourcing of correlating development work to engineering service firms is observed. Companies like Daimler-Benz, BMW and Audi, who aim at being technology leaders in the automotive industry, thereby putting continuous pressure on developing capabilities in these firms. As a consequence firms like Edag, AVL, Bertrandt, Rücker, CADFORM, MSX Engineering, etc. quickly grew in size and a number of them developed full-car development capabilities ranging from styling and concept to prototyping. In the 1990s the proportion of external R&D for OEM increased to between 10 and 20%. At the same time engineering service firms played a critical role in substituting for capability deficits of the suppliers which now had to cope with a larger development responsibility. Engineering service firms were also key in developing modules.

Thus engineering service companies play an increasingly important role in the network for car development. Most engineering service companies specialise in either product or process engineering, and in either the engine-drive unit or the body-interior parts of the car. In view of the shortening of time-to-market requirements and in order to compensate competence gaps engineering service firms often become third partners in the cooperation between suppliers and OEM for new product development.

Empirical studies show a very complex picture of interactions between the various actors in these networks. A general problem of communication and cooperation in the new networks of product development exists with regard to protection of know-how and the development of indigenous competences by the actors. In this regard a new trend of trying to protect know-how via patents can be observed. This could indicate increasing problems with litigation issue hampering the knowledge flows needed for the seamless communication and cooperation between all partners of the network in the future.

6.5.3. Cooperation at the interface between the OEM and the small and medium enterprises (SMEs)

Networking is another area of developments which seem to reflect European distinctiveness. Networks of suppliers must be defined as an operative concept, involving both hierarchical and coordination mechanisms, in dynamic environments.

A couple of factors come together here which are not unique but fairly strong marked in the European context:

- the existence of "industrial districts" in a number of European regions (around Turin, Stuttgart etc.);
- industrial policies by state actors on different levels (European, national, regional);
- the policy of OEM to avoid becoming dependent on "mega-suppliers", a publicly stated concern of OEM;
- the potential of communication technology supporting network initiatives (this, of course, not just in Europe).

The new network approach currently pursued in numerous European regions is based on clusters policy which is a key dimension of the European policy[18] and largely engaged by local authorities in several automotive regions[19] to keep a competitive manufacturing in Europe and to attract new investors. The development of regional and transnational networks is also linked with restructuring processes of automotive multinational firms.

While similar initiatives can also be observed in the other Triad regions, the development of an active approach of organising small and medium companies on a regional basis in order to compete with global players seems to be very much a European speciality. Many of the elements of the cluster approach however are not new and have been practiced in some of the traditional automotive industrial districts for a long time. This is true for the traditional auto regions around Detroit, Stuttgart, Turin and of course Toyota city.

6.6. Niches and Specialists Related to the Sports Car / Racing Tradition

This is probably the most important area of European distinctiveness (see above). Among the factors which have contributed to the development of this complex, the sports car/racing tradition particularly needs to be mentioned. At the same time it is the most under-researched area.

Since the beginning, Europe has been the centre of niche luxury cars/sports cars/racing cars. While some of the big name companies in this field have been absorbed by bigger players (for example, Aston Martin by Ford), many have remained independent. These firms are in most cases embedded in a network of production, engineering, and other support firms. The formula 1 complex in the UK may serve as an example here: more than 30,000 people and around 200 small and medium-sized firms clustered around

[18] European Commission, *Regional clusters in Europe*, Observatory of European SMEs, n°3, 2002.
[19] Cluster Building and Networking. Analysis of transnational technology networking between existing clusters of SMEs and one ore more technology poles. Final report by agiplan for the European Commission, Directorate General Enterprise, Mülheim/Ruhr, 1999.

Oxfordshire in Southern England where are designed and assembled approximately three quarters of the world’s racing cars are designed and assembled, including the vast majority of the most competitive formula 1 cars. A similar though smaller network can be found around Bologna in Italy.

6.7. Conclusions

To what extent does it then make sense to speak of a distinct European auto system? To make it short “cons” and “pros” arguments could be listed.

“Cons”:

1) In terms of many – but not all – basic manufacturing concepts and models Europe mostly was a follower. This is true for the adoption of Fordism as well as Toyotaism, to name the most important ones. An attempt to develop an alternative European approach in productions/work organisation did not have a great impact (although interesting non-intended effects as was shown in the analysis).

2) There is a substantial presence of non-European carmakers and suppliers in Europe. As was shown they play an important role in introducing new concepts and practices.

3) Some of the new concepts were firstly implemented outside Europe due to restrictions and limitations here. Brazil and Middle and Eastern Europe in many cases have played a pioneering role in this regard.

“Pros”

1) Fordism diffused only to a limited extent and with modifications in Europe. Also, there has always been a strong anti-Taylorist attitude among European actors fostering the search for production alternatives. New production concepts which evolved out of this search played an important role in the development of modular production ideas and led to the outsourcing of systems and modules to specialised suppliers.

2) Customer structures and preferences remained markedly different. This supports the existence of niche carmakers and a tendency to look for scope instead of scale effects.

3) The industry could dispose of a large specialised firm structure for knowledge-intensive services. This is supported by a strong network of semi-public research

and training institutions. These institutes and academic training in general are to a high degree oriented at mechanical engineering/auto-related activities due, among others, also to the fact that the computer and related industries which would have divergent engineering resources could not take hold in Europe.

4) The national states have maintained an active role in supporting the industry in particular in regional policy programmes. This supported the development of capabilities (and thereby the sustainability) of the small and medium enterprise base of the industry.

5) Supplier relations are different from elsewhere in the Triad, with "friendly" links to a more independent supplier base and quite common.

On balance the pro arguments seem to weigh heavier. But these were mostly structural factors speaking for the existence of a (somewhat) distinctive European auto system. What are specific consequences in terms of knowledge and competences? The analysis has shown that such a distinctive approach may consist of three elements: networking capabilities; niche product capabilities for luxury/sports cars relying on an external engineering-service-firm potential; "co-opetition" capabilities in the relationship between OEM and suppliers/engineering service firms, i.e. governance forms allowing a middle way between Keiretsu-type of firm lock-ins and arm's-length relations.

If the future lies in the segmentation of the automotive value chain (i.e. a re-allocation of work across the different links in the chain) the European automotive industry seems to be specifically well positioned in terms of structures and capabilities already.

IV. CONCLUSIONS AND POLICY IMPLICATIONS

Following the EC guidelines for Final report, we will present the main conclusion of the CoCKEAS project regarding the transformations in the EAS (see IV.1.) and also about the conditions underlying cooperative research in social sciences (see IV. 2.) before to discuss their implications on automobile policy (see IV. 3.).

1. Main conclusions to be drawn from transformations in the EAS

Relying on previous work done by the GERPISA network that showed how many different productive models are to be found in the automobile industry, the CoCKEAS project has added new dimensions to analysis of car manufacturer strategies by re-focusing it on the study of relationships between actors within the EAS.

The automotive industry is a breeding ground for a few "meta-strategies" (like modularisation and externalisation). This acts as a magnet to many companies, and to consolidate their presence in this line of business they develop both singular productive configurations to fit their profit strategies and company governance compromises that are constantly being renegotiated. Such "meta-strategies" should be thought of less as unilateral directions that firms necessarily converge towards (a "one best way") and more as new strategic orientations around which each develops its own responses, depending on the internal constraints it faces and the economic and social environment in which it is operating.

Against this background, studies of the transformation of the EAS have underlined:

- the new phase that the ongoing restructuring of the value chain has entered, with a whole set of activities ranging from whole vehicle design to final product manufacturing and distribution to drivers;
- the ensuing thorough restructuring of the components making industry;
- the key role that service activities play in the competitiveness of the European automobile industry;
- the advantage of basing analyses on the intangible dimension of the EAS;
- the new configurations of the European automobile space.

1.1. Coordinating the value chain: design-manufacturing-distribution

1.1.1. Changes in the OEM-FTS relationships

The 1990s featured a new step in the automotive industry's long-term internationalisation drive, one that was associated with globalisation and with the reinforcement of inter-firm competitive rivalries all across the world (marked by a proliferation of mergers and acquisitions, both for the car makers and the suppliers). This was also a time of strong internal growth, based on crossed external direct investments between automobile regions. A rationalisation drive that was already underway began to take on a new strategic dimension insofar as it was now guided by the search for a closer relationship to the market, something that involved setting up new relationships with end-users (as per the tenets of a *make-and-deliver-to-order* approach). This meant that all automotive system interactions had to be restructured, from whole vehicle design to final product manufacturing and distribution to drivers. Whereas up until this point re-organisations had mainly affected firms' internal management organisation, this new strategic rationalisation drive centred on inter-firm relationships and on coordinating activities within the automotive system. Asides from exacerbating competitive rivalries, due to pressure from institutional investors globalisation also entails a search for greater financial profitability. This caused firms to focus on their core businesses inasmuch as this constitutes the source of their competitive advantage. It also led them to externalise activities for which other parties, notably the FTS, had an advantage in competencies and scale economics – this being the reason why carmakers/OEM delegated to FTS the main systems and modules design, production, preparation and delivery operations, as well as the management of relationships with lower tier suppliers.

In this sort of environment, cooperation between OEM and FTS became a key factor in the automobile industry's performance. The fact that Europe enjoys such a rich fabric of components makers (whether multinational or medium-sized firms) transacting with manufacturers encouraged the advent of new modalities of cooperation – as witnessed by the widespread diffusion of modular production, a system whereby a whole range of differentiated passenger car models are made out of a single shared vehicle architecture. In this domain Europe is ahead of the United States or Japan.

1.1.2. The impact of ICT

These trends were given a second wind by the recent diffusion of ICT, which broadened the potential for informational and operational integration all throughout the supply chain. The ability to exchange information amongst the system's various actors rose by a factor of 10, in terms of the mass, precision and speed of the information being processed. The much-desired transition from a push to a pull logic found new relays, and the ability to coordinate an entire chain of actors efficiently became a major strategic issue. Network relationships started to replace previously hierarchical relationships, and the link to the final market (the client) came to be viewed as the driver behind the supply system. The existence of an integrated information flow (EDI) was assumed even before that of an integrated production process.

But the generalisation of e-commerce (B2B, B2E, B2D, B2C) raised a number of issues. The diffusion of these technologies clearly was catalyst for change in OEM-FTS relationships, but the effects thereof were ambiguous. In fact, a distinction should be made depending on the nature of the component in question. Whereas the outlook for B2B seemed to be quite promising for standard components that could be purchased via a catalogue, it was not nearly as good for specific components, notably for items being co-developed by a car manufacturer and a FTS - actors that continued to face an abundance of technical or economic obstacles, but who were nevertheless supposed to be the drivers behind the innovation capabilities that had become so key to modern competitiveness. In short, it became quite difficult to assess the potential cost savings from B2B (supposedly the result of greater price competition) and from the diffusion of these technologies, especially since a number of barriers remained in place. It is important to relativise the overly enthusiastic vision of some observers and not to under-estimate the impediments blocking the dissemination of such tools. Building-to-order (BTO) kinds of approaches and the computerised manifestations thereof have all stumbled over big problems, relating to logistics and to the organisation of production. Because of all these hindrances, an approach of this sort seems nowadays to be more of a case of mobilising the sort of managerial concept one could use to improve some of the catalogues' availability indicators than a representation of future production systems.

Far from a generalised diffusion of such tools, what we should be predicting is a diversity of modalities that will vary depending on the nature of the component in question. Uncertainty raises firms' propensity to experiment. Moreover, rivalry between carmakers and suppliers (to see who can control these tools) is conducive to the proliferation of e-commerce platforms. Selectivity will probably mean the organisation of fewer experiments, but we can also expect a whole range of diverse configurations to materialise, especially since carmakers' strategic orientations are far from being homogeneous in this area.

1.2. Restructuring the automotive component industry

This change has led to a restructuring of the components industry, with a hierarchy having been established amongst those FTS that maintain a direct relationship to car manufacturers – basically the large multinational components making firms and lower tier suppliers that are being forced to deal with these new challenges.

1.2.1. Concentration and formation of global oligopolies

In the race to reach critical financial (R&D investments), economic (scale returns) and technological (access to competencies) mass, the sector has been swept by a wave of concentration, resulting in the formation of global oligopolies that covering the different segments of the components and systems market. Countless mergers and acquisitions have taken place in the past few years and will continue to do so for the foreseeable future. European components makers have widely internationalised into North America, Japan and the emerging markets, whilst North American (and to a lesser extent Japanese) components makers have considerably reinforced their positions in Europe by acquiring European companies or building new sites, notably in Central and Eastern Europe. Already confused at the OEM level (i.e., Renault-Nissan and GM-Fiat alliances, the DaimlerChrysler merger), the “Europeanness” of multinational firms is difficult to delimit for components makers.

This does not really matter if firms have been integrated into the EAS dynamics of cooperation, something they can achieve by moving strongly into modular production and/or by taking markets away from European firms (as Delphi, Visteon or Magna International have done). Of course, a close watch must be kept for signs of predator behaviour, wherein firms capture and misuse technologies, or else abuse a dominant position. Note that competition, especially when it is innovation-based, is usually limited to this latter situation.

1.2.2. Opportunities and difficulties for small and medium-sized components makers

In the hierarchized tiering system practiced by the suppliers to the European carmakers, SMEs clearly have to contend with a variety of constraints. These can generate major problems and even be fatal for a firm, or else force it to join forces with another company:

- demands for price cuts can have a ripple effect throughout the supply chain;
- an associated squeezing of profit margins on OEM deliveries, something that is difficult to offset with after-sales services;
- funding problems relating to:
    - the need to make investments that are onerous and even risky, due to the increasingly frequent renewal of models, launch delays and also because of the fact that some models are very successful whilst others are total failures;
    - fluctuations in orders associated with variations in demand;
    - the constant possibility that transaction principals will be fickle and change suppliers without warning;
    - the need to invest in R&D in order to be innovative, and in training so as to develop staff members’ level of competency;
    - cash problems stemming from delays in invoice payments.
- globalisation-induced constraints that convince SMEs to follow their customers into countries where they themselves are setting up operations;

- managerial problems that can be attributed to European SMEs' traditional dearth of managerial competency; the implementation of new organisational forms; total quality management; funding; the integration of ICT; adaptation to national and European regulations, etc.

Thus significant and growing responsibilities and costs do weigh upon parts maker and subcontractor SMEs. Transaction principals (manufacturers and FTS) ignore this when devising their own strategies and practices, since they themselves are under the cosh from the effects of increased competition and accelerated globalisation and thus tend to pass some or all of their own constraints on to the weaker actors.

1.3. Services, a key factor of the European auto industry competitiveness

By analysing the situation in EAS terms, we have been able to account not only for the components industry but also for the importance of the other actors, and above all for the wide variety of service activities that have helped to maintain the European automobile industry's competitive even as it has been suffering the effects of the present and deep-seated restructuring drive.

1.3.1. A dense fabric of design and engineering companies

The EAS is characterised by the very high density of its engineering and styling firms. These companies have been taking responsibility for a growing proportion of the design activities that manufacturers have been subcontracting out due to the rise in the number of models they offer (hence in the number of projects to be organised). This industrial fabric, mostly comprised of medium-sized firms (like Pininfarina) and even micro-companies, has made a major contribution to the European automotive industry's increased competitiveness, through the development of its design capabilities, and thanks to its specialised technological competencies (i.e., in mechanics) and intensive interactions with the European market (i.e., styling companies). These firms are now responsible for a large proportion of new vehicle development, either devising new variants of specific large series vehicles so as to offer niche cars (i.e., coupés or roadsters) or doing the overall design of a model or subassembly.

Some also took on a manufacturing activity such as niche vehicle assembly and are tempted to expand their competencies in order to be able to cover a wider spread of activities, becoming quasi-integrator. Such actors (i.e., Valmet Automotive in Finland, Piaggio in Italy, Magna-Steyr in Austria or Matra Automobiles and Heuliez in France) assemble vehicles, this being an activity that has been subcontracted to them by the major carmakers or else they manufacture the niche vehicles that the major carmakers have had a tendency to leave to one side (M72 by Matra, Pininfarina's P3 project in Portugal). The market's ever-greater segmentation offers niches where these actors could hope to position themselves.

The situation is more heterogeneous for the other commercial services to car companies, notably logistics and e-commerce. For example, the externalisation of logistics, which became a strategic factor in coordinating an automotive system's production activities, benefited those multinationals in this sector that were in a position to offer a global product range; and which wanted to take on new functions. Similar to an FTS in this respect, they relegated transporters to a lower tier subcontractor's role. The emergence of ICT created a confused situation marked by a proliferation of e-commerce firms (marketplace managers, Access Service Providers, suppliers of e-commerce software, etc.) due to the uncertainty in this area. When these technological and economic solutions finally stabilise, the configuration that will be replacing the current effervescence should be more stable in nature – but it difficult to conceive of this today.

1.3.2. Services relating to automobile sales and utilisation

Downstream, car companies will have to cope with the change of the regulatory framework for automobile distribution introduced in 2002, a change that is going to accelerate the reconfiguration of a sector already prone to the effects of inter-agent interactions and economic and technological developments. Encouraging traditional actors (dealers) to concentrate meant affirming the role of the major multi-site and multi-brand diversified internationalised groups (like Jardine, Inchcape or D'Ieteren), with manufacturers trying to rationalise their networks and homogenise their practices. It was also with this in mind that from the late 1990s onwards many actors were persuaded to assume control of some of their sales outlets via a process of subsidiarisation. Observers over the past decade have frequently referred to new actors' entry into the automobile distribution (retail, e-commerce) market, but this was somewhat anecdotal in reality. Furthermore, the new regulations (and more specifically, the separation between sales and after-sales that has replaced the "natural link" which carmakers were once able to get the market to accept) mean that it is more crucial than ever for automakers to figure out how they are going to control their commercial outlets and defend their consumer brands. In a sense, renewed forms of association between a whole set of commercial services (sales financing, insurance, after-sales service, maintenance, vehicle recalls, used car repurchases, etc.) are forcing the manufacturers into a head-to-head competition with any other candidate desirous of supplying customers with a whole range of general services. Automakers were already struggling to keep up with (the slow) changes in user modes and were offering forms of long-term rentals as a substitute for vehicle purchases, or else adaptable arrangements (i.e., possibility of several vehicles being made available) varying according to people's mobility requirements. Manufacturers are not the only ones to be positioning themselves thusly at present – nor will they be the only ones to do so in the future.

As such, automakers have had to rationalise their retail networks, cutting their high distribution costs and finding other arguments to dissuade potential competitors from entering these lines of businesses. The rationalisation trend encouraged concentration in the retail sector and diffusion of ICT as companies tried to exploit their polyvalent networks in such a way as to be able to offer customers a whole menu of services - something their competition would find difficult to match. For example, one of the manufacturers' main advantages is that they can repurchase a used car as part of a new vehicle sale. Based on specific competencies instead of on (rapidly dissipating) regulatory protections, this type of advantage was supposed to drive a reconstruction of brand policies that would in any event have led to a diversification of commercial approaches and an acceptance of the idea that the customer interface role should be shared with other service providers. Note that under the new distribution regime, the direct link with consumers could become weaker leading OEM to loose some understandings of the consumers needs, making necessary to develop new competencies to avoid such problems.

With this in mind, vehicle customisation is seen as one way for manufacturers to leverage their advantage, thus reinforcing the pull logic that assumes that the production process first starts when the customer orders his/her vehicle. Instead of having to sell the vehicle products that the OEM were forcing on the market at just any price (a system based on offering discounts, thus further eroding already mediocre profit margins), the distribution network is supposed to intervene in a more active manner. It remains that the difficulties inherent to an ideal "built-to-order" system, on one hand, and the relatively standardised and foreseeable nature of most customer demand on the other, persuaded the carmakers to give up on their excessively ambitious earlier goals, like being able to deliver vehicles only 3 to 7 days after they were ordered. Where requested, vehicle specification (customisation) could become the responsibility of the distribution network, or even of the logistical firms in charge of ensuring the new vehicles' transportation from assembly plant to dealer room.

With regards to maintenance and repairs, carmaker networks had to cope with the rise of specialised actors, and in particular with the rapid and cheap repair chains that they tried to counter through acquisitions (Midas Europe by Fiat via Magneti Marelli; Kwik-Fit by Ford before it was resold in 2002) or by building their own networks (Renault's launch of the Car Life rapid repair chain). Recent modifications in European automobile distribution regulations are doing away with the two rents that the carmakers and their networks had been enjoying. On one hand, carmaker networks are losing their rents on spare parts, which sales generated substantial profit margins. On the other hand, the regulatory modifications are also forcing carmakers to compete with independent repair shops on after-sales service and maintenance, although vehicles ever-greater electronic content infers specific equipment and competencies and therefore constitutes an entry barrier.

Finally, at the other end of the product channel, new European regulatory framework regarding recycling end-of-life vehicles have introduced just as great an upheaval in this area, with new technological and organisational competencies being mobilised and encouraging the emergence of new actors (or at least a change in the status of existing ones) as well as new forms of coordination between these actors and manufacturers - one example being the local inter-manufacturer cooperation modalities that make it possible for this group to cope with the new constraints.

1.4. A new research agenda for auto research

CoCKEAS studies have paved the way for a new research agenda for the automobile industry, one that researchers have tended to think about exclusively in productive system terms. The explicit incorporation of intangible dimensions has unveiled new logics that are linked to these productive transformations. This specifically applies to relationships between carmakers and the world of finance; and to the analysis of automobile utilisation systems.

1.4.1. Auto industry and Finance

By focusing on carmakers alone, our studies have accounted both for the way in which the general financialisation of the economy has affected the automobile industry and also for the intensification of carmakers' own financial activities.

After analysing company accounts from the 1990s, we have drawn three major conclusions from studies on car manufacturers' capital structures and on the impact of the rise in shareholder value principles.

- Firstly, car manufacturer profitability remained relatively stable during this period of time, and well below the financial community's requirements (a ROCI of 12-15%). In terms of the creation of shareholder value, the automobile sector did not perform well.

- Secondly, institutional investors (especially North American ones) continued to maintain no more than a limited presence, as most car manufacturers had a shareholder of reference, whether the State (Renault, VW), the founding family (PSA, Fiat, BMW) or a bank (DC). Those institutional investors that could be found were usually domestic ones, and often allies of the shareholder of reference.

- Thirdly, the diffusion of shareholder value principles seems to have only had a limited effect. Although a lot of work was done on financial communications and despite more selectiveness in investment decisions (thus reinforcing the move towards greater externalisation), corporate strategic decisions appear to have continued to be made with a view towards long-term strategic horizons, thanks to the presence of a shareholder of reference, this being a factor of stability and longevity.

However, the search for economic profitability did induce carmakers to look for new sources of profits, especially since greater competition squeezed margins on new car sales. As a result, the services that are associated with the sale and utilisation of motor vehicles began to seem like a new opportunity. With one eye on the profit rates achieved by North American carmakers like GM and Ford (largely explained by the companies' financial activities), automakers reinforced their capacities in credit financing (accounting for anything between 25% and 40% of a new car's price), often bundling this together with an insurance policy offer. In the end the banking activities they have developed were such that they had to turn to the financial markets to collect the necessary resources. This indebtedness made them more vulnerable to interest rate volatility and to rating agency assessments of their creditworthiness.

1.4.2. The incorporation of user systems

In addition to financing, carmakers have begun to offer packages that include financing, insurance and after-sales service provisions and reinforce their activities in maintenance and repair. This has evolved towards proposals that are tantamount to a "mobility service" offer. They have been forced to redo the range of services they offer in order to cope with recent changes in the automobile distribution exemption regime, which have destroyed the rents they used to enjoy. In the future they will have to learn how to extend their competitive watch capabilities, which have traditionally focused on their rival manufacturers, so as to keep an eye on other service suppliers coming out of areas like distribution, banking, insurance and rentals.

One of the main justifications for reforming the block exemption regime is the expectation that new car prices will fall as a result of greater competition, thus benefiting

European consumers. This raises a few questions about distributive justice issues. Analyses should focus specifically on motoring expenditures, notably those of the more underprivileged social classes that rarely entertain direct relationships with carmakers since they usually buy used and relatively old vehicles that they have acquired outside of a make's dealer network and which they get repaired or maintained by an independent operator. Thus, if the structure of household spending on consumption is taken into account, what we get is an upside-down image, with wealthier households devoting a large part of their automotive budgets to new vehicles purchases whereas the other types of expenditures (fuel, maintenance and repairs) are more predominant for the least affluent households.

In actual fact, automobile firms and their networks have a higher profit margin on product utilisation items than on new vehicle sales. This suggests that in the current configuration, the "poor" are paying for the "rich". If this were to be confirmed by more in-depth studies (the present analysis only touches upon the French situation), this paradoxical result would tend to indicate that another effect of the distribution regime reform will be a lessening of the social inequalities that up until now have been compounded rather than mitigated by indirect taxation and the structure of property rights. The new research agenda introduced new issues regarding social cohesion.

1.5. New configurations of the European automobile area

Finally, work done as part of the CoCKEAS project increased understanding both of the geographic challenges that are associated with European Union enlargement and also of transformations in productive organisation. Two main conclusions can be drawn from this.

1.5.1. Opening towards Central and Eastern Europe: limited fallout in territorial competition terms

The enlargement of the European automobile area was particularly marked by an opening up to Central and Eastern Europe (with manufacturers and components makers increasing their investments in this region). Enlargement has led to new types of territorial competition, with the new countries competing with the existing automobile regions, specifically in Southern Europe, to host production activities. It remains that the impact of these delocalisation actions (in the strictest sense of the term - closures or else lower activity levels in certain regions and displacement towards new sites) appears to be a limited one, with most new presences having been established in an attempt to benefit from growth in these new markets.

- Nevertheless, the newly established entities have to take into account the high level of volatility in these markets. Some car manufacturers and components makers share such risks by undertaking joint investments (co-location).

- Automobile output continued to rise in the Iberian Peninsula during the 1990s, suggesting that Southern Europe is still competitive with Eastern Europe.

- Europe's automobile industrial heartlands (Germany, France, Italy and even Great Britain) did not experience a massive delocalisation of automobile production. Not only did it preserve almost all of the more complex activities, but also new assembly units were still being built here.

1.5.2. The spatial agglomeration of automobile activities

The close cooperation between economic actors that was so key to the new interactions characterising the European automotive system translated into a reinforced spatial agglomeration of activities, at both the vehicle assembly and the design function levels.

- With regards to assembly units, many manufacturers showed a strong preference for getting such FTS units to set up in the immediate vicinity of their assembly lines (suppliers parks), and sometimes even on-site (i.e. MCC, Hambach). Suppliers prepare modules for vehicles that are in the process of being assembled in accordance with the requirements of a synchronously structured production sequence. This allows for a more efficient management of the variety of the models being assembled, and a quicker resolution of any dysfunctions that may arise. Note a very strong degree of heterogeneity in these modes of organisation due to the greater commitment of some manufacturers (Ford, VW) and the reluctance of others (especially Toyota). In addition, there is only a limited polarisation in the surrounding regional economic fabric: basically these are assembly activities that are being used as part of a module preparation sequence, manufacturing activities remaining centralised in a few large units.

- The spatial agglomeration of design activities is just as pronounced. Although certain delocalisation actions may have transpired, notably involving moves into Central and Eastern Europe, the trend has been towards a grouping of firms' design activities in a limited number of important centres situated in major metropolitan areas (i.e., Renault's Technocentre in the Paris suburbs), places where a firm's engineers and technicians can collaborate with its client and/or suppliers. In addition the development of concentrated clusters of small and medium-sized businesses offering highly specific technological competencies like styling (Northern

Italy); or else the motor racing industry in regions like Oxfordshire and Northamptonshire in Great Britain or Emilia-Romagna in Italy. In this latter instance design and production were united in the same location, as was the case for the bar turning industry in the Arve Valley (Haute Savoie, French Alps) and for plastics processing in the Oyonnax region (Ain, France). In any event, just because ICT diffused throughout the design function does not mean that distances no longer count.

2. Conditions underlying cooperative research in social sciences

The above proposals conclude the CoCKEAS programme which has been implemented under the aegis of the worldwide GERPISA international network (Group for the Study and Research of the Automobile Industry and its Employees).

2.1. The GERPISA international network

The GERPISA includes more than 300 members from 32 different countries. Linked to the Centre for Historical Research (CRH) at the School for Advanced Studies in Social Sciences (EHESS) and recognised as an "équipe d'accueil" by France's Ministry of National Education and Research, its administrative team works out of the University of Evry (Paris region). It receives financial support and complementary materials from French carmakers and their professional committee (CCFA), as well as from the European Union. It is managed by a steering committee composed of 24 members.

The network is mainly a regrouping of European researchers, including different members of the CoCKEAS thematic network consortium. It also includes researchers from other part of the world (North America, Japan, Southern Hemisphere countries) as well as professionals from the automobile industry. The network's longevity and rising strength is worthy of note, particularly when it is compared with another network, known as the IMVP (International Motor Vehicle Program) and organised by MIT (Massachusetts Institute of Technology, Cambridge, Massachusetts, USA). The IMVP is interested in the same field of study, but due to its operational modalities it has developed in a very different manner.[20]

The scientific activity of the GERPISA network is based on pluri-annual research programmes. Three main research programmes have been realized since 1992.

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[20] Michel Freyssenet "Parallel history: IMVP and GERPISA", in *La lettre du GERPISA*, no.151&152, March and April 2001.

- Under the scientific leadership of Robert Boyer (economist, CEPREMAP, CNRS, EHESS) and Michel Freyssenet, run by an international committee and with support from the European Union (3d Framework), the 1993-1996 programme was, thanks to its study of automobile firms' (and their transplants') trajectories, productive organisations and employment relationships, able to demonstrate that lean production, which according to the authors of *The Machine that Changed the World* (Womack, Roos and the Jones, 1990) was destined to become the industrial model of the 21st century, was in fact an unjustified amalgamation of two completely different industrial models, the "Toyotan" model and the "Hondan" model. It also discovered that there is, always has been and probably always will be more than one industrial model performing adequately at a given moment in time – in other words, shareholders, executives and employees do not all have to pursue the same "one best way". What they do have to do on the other hand is to develop "company governance compromises" that will help them to implement profit strategies which will be relevant to the economic and social environment in which they find themselves.

- A second programme (1997-1999) on "The automobile industry between globalisation and regionalisation" and now under the direction of Michel Freyssenet and Yannick Lung (economist, Bordeaux IV) tested the analytical framework that the first programme had built up to try and understand the new automobile manufacturer and components maker internationalisation drives that had been observed during the previous decade. What came out of this was that the viability of actors' decisions depends primarily on how compatible their profit strategies are with the modes of growth and income distribution to be found in the spaces into which they move.

- Extending analyses of forms of regionalisation in the automobile industry, the third programme (2000-2002) analysed the sector's new contours as well as the new types of relationships and cooperation being developed amongst its actors. Under the leadership of Yannick Lung, it studied issues relating to the "Coordination of knowledge and competency in regional automotive systems", within the CoCKEAS project framework.

The overlapping of the CoCKEAS and GERPISA research programmes has created the conditions for an efficient coordination of researchers working together since several years and the integration of new participants leading to a large mobilisation of the worldwide academic community of social scientists working in the field of the auto industry: about 159 presentations have been made and discussed in the different

CoCKEAS and GERPISA meetings – plus 30 papers written for collective volume – by more than 200 different authors and co-authors (2/3 from European countries). Scientific exchanges have been developed with other international network (IMVP-MIT; CGEP-TSER; Dialogue workshop *The internationalisation of European SMEs: culture, entrepreneurship and competitiveness*[21]) and relationships with practitioners have been consolidated by the way of practitioners' sessions at each GERPISA colloquium and some CoCKEAS workshops (London, Venezia), and joint study (UEPLAC-TACIS programme).

2.2. Complementarity logic, comparative approach and paradigm of renewed diversity

The strength of this network activity relies on some basic operational principles for the GERPISA research programmes, refusing overly simplified ideas and developing cooperative initiatives based on a logic of complementarity and a comparative approach.

- The studies' logic of complementarity materialised in the network's multi-disciplinary set-up, which brought together a number of social sciences researchers from various disciplines and different parts of the world, all of whom were concerned with specific issues (i.e., how work is organised in workshops, e-commerce in the automobile industry, etc.). The angles of approach to any one issue were diversified by applying the precepts of shared research – an approach that can be used to guide and to organise international programmes.

- This comparative approach was based on the development of a shared methodology for studying ongoing transformations within an analytical framework that accounted for automobile company and system trajectories by seeking to understand the meaning of the observed attributes above and beyond their ostensible similarities or differences. Participation by researchers working directly on the various automobile countries in Europe or the other regions of the world allowed for comprehensive research.

To counter the tunnel vision of the future that crops up so regularly in industrial and academic circles, a strict and meticulous comparative approach-based empiricism was required[22]. The past decade has been a veritable breeding ground for visions of the future, whether the inevitable diffusion of the so-called Japanese model, the

[21] Presentation of some CoCKEAS findings: "The place of SMEs in the European Automotive System", by. J.J. Chanaron and Y. Lung, .Workshop organised by the EC, Brussels, 28 June 2002.
[22] Michel Freyssenet, "The Surest way to make a mistake in Social Sciences, Japanisation, the end of work, Globalisation, the New Economy, Networked Societies, etc.", in *La lettre du GERPISA*, no. 161, July 2002

irreversibility of globalisation or else the advent of a new era of prosperity thanks to the "new economy", the network society, and today the hydrogen economy.

The acceleration of technological and organisational change in our societies means that actors constantly have to cope with a recurrence of new phenomena, something that needs to be analysed. When faced with a phenomenon that seems novel, three research operations would seem to be indispensable.

- The first consists of contextualising facts that could otherwise be deemed to comprise a (new) trend by examining them in the light of the history of the concrete entity to which each refers (such and such an individual, group, institution, society, etc.) so as to understand their meaning and thus verify whether their aggregation would be a legitimate endeavour.

- The second involves establishing via comparison and reasoning which pre-conditions will render the facts that have been regrouped or selected feasible and viable.

- The third is to conceptualise them in such a way as to replace the shared, spontaneous or pseudo-knowledgeable representation with one that is more illustrative and operative in nature.

Such an approach had led to a paradigm we can call the paradigm *of limited but periodically renewed diversity* within capitalist societies, in lieu of the "one best way" or "one necessary way" paradigms that supposedly applied to each main historical period, and which were analytical filters that at the very best were no more than a retroactive illusion.

2.3. The outlook for extension

Conclusions from GERPISA preceding programmes, including from the CoCKEAS project, deserve to be extended within this paradigm. This will enhance our understanding of the shift towards a new knowledge-driven regime of growth. Such a transition implies not only the emergence and diffusion of new sectors based on the production and dissemination of knowledge (ICT, biotechnology) but also the restructuring of older economic activities based on a manufacturing paradigm. Information technologies are generic in nature, i.e., they are part of the different sectors' technological trajectories. Instead of reducing extant disparities and inequalities, they reproduce and even reinforce them. As such, it is urgent to analyse *the manufacturing industries' transition towards a knowledge-based system of production.*

The twofold dimension of this restructuring process corresponds to two major societal issues:

- the destabilisation of actors' (firms, employees, policy-makers, etc.) institutionalised compromises through an undermining of organisational modes that were built upon a manufacturing logic in a specific historical context (latter half of the 20th-century);

- the development of new compromises necessary for the implementation of modalities to mobilise and coordinate increasingly complex, interdependent and multidisciplinary types of knowledge and competencies. New configurations and organisational models have been emerging.

The outcome of this ongoing process is not written in stone. The *knowledge-based society* is only one scenario amongst many others, and an exacerbation of inequalities and increased tensions are conceivable. In any case, this process will lead to a variety of institutional configurations, due not only to sectoral differences (i.e., the automobile industry vs. the aerospace) but also within a given industry. This is due to:

- the diverse nature of the territories being affected by such structural changes (significance of the national institutional context during the establishment of such compromises);

- the diversity of actors' strategies, notably the variety of firms' trajectories.

With this in mind, the GERPISA contributed to the scientific community's mobilisation within the 6th Framework Programme, having expressed its interest in building up a network of excellence (EoI) that would have three main objectives:

- Produce new knowledge on the variety of the paths within the manufacturing industries' transition towards a knowledge-based production system.

- Validate a multidisciplinary methodology based on the co-ordination of in-depth field researches – inferring a long-term and continuous involvement by researchers with professional – in an attempt to build and validate an analytical matrix whose purpose is to identify and conceptualise a variety of configurations and trajectories.

- Consolidate and broaden a social science international research network that integrates researchers interested in studying industries' dynamics, ensuring an international reputation for the network, and transferring towards other sectors the networking capabilities originally developed for the automobile industry.

3. Policy implications

Automobile policy can be thought of as a system of multi-level governance which a number of instruments that tie into the European Commission's different Directorates (Enterprise, Competition, Research, Environment, Regional Policies, etc.) can be used, and where various echelons of State intervention (local authorities, national government, European institutions) are combined at the behest of automobile firms and other social actors (labour unions, consumers associations).

This multiplicity raises some very serious problems regarding the level of coherency between the various tools being used or else people's understanding of the strategic orientations the European Commission has been trying to organise. The main purpose of the CoCKEAS project was not to discuss these issues - but some of our conclusions are relevant to three areas of European automobile policy:

- technological policy;
- support for small and medium-sized businesses (SME);
- competition policy.

3.1. Strengthening European technological policy to benefit the automobile industry

The automobile is subject to permanent technological innovation. It is a product that could be profoundly modified by a generalisation of electronics; and through research into new driving systems, notably fuel cell vehicles. Research projects of this ilk have mobilised considerable financial resources. In addition, they infer co-operative approaches so that expenses, risks and knowledge have to be shared. It therefore appears essential that Europe not be handicapped by the fact that many different institutions and actors are working in these research fields, catalysts who should be supported both because of the need to strengthen the European industry's long-term competitiveness vis-à-vis its North American and Japanese rivals and also because of the collective progress that can be achieved in areas like safety and pollution reduction. A more visible European technological policy in favour of the automobile industry (as would seem to be the case for Aeronautics and Space, a priority thematic of FP6) would be useful.

Furthermore, the main limitation of European intervention stems from its relatively limited capacity for mobilising actors, at least in comparison with State interventions in the two other main automobile countries, the United States and Japan. This is notably the case for large technological projects heralding the advent of future developments. For example, the European "Car of tomorrow" project was much less ambitious than the U.S. PNGV ("Partnership for a New Generation of Vehicles") project, both in terms of its financial resources and also with respect to the actors involved. It remains to be seen whether the perspectives that the 6th Framework Programme has opened up, a number of which seem to relate to the automobile, will be enough to offset this shortcoming.

The regulatory framework (i.e., technological authorisations, emissions standards and recycling) should be a factor providing an incentive for such innovations. The projects being implemented should be ambitious, in terms of the financial resources they mobilise. Cooperation practices that have been widely developed amongst automobile firms in Europe (between manufacturers working on a variety of joint projects; between OEM and suppliers and engineering companies; or even in their many different cooperative efforts with academic laboratories) should be able to create conditions that are favourable to projects of this sort - which should also be reinforced by initiatives aimed at structuring the European Research Area. It remains to be seen whether these *a priori* favourable conditions were in fact fully exploited in previous European scientific and technological programmes (4th and 5th FP, BRITE-Euram), and this verification has to be done before a critical general report can be finalised and provide a framework for the 6th FP (regarding for example fuel cell vehicles) by paying special attention to the integration of the Small and Medium Sized Enterprises (SMEs).

Special care should be taken to consolidate the fabric of car engineering services companies, an essential component of the design capabilities that partially drive the competitiveness of the European automobile industry. Encouraging regroupings within a framework of co-operative inter-SME approaches plus mechanisms to offset the risks resulting from an asymmetry of power between these SMEs and the car multinationals with whom they deal – these are all policies that merit special attention in the form of appropriate support.

3.2. Support for SMEs: channelling the competition effects from the territories involved in the enlargement drive

SMEs, much like the big car company entities, are very much under pressure from a threat of delocalisation to the new peripheries of the European automobile area, a move that offers cost and work flexibility advantages. It is important that the effects of this kind of territorial competition do not lead to any local crises in the former peripheral areas as a result of corporate predator behaviour (delocalisation). It is also urgent to encourage a development of new technological and organisational competencies in these regions. The drive towards Central and Eastern Europe, given the outlook for these markets, should not be achieved to the detriment of the countries of the South, especially the Mediterranean Basin.

3.2.1. Consolidating automobile regions

The production of automotive components, even if it is not the only activity taking place, is often highly concentrated in geographic terms, either because it is associated with an automobile activity that goes back a long ways (Peugeot in Sochaux) or because it is tied to a local production system/cluster dynamic - or to a combination of the two (Piedmont in Italy). For local SMEs, an agglomeration of automotive activities corresponds to two types of configurations:

- in the first, the SME network is vertically structured by a central firm, often a major automobile group, which is mainly responsible for determining the outlook for local economic development (Peugeot and the Pays de Montbéliard);
- in the second, the network structure is more horizontal. Supported by a fabric of SMEs that interact with one another, it corresponds to a local endogenous development based on a collective dynamic that can by itself create the conditions for maintaining, reinforcing or weakening the competitiveness of the cluster.

In these two configurations, whole fabrics of SME are undergoing competition from new countries (notably in Central and Eastern Europe) due to European automobile area enlargement. Inasmuch as it is difficult to wage a war on the basis of cost competitiveness, if the automotive group and the local SMEs are to continue having a relationship, the latter firms will have to base their competitive advantage on arguments other than the ability to deliver a generic product that a competitor can always offer at a lower price. It is therefore crucial that the advantage reside in the relationship itself, i.e., that the link between the two parties be grounded in a co-production of specific resources, involving both the customer firm and its supplier in the development of responsiveness and innovation capabilities, working together with all other territorial actors who might be able to participate in this effort (other firms, local institutions, educational system, technological infrastructure, etc.).

3.2.2. Developing cooperative capabilities

Although SMEs often offer the desired technological competencies, they must also possess the organisational capabilities that will allow them to function up to market standards. Not only must they be able to work within cost-quality-time constraints, but they also have to be able to follow and even anticipate developments in the sector’s production methods (e.g., modular production) and reinforce their resources in terms of design and innovation. Leaving behind an approach that mainly focuses on an internal control of specific knowledge, the point here is to cultivate a new competency: *cooperative capabilities*. Encouraging this attitude should help to reinforce the SMEs' capabilities and at the same time provide them with the wherewithal to manage this new direction (in terms of intellectual property rights, negotiations with transaction principals, etc.).

The OEM is sometimes the party driving this consolidation of local SMEs' competencies, and encouraging them to develop a co-operative attitude. The experience of Fiat's "Guided Improvement" programme in Italy's Piedmont region constitutes an interesting approach. Fiat was largely involved in the restructuring of its own suppliers (with the number of direct suppliers dropping from 1,200 in 1987 to 364 in 1998). Over the same period of time, its own outsourcing rates changed: from 52% to 72% for its production function; and from 30% to 72% for its design function (source: Fiat-Auto). From 1998 onwards, Fiat was involved in setting up a consortium together with other transaction principals (Iveco, New Holland from the Fiat group) and FTS from the Piedmont region, who were then supposed to extend the training programme to second tier suppliers. After the November 2000 suspension of this programme, there is a feeling of unfinished business.

Even if this means supporting a joint approach that associates large automobile groups and SMEs, it is not at all sure that OEM are in the best position to assume certain functions that are usually carried out by intermediation structures:

- professional organisations like the associations of European automotive car and parts makers (ACEA, CLEPA) which in 1998 wrote a white book and set up the Leonardo da Vinci Training Network project within a procedural framework that had been devised by the European Commission (ELSA: Virtual Learning Environment);

- local institutions within the framework of a regional development policy that is intended to orient territorial organisation towards a cluster configuration.

This co-operation approach is also being followed at a horizontal level inasmuch as SMEs are being asked to join federated regroupings with other suppliers so that they are able to come up with the sort of global offer that their customer firms expect. Along these lines, the ACECIA (Integrated Components for the Automotive Industry) has tried to structure the component industry in Portugal by giving five local SMEs access to each others' complementary competencies, and to two technological infrastructures- this in an effort to bring local SMEs up to scratch so that they can participate in the modules' production. The shaping of consortiums of this sort also affects service activities (i.e., maintenance or treatment of surfaces), work that is harder to delocalise but where the bigger companies do want to deal with a single partner.

3.2.3. Support the internationalisation of SMEs

In this technological and organizational competencies reinforcement process, internationalisation capability is an important factor for SMEs. Forced to invest in training, in the acquisition of technology and equipment and in development, internationalisation (via export and/or the establishment of overseas facilities) is often indispensable if a firm wants to benefit from a sufficient volume of activity to spread out the fixed costs it incurs. In the Piedmont region, more than one-third of the turnover of the SMEs came from export markets and in three cases out of ten foreign direct investment had already taken place or was in the planning stage.

In a dynamic in which productive internationalisation is associated with a new market entry type of growth (as opposed to an act of relocation *stricto sensu*, i.e., a closure of factories in one's regions/countries of origin and a transfer of production abroad), two different situations can arise:

- In the first, the foreign facility is an accompaniment to a client's own internationalisation path when this client, after having drawn up a list of preferred suppliers, decides to continue working with the same firms (follow sourcing).

- The second entails opportunities where firms establish operations abroad precisely in order to be included on a customer's list of preferred suppliers, something that might make it possible, in the long run, to get business back in the country of origin.

Inasmuch as European SMEs seem poorly equipped (with the exception of a few very up-to-date competencies) to take business away from companies that are already present in North America and Japan, it is first of all at the European level that opportunities will arise, what with the ongoing rationalisation of the supply chain. SMEs can also take advantage of rapidly growing emerging markets and establish operations in new regions on Europe's borders (associated countries and partners) or in emerging countries with a high potential for growth (Mexico, Brazil and even China). For example, 60% of foreign direct investments of Portuguese parts makers are carried out in other EU member States and 30% in emerging countries (with a special emphasis on Brazil, which experienced exceptional automotive growth in the 1990s).

With B2B, the introduction of information and communications technologies in inter-firm relationships paves the way for accessing new markets abroad, although we should not forget that the limitations of these emerging tools during the initial phases of their diffusion. Their social and collective appropriation infers the existence of a dynamic process in which company (manufacturers, suppliers, service providers) strategies still compete with one another, without any norm having been affirmed; and where organisational mutations will have to take place if these tools are to have a stable presence amongst the range of practices at actors' disposal.

In any event, this will involve:

- developing SMEs' levels of training so they can match global technological and organisational competencies standards;
- encouraging them to associate with local partners whenever it is possible to identify a modicum of complementarity (in terms of resources and competencies);
- allowing firms to finance their internationalisation drive themselves whenever this move is growth-oriented. There are two sides to this equation: on one hand, the funding tools on offer must be accessible to SMEs, who do not have large groups' facilities for raising capital (access to equity markets, borrowings, etc.); on the other, modalities have to be thought up for sharing the risks associated with internationalisation. SMEs will have to assume some of the (research or market) risks that were previously covered by their clients and their smaller size means that they are unable to diversify their areas of intervention. As such, it is at a collective level that this sharing of risks will have to take place.

3.3. Competition policy

The CoCKEAS studies abounded with thinking about certain aspects of European automobile industry competition policy, relating on one hand to the financial structure of car manufacturers' shareholder equity, and on the other to the issue of automobile distribution block exemption reform.

3.3.1. Not giving in to the illusion of corporate governance

As a topic, corporate governance has dominated for the past few years, causing certain observers to conclude that European firms should convert to the principles of "good governance" by adopting rules of transparency as well as free shareholder access to and/or exit from a company's capital (i.e., free capital market).

Regardless of how justified some of these principles are (especially transparency), recent events, mostly in the United States over the past few months, have revealed the dysfunctions and failures that arise whenever these are the only principles to be applied. They also remind us of why there is such an urgent need for regulation.

This need would seem to be manifest in the automotive system, where actors negotiate and adapt a number of compromises with a long-term perspective in mind - in other words, where they probably acknowledge that a whole array of varied and sometimes conflicting interests have to be taken into account, notably with regards to the relationships between shareholders, executives and employees (but also between carmakers-suppliers, carmakers-distributors, etc.). At the company level alone, it would be a major industrial risk were any one social actor able to dominate. The general context of the 1990s was marked by the rise of shareholder-oriented companies as opposed to stakeholder approaches. And yet, the renewed competitiveness of the European automobile industry was partially due to the fact that European carmakers resisted this pressure, thanks to the stability of their shareholder of reference (and whether or not this involved control by a family, by the State or by banks) - this being the guarantee of the long-term orientation of the strategic decisions being made.

Note that Fiat, the European carmaker that made the greatest commitment to the principles of shareholder value during the 1990s by overturning its previous wage-labour nexus and downgrading the role of its labour unions, is today the manufacturer experiencing the greatest problems. Inversely, the most profitable carmakers are those that did not apply all of the principles of "good governance". It may be impossible to deduce any causality from this (since other factors must be taken into account, starting with the product policy), but it would nevertheless seem to be the case that in this sector having a long-term shareholder of reference is a necessary pre-condition if strategic decision-making is to be kept from becoming excessively short-term oriented; and if the conditions for concluding stable compromises with all actors are to be preserved.

Undermining this configuration in the name of the general principles of the freedom of capital movement could destabilise this organisation and be damaging to it. Quite the contrary, it is by reinforcing the symmetry of power, for example by encouraging a development of European entities to provide a framework for negotiations between major automobile firms and their employees or small and medium-sized businesses that the cooperative foundation of the EAS, the foundation of its competitiveness, will be able to take root.

3.3.2. Latent issues in automobile distribution

The CoCKEAS research project did not focus on distribution reform analysis per se, but it did put it into the context of a broader approach to automobile utilisation by providing information to complement earlier and more specific studies on this topic, work that the European Commission either undertook (i.e., the Monti report) or else commissioned.

Indeed, discussions on distribution reform (criticisms of exclusive and selective distribution) have mainly stressed the beneficial effects of getting distribution networks to compete with one another so as to encourage lower new vehicle prices, something from which European consumers can profit. In actual fact, new car sales only represent a small share (less than 25% in France) of total household driving expenditures. This has tended to fall relative to other automotive spending items, those where customers are able to acquire supplies from sources differing from the ones carmakers and their networks might offer them. In addition, certain households, the least affluent ones, are excluded from any consideration of new car prices seeing as they are unable to buy them and drive older used vehicles that are very difficult to maintain in good condition.

In addition, studies have indicated that automobile companies and their distribution networks achieve greater profit margins on those spending items that relate to car utilisation than they do from new vehicle sales. For example, with respect to the structure of dealership profitability in France, most (60% of total gross margins) of this very mediocre profitability comes from the small proportion (20%) of revenues that are made on after-sales and spare parts. In other words, in the absence of the extra business they get from servicing the vehicles sold, new vehicle sellers would not be able to live from the proceeds of their outlets alone. Nor would they be able to comply with the locational or signposting and equipment-related constraints that manufacturers require of them.

The main question that should be asked at this juncture relates to the impact of this snowballing of deregulatory measures, i.e., the effect this is going to have on the branch in general and on new vehicle prices in particular. Regarding the latter issue, attentive observation of way in which the distribution companies that are tied into the manufacturers' networks function on an economic level raises several questions. Far from reducing new retail vehicle prices, it appears that attempts to encourage unbundling by breaking up the "natural connection" between vehicle sales and certain "associated services" (notably after-sales, maintenance, and the sale of spare parts, as encouraged since 2002 by new regulations that open these areas of activity up to new competitive actors) may lead to higher prices.

After all, opening such services up to other actors lowers margins – something that will have to be offset by higher margins on new or used vehicles. Yet up until now margin increases have been minimal. It is difficult to cut new vehicle distribution costs, even where the networks involved have been consolidated, when distribution companies are no longer able to get the users of the vehicles that are already on the road (and in particular, the older ones) to pay for most of the fixed costs which they incur as a result of their operations.

As for repairs, competition does prevail, but whenever users refuse to let one of the make's representatives work on their vehicles, preferring an independent repair shop, they have no other choice for a whole series of parts than to source them from the local representative of the carmaker's network. Spare parts distribution activities also affect those vehicles that are not being repaired in these networks. Up until the recent reform, it was in exchange for sharing some of the rents from this type of business with their distribution network that automakers could avoid having to assume some of the considerable costs of having to integrate their distribution function, or to put it more simply, of having to remunerate the new car sales function, this being the only activity capable of ensuring the longevity of an exclusive type of geographic representation. This raises questions about the redistribution of the profit margins (rents) that the car manufacturers and their distribution networks should be generating on other activities. Note that this issue is not a neutral one in distributive justice and social cohesion terms, since the structure of motoring expenditures will vary depending on the level of income concerned.

V. DISSEMINATION AND EXPLOITATION OF RESULTS

We've developed different ways for disseminating the results of the CoCKEAS project during the lifetime of the project.

5.1. Regular information

Regular information has been disseminate through the websites:

- http://www.cockeas.org

- http://www.gerpisa.univ-evry.fr

where papers presented during the workshops and the annual GERPISA conference can be downloaded. The proceedings of the annual GERPISA conference have been diffused on CD-ROMs.

Information on progress in the project and debates has been done by the GERPISA's newsletter *La Lettre du GERPISA* published on a regular basis (9 issues per year). Diffusion: emailing list of more than 800 people; downloadable on the GERPISA website.

Presentation of preliminary CoCKEAS results at specific conferences allowed dissemination among practitioners:

- *Global Automotive Management Council Senior Management Briefing*, Workshop organised by INTELI, Sintra, Lisboa (Portugal), 16-19 September 2001.

- Colloque international *Les nouvelles mobilités et la voiture de demain*, organised by the CCI du Doubs and the Agence de développement et d'urbanisme et du Pays de Montbéliard, Sochaux, 13-14 December 2001.

5.2. Publications

The results of the CoCKEAS programme have been published using different supports (not including individual publications in journals):

- four issues of the GERPISA journal *Les Actes du GERPISA* (diffusion: 800 paper copies and downloadable on the web site);

- five issues of three different international scientific reviews have been realised or are planned with a selection of papers presented at the various meetings;

- two edited volumes started in the previous GERPISA research programme have been improved and achieved.

The exhaustive list of collective edited publications associated to the CoCKEAS project is the following one (see the detailed contents in the Annexes to this report):

A. Title: *Synthesis and Opening: About the Three GERPISA Research Programmes*

Editor: Yannick Lung

Journal: Actes du GERPISA. Issue: April 2001, N° 31

Publisher: GERPISA, Université d'Evry Val d'Essonne

B. Title: *Recent Trends in the Relationships between Automobile OEMs and their Suppliers*

Editor: Jean-Jacques Chanaron

Journal: Actes du GERPISA. Issue: December 2001, N° 32

Publisher: GERPISA, Université d'Evry Val d'Essonne

C. Title: *Vertical Relationships and Modularization in the Automotive Industry*

Editor: Giuseppe Volpato

Journal: Actes du GERPISA. Issue: March 2002, N° 33

Publisher: GERPISA, Université d'Evry Val d'Essonne

D. Title: *The New Geography of Automobile Production*

Editor: Ulrich Jürgens.

Journal: Actes du GERPISA. Issue: October 2002, N° 34

Publisher: GERPISA, Université d'Evry Val d'Essonne

E. Title: *The Tyranny of Finance? New Agendas for Auto Research*

Guest editors: Julie Froud, Sukdev Johal and Karel Williams

Journal: Competition & Change. The Journal of Global Business and Political Economy. Issue: 2002, Volume 6, Number 1

Publisher: Routledge

F. Title: *Redesigning the Automakers-Suppliers Relationships in the Automotive Industry*

(selection of papers presented at the 9th GERPISA international colloquium)

Guest editors: Yannick Lung and Giuseppe Volpato

Journal: International Journal of Automotive Technology and Management

Issue: 2002, Volume 2, Number 1. Publisher: Inderscience Enterprises Ltd

G. Title: *The Changing Geography of Automobile Production*

Guest editor: Yannick Lung

Journal: International Journal of Urban and Regional Research

Issue: 2002, Volume 26, Number 4. Publisher: Blackwell Publishers

H. Title:

(selection of papers presented at the 10th GERPISA international colloquium)

Guest editors: Giulio Calabrese and Yannick Lung

Journal: International Journal of Automotive Technology and Management

Issue: 2002, Volume 2, Number 4. Publisher: Inderscience Enterprises Ltd

I. Title: *Coordination of Competencies and Knowledge in the European Automotive System*

Guest editor: Yannick Lung

Journal: International Journal of Automotive Technology and Management

Issue: 2003, Volume 3, Number 1. Publisher: Inderscience Enterprises Ltd

J. Title: *Globalization or Regionalization of the European Car Industry?*

Editors: Michel Freyssenet, Koïchi Shimizu and Giuseppe Volpato

Publisher: Palgrave-Macmillan, Basingstoke. Date: February 2003

K. Title: *Cars, Carriers of Regionalism*

Editors: Jorge Carrillo, Yannick Lung and Rob van Tulder

Publisher: still in negotiation. Date: 2003

5.3. Follow-up of the results

The main contributions of each partner to the CoCKEAS research programme could be summarised as follow:

Partner	New analyses	Concepts, tools and methodology	Conference	Publication
IFReDE-E3i (Université Montesquieu, Bordeaux)	New geography of automobile production Concentration in the component industry Usage patterns Institutional investors and car companies Corporate governance: French carmakers	European Automotive System Automobile usage system Statistical analysis on the EAS	CoCKEAS workshops Kick-off meeting, March 2000 WP#4, March 2001	*Actes du GERPISA* 31, *IJURR* Symposium 26(4), 2002 *IJATM* special issues 2002, 2003 *Cars, carriers of regionalism*(ed.)
GERPISA (Université d'Evry-Val d'Essonne)	International comparison - within European countries - between Europe and other automobile regions (North America, Japan, Emerging countries)	Variety of productive models Comparative researches (each workpackage)	International colloquium, June 2000, 2001 & 2002	*Actes du GERPISA* *Lettre du GERPISA* *Globalization or Regionalization of the European Car Industry?* (ed.) *Cars, carriers of regionalism* (ed.)
GATE (University Lyon 2)	Modularization and technology management Digital procurement The "periphery" of the EAS	European automobile system Comparative analysis of modularisation	CoCKEAS workshop WP#1&2, March 2001	*Actes du GERPISA* 32
CGS (Ecole des mines and ARMINES)	Co-design and inter-firms cooperation	Semi-designed product		
WZB	International comparison Europe vs rest of the world Corporate governance in the EAS	Comparative research European distinctiveness	CoCKEAS workshop WP#5, November 2001	*Actes du GERPISA* 34
University Erlangen-Nuremberg	Internationalisation of German car makers			
University of Turin	Inter-firms relationships in Italy			

	(second tier) Internationalisation of Italian auto firms			
Ca' Foscari University of Venice	Analysis of OEM-FTS relationship Managing information flow Distribution issues Corporate governance at Fiat	Glossary Framework to analyse the impacts of ICT Meta-strategies	CoCKEAS workshop WP#1&2, October 2001	*Actes du GERPISA* 33 *IJATM* special issue 2(1), 2002 *Globalization or Regionalization of the European Car Industry?* (ed.)
Erasmus University	Central and Eastern European Countries Regionalisation in the auto industry			*Cars, carriers of regionalism* (ed.)
Catholic University of Nijmegen	Strategic choices of German carmakers Inter-firms relationships in Netherlands			
Public University of Navarra	Inter-firms relationships in Spain			
Chalmers University of Technology	Modularization and knowledge management in the Swedish auto industry	Assembly-oriented product structure		
Victoria University of Manchester	Financialisation of the car industry Motoring expenditures	New research agenda. Motoring poor.	CoCKEAS workshop WP#3, April 2001	*Competition and Change* special issue 6(1), 2002

European Commission

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