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**CHARACTERISTICS OF THE EUROPEAN AUTOMOTIVE SYSTEM  
IS THERE A DISTINCTIVE EUROPEAN APPROACH?**

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First Draft!

## **INTRODUCTION**

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. By the year 2000, the Europeans seem to have re-invented themselves, being ready to demonstrate this to their triad competitors. On the level of the OEM, the US car industry is no longer “big three” after the “takeover” of Chrysler by Daimler, and two of the Japanese big five belong to European car companies now.

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

- the customer structure in terms of social characteristics, income, tastes;
- the industry structure in terms of OEM-supplier, small and big company configuration;
- institutional conditions, industry policies of the states (national flagships), industrial relation systems;
- geographical particularities, structures of urbanisation etc.
- On the other hand, a number of factors speak against the hypothesis of a distinctive European approach:
- Since a long time now, American companies have had a strong presence in Europe, and recently, Japanese manufacturers have followed. So, more or less, a constant share of 25 percent of automotive activities have traditionally been governed from outside of Europe.
- Almost all paradigmatic concepts in the automotive industry are of non-European origin. This is true for Fordism as well as Toyotism (lean production system) and for all areas reaching from production organisation, to supplier relations and product development.

This paper discusses pro and cons concerning the hypothesis of a distinctive European approach. It will not discuss differences between European countries. “Europeanness” will

probably remain a fuzzy attribute. In any case, it will not be used in the narrow sense of the policy of the European Union or of other actors on the European level.

The discussion will focus on three areas: firstly, issues of production organisation, an area in which European companies have sought to differentiate themselves for a long time (cf., in particular, the Swedish work concepts); secondly supplier relations regarding the issue of modularisation and, thirdly, engineering and design. The paper will end with some conclusions.

## **“NEW PRODUCTION CONCEPTS”**

This is an area where numerous attempts towards developing a European approach have been made by European actors (cf. Jürgens, in Shimokawa et al. 1997). 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 (Agurén/Edgren 1980) in Sweden, alternative forms of production organisation were implemented since the 1970s, in particular the 1980s. The various approaches and their development have been described in detail in the literature. The rise and fall of Udevalla can serve as an example. Seen from today's perspective, this European approach to develop non-Taylorist production concepts does not seem to have had much impact on the other triad regions. And since the early 1990s, it has been dismantled to a large extent in those plants where it was at all implemented. Since the 1990s, the lean production/Toyota production system clearly has become the dominating paradigm.

Thus, despite the fact that differences remain to Japanese and American factories and that there is considerable variance between companies and locations within Europe, there can be no doubt that the distinctive European approach has been on the retreat in particular in the area of assembly operations (cf. Jürgens, *ibid.*, Springer, in: Industry and Democracy).

Clearly, European companies have been seeking less differentiation with their major triad competitors in this regard. However, two points have to be made which should caution against a too radical interpretation of this tendency:

Firstly, 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©) which was developed as an evaluation tool for work planning by the KAL project of the Swedish Trade Union Confederation (cf. Bergström 2000). This tool for the evaluation of work should guide work planners and labour unionists in work analysis and work planning. It measures work places on altogether 23 dimensions.

Another example is the 5000x5000 plant now being set up at the Volkswagen Wolfsburg site. The agreement struck between Volkswagen and the IG Metall on August 28, 2001, contains regulations on work design. Under “Goals” it is stated:

*“Each employee has the right of a human-oriented work design. (...) Work organisation has to be designed in such a way that employees will neither be over- or under-taxed, that they will be charged with diversified and holistic tasks which correspond with and which require further development of their knowledge and abilities.”*

The greatest impact of the alternative design movement probably was in the area of small and medium sized companies which to a large extent have introduced cellular production concepts in their manufacturing and assembly areas. Cellular layout and teamwork have become widespread and seem to be non-controversial in practice. However, the world-wide diffusion of

cellular production cannot be explained by European design influence only. The Japanese concepts of U-shaped process layout played an equal role.

Summarising it can be said that the general impact of the alternative work design movement on operations management in European plants remained limited. In an unplanned way however the 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 OEM-centred, production-oriented, and driven by increasing product complexities and by automation projects. More or less in parallel these concepts were developed at Opel (where they were called “New Production Concepts” by the production planners) and at Volkswagen for its new “Building 54” which aimed at a high degree of automation of assembly operations. While the Opel planners developed “modular areas” for the assembly of doors, cockpits, seats, with stationary production, relatively long cycle times and some degree of job enrichment, the Volkswagen planners were in particular interested in designing a process which allowed a maximum degree of automation. It was the Volkswagen approach in particular which required a new product architecture. At this stage the “open front structure” was developed and with this the “front end module” which was assembled in a separate area of the Wolfsburg plant at that time. A decade later the “front end” was one of the first modules to be assembled (while still developed by VW) by a supplier firm [Hella]).

This leads us to supplier relations as another area of European distinctiveness.

## SUPPLIER RELATIONS

The structure of the supplier industry, traditionally, had been quite different between the triade 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 hand full of these supplier firms were publicly listed.

The restructuring of the 1990s made the European supplier landscape a particular hot spot. This for two reasons: Firstly, the existing companies were too small in terms of development capacity, multi-plant structures, access to capital markets. Requirements of OEM regarding modularisation, globalisation could not be met under these conditions. Secondly, with the big two US companies and PSA and Fiat, spinning off their internal supplier base companies hungry for new customers which – in view of the Japanese Keiretsu system – could only be found in Europe. The companies aggressively acquired European firms to gain access to OEMs 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 SME.

## Modularisation and Systems Capabilities

The assembly islands for cockpits, doors etc. at OEMs mentioned above have all been disbanded in the meantime. This has become a major business for suppliers. Facilitating this transition was one of the major function of the crisis of the early 1990s. The tiering of the supplier industry – aiming at a reduction in the number of direct OEM suppliers following the Japanese example – received a particular thrust under these conditions. Defining the modules in view of the various requirements (in terms of development, manufacturing, logistics etc.) has been a cumbersome process requiring an enormous engineering effort on the side of the OEMs. And on the side of the suppliers which wanted this business, enormous efforts were necessary to acquire the engineering capabilities. This was to a large extent a European effort. But it did not involve only European suppliers as was already mentioned. Thus the module industry today cannot be regarded as a European speciality.

In terms of numbers of suppliers for modules (and systems) the greatest concentration however seems to be in Europe (this will have to be confirmed by research). The term “module” is not clearly defined and therefore used by suppliers in a loose sense. A quick take on the German supplier scene shows around 5% of suppliers reporting supplier of modules and 22.6% systems. Of the 5% (= 100) 21.4% have a turnover of below 100 million DM; 35.7% between 100 and 1.000 million DM and 42.9% over 1,000 million DM (Ehrig 2001/2002).

## Modularised Factories – Supplier Parks

Related to the theme of modularisation but also induced by considerations of scarcity of capital and management resources, and not least of operations management, new concepts for integrated production sites have been developed during the 1990s. In (almost) all European companies pursued, this approach was realised in some cases in sites outside Europe as part of the globalisation programmes of these manufacturers. The “Europeanness” of this approach has to be relativised in view of the fact that Ford and GM Europe/Opel with their European affiliates and, in particular, Nissan in Sunderland played an important and so some extent pioneering role in this regard. In North America resp. Japan, however, these manufacturers proceeded much slower resp. failed in their efforts to implement similar programmes (the prominent example is the Yellowstone project of GM. Major elements of this were however implemented in the meantime at some of GM’s North American plants).

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

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

These various forms have been investigated in the context of Gerpisa’s research programmes by many authors (cf. Salerno, etc.). Albeit not most far-reaching the supplier park model has turned out to be the model most widely followed.

After learning from the experiences of Nissan in Sunderland, Fiat in Melfi, etc. it seems that a specific (standard) model has developed in the meantime. It aims at an “agile complexity management” (Schardt 2001) at the OEM plant and the suppliers. It allows an optimisation of just-in-time and in-sequence delivery and material handling. It also minimises investment in production assets. And last, but not least it allows avoidance of lock-in effects. The business model for this (to my knowledge) has been introduced first by Ford. Key elements of the Ford industry park concept:

- Investment and planning are done by an external investor;
- building structures are designed according to supplier needs;
- buildings are leased by suppliers, contract length corresponds with supply contract length;
- supplier and OEM plant are linked via a bridge conveyor;

- pay-on-production procedure.

Summarising, 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. With the supplier park etc. 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.

## Networking

Networking is another area of developments which seem to reflect European distinctiveness. 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 OEMs;
- the potential of communication technology supporting network initiatives (this, of course, not just in Europe).

The new network approach currently pursued in a number of European regions, is based conceptually on Michael Porter’s theory of clusters (cf. Porter 1998). The European union supports these cluster activities with various funds (structure fund, InnoRegio programm, etc.). Austria is specifically active in the formation of automotive clusters (European Commission DG XVI/Federation of Austrian Industry in Styria).

Let us take the example of the automobile-cluster (AC) of Upper-Austria (around Linz):

AC describes itself as the largest cross-industry automotive network of Austria. It is aiming at strengthening the international competitiveness, innovativeness and cooperation of its partnering firms, in particular small and medium. It is supported by EU and Austrian funds (Zukunftsfonds des Landes Oberösterreich; this money comes from privatisation of state companies). It is a branch of a regional development and marketing firm (cf. [www.automobil-cluster.at](http://www.automobil-cluster.at)).

The catalogue of AC member companies is entitled “The virtual cluster auto” claiming all-round capability to make a car. In fact, in terms of revenues and employees the cluster equals a full-size OEM.

### Facts and figures:

Total turnover	155 billion ATS
Turnover in the supply sector	86 billion ATS
Employees	58,500
R&D ratio	4.16%
Export ratio	65.99%

The majority of supplier firms in the network are small and medium: 71% of AC partners employ less than 250 employees.

Support activities provided by an AC team are in five areas:

- Information and communication: a data bank of the AC partner teams, information on network activities, plant visits, etc.;



- qualification: various activities for further education, workshops, inter-company learning, study tours, etc.;
- cooperation: cooperation projects between firms and technology transfer institutions;
- marketing and PR: information material, fares, presentation of partner companies at OEM and tier 1 companies;
- internationalisation support: networking with foreign automobile initiatives; response to requests of foreign companies concerning cluster firms, etc.;
- support of cooperation projects encompassing minimum three AC partners concerning costs for personnel, external services and other.

The AC – Upper Austria may be a particularly well-run and successful cluster but it may stand here for various cluster activities in other European regions. While it reflects efforts of regional development and (in cases such as Upper Austria and also Sachsen-Anhalt in East Germany) it is also the attempt to prevent business going to middle-eastern countries with much lower wages. The aim is to develop capabilities and provide system solutions while maintaining the small and medium company structure. The stretch goal of these activities is the “virtual-car capability”. While similar initiatives can also be observed in the other triade regions (cf. Whittaker 1997 describing the development of the Ota Ward near Tokyo; and Best 2001 referring to initiatives in the USA); the level of intensity of “clustering” seems to be a European speciality.

## NICHES AND SPECIALISTS, KNOWLEDGE-INTENSIVE SERVICES

This is probably the most important area of European distinctiveness. At the same time it is the most underresearched area. The following conditions provide a particularly fertile ground for the development of related activities:

1. Firstly, since its 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, 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. While the UK may have lost its role as mass production location for cars, it remains to be the centre for the formula 1 complex. The number of employees employed by a great number of small specialist firms around this complex altogether equals another fully grown car manufacturer (around 40,000?). A similar though smaller network can be found around Bologna in Italy.
2. The “model-offensive” of European car makers in the 1990s – with the multiplication of niche cars mostly in upper price ranges – could not be facilitated by the OEMs alone. Parallel to outsourcing components/modules, including – as a tendency also the outsourcing of correlating development work to suppliers the OEMs increasingly relied on engineering service firms. 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 Bertrandt, Edag, etc. quickly grew in size (see for a sample of German firms Appendix 1) 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 OEMs 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 (cf. Rentmeister 1999).
3. While most of the engineering service firms which have acquired a full-car development capability refrain from taking the step to also build cars, one company has taken this step thus acquiring what it calls, as a trade-marked expression, the “0.5 tier” supplier status. This means the company is able to develop and produce a complete car leaving to the OEMs the brand name and the distribution and marketing activities. (elaboration of the Magna case in the presentation)

While it is true that in the 1990s a similar development to outsourcing engineering services can be observed in the American auto industry, the European industry structure seems far more differentiated, specialised, pro-active. In Japan a comparable independent R&D infrastructure does not seem to exist.

## CONCLUSIONS

To what extent does it then make sense to speak of a distinct European auto system resp. approach? To make it short I will list “cons” and “pros”:

### “Cons”:

1. In terms of concepts and models Europe was mostly a follower. This is true for the adoption of Fordism as well as Toyotism, 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 car makers and suppliers. 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.

### “Pros”

1. Fordism diffused only to a limited extent and with modifications in Europe (cf. Tol-liday 1998). Also, there has always been a strong anti-Taylorist attitude among European actors fostering the search for production alternatives.
2. Customer structures and preferences remained markedly different. This supports the existence of niche car makers 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 like the Fraunhofer institutes (an aspect which should be included in the analysis of the paper). 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 state has 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.

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 about a specific approach resulting from that? 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 OEMs 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 the European automotive industry seems to be specifically well positioned in terms of structures and capabilities already.

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