SYNTHESIS REPORT

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TITLE: **Future Working Structures**
Future European Automotive Working Structures for the Challenges of Technological. Social and Competitive Change

PROJECT COORDINATOR: BMW AG
Bayerische Motoren Werke Aktiengesellschaft

PARTNERS: BMW AG
Daimler-Benz AG
Rover Group Ltd.
GIE PSA Peugeot Citroën
Renault S. A.

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1, Titles, Names of Authors and Addresses

In the following the contact persons and addresses are listed. The structure is the same as it is in the technical report, first the scientific institutes, then the industrial partners of the automotive industry.

Project Leader: Dr. Herwig Letz
BMW AG; Central Personnel Department, D-80788 München
Tel. ++49-89-382-27600, Fax. ++49-89-382-27644

Project Co-ordinator: Dr. Peter Cammerer
BMW AG; Central Personnel Department; D-80788 München
Tel. ++49-89-382-26538 or -30030; Fax. ++49-89-382-30025

Task 1

WZB Wissenschaftszentrum Berlin (1 A)

Priv.-Doz. Dr. Ulrich Jürgens
Wissenschaftszentrurn Berlin für Sozialforschung (WZB)
Abteilung „Regulierung der Arbeit"
Reichpietschufer 50
D-10785 Berlin
Tel.: **49-30-25 491272
Fax: **49-30-25 491684

Dr. Peter Auer
Wissenschaftszentrum Berlin für Sozialforschung (WZB)
Abteilung „Arbeitsmarkt und Beschäftigung"
Reichpietschufer 50
D-10785 Berlin
Tel.: **49-30-25 491123
Fax: **49-30-25 491222

Dr. Peter Jansen
Schillerstraße 95
D-1 0625 Berlin
Tel.: **49-30-31 33663
Fax **49-30-31 33663

Technische Universität Chemnitz-Zwickau (1 B)

Professor Dr. Peter Pawlowsky
Technische Universität Chemnitz-Zwickau
Fakultät für Wirtschaftswissenschaften
Forschungsstelle Sozialökonomik der Arbeit am
Lehrstuhl Personal und Führung
D-091 07 Chemnitz
Tel.: **49-371-5314312/8354
Fax: **49-371-531-4342

Uta Wilkens
Technische Universität Chemnitz-Zwickau
Fakultät für Wirtschaftswissenschaften
Forschungsstelle Sozialökonomik der Arbeit am
Lehrstuhl Personal und Führung
D-O91O7 Chemnitz
Tel.: **49-371-531-3969
Fax: "'49-371-531-4342

Arbeitszeitberatung Dr. Hoff, Weidinger und Partner (1 C)

Dr. Andreas Hoff
Arbeitszeitberatung Dr. Hoff Weidinger und Partner
Lückhoffstraße 22
D-14129 Berlin
Tel.: **49-30-803 2041
Fax: **49-30-803 9133

Jan Kutscher
Arbeitszeitberatung Dr. Hoff, Weidinger und Partner
Lückhoffstraße 22
D-14129 Berlin
Tel,: "*49-30-803 2041
Fax: **49-30-803 9133

Technische Universität Berlin (1 D)

Prof. Dr. Dr. h.c. Bernhard Wilpert
Berlin University of Technology
Institute of Psychology, Department of Work and Organizational Psychology
Dovestr. 1-5
D-1 0587 Berlin
Tel.: **49-30-314-22915
Fax **49-30-314-25274

Hans Maimer
Berlin University of Technology
Institute of Psychology, Department of Work and Organizational Psychology
Dovestr. 1-5
D-10587 Berlin
Tel.: **49-30-3 14-26885
Fax: **49-35-3 14-25274

Stefanie Terfloth
Berlin University of Technology
Institute of Psychology, Department of Work and Organizational Psychology
Dovestr. 1-5
D-10587 Berlin
Tel.: **49-30-314-26885
Fax: **49-30-314-25274

Task 2

Cardiff Business School, University of Wales

Prof. Daniel T. Jones
Lean Enterprise Research Centre
67 Park Place
Cardiff CF1 3AS
United Kingdom
Tel.: **44-l-222-874544
Fax: **44-] -222-874556

Task 3

Warwick University

Mr. Gordon Brace
Warwick Manufacturing Group
International Manufacturing Centre
Warwick University
CoventxyCV47AL
Tel. ++44-1203-523974
Fax. ++44-1203-524307

Mr. Paul Kelly
Warwick Manufacturing Group
International Manufacturing Centre
Warwick University
Coventry CV4 7AL
Tel, ++44-1203-524853
Fax. ++44-1203-524307

Mr. Julian Coleman
School of Engineering
Bolton Institute
Deane Road
Bolton BL3 5AB
Tel. ++44-1204-528851
Fax. ++44-1204-381107

Task 4

GHK Universität Kassel

Prof. Dr. Ekkehart Frieling,
Michael Freiboth
Dr. Detlef Henniges
Carsten Saager
University of Kassel Gesamthochschule
Institute of Industrial Science
D-341 34 Kassel
Tel. ++49-56 1-804-4210
Fax. ++49-561-804-4162

Task 5

Theme 1: BMW AG München

Dr. Peter Carnmerer
Central Personnel Department
D-80788 München
Tel. ++49-89-382-26538 or -30030
Fax. ++49-89-382-30025

Karl Drechsler
Central Personnel Department
D-80788 München
Tel. -!+49-89-382-22396
Fax. ++49-89-382-23946

Marc Pastowsky
Central Personnel Department
D-80788 München
Tel. ++49-89-382-27628
Fax. ++49-89-382-23946

Theme 2: Rover Group Ltd.

David Bower
Personnel Director
Rover Group Ltd
Bickenhill
Birmingham B377HQ
Tel. ++44-121-781-7112
Fax. ++44-121-781-7127

Tony Hatfield
Personnel Director
Rover Group Power Train
Longbridge
Birmingham B31 2TB
Tel. ++44-121-482-3151
Fax. ++44-121-482-3721

Andrew Shea
Personnel Officer
Rover Group Power Train
Longbridge
Birmingham B31 2TB
Tel. ++44-121 -482-2163
Fax, ++44-121-482-3721

David Yearby
Strategy Development
Rover Group Ltd
Bickenhill
Birmingham B377HQ
Tel, *44-121 1-781-7306
Fax. ++44-121 -781-7229

Kerry Cook
Strategy Development
Rover Group Ltd
Bickenhill
Birmingham B377HQ
Tel. ++44-121 -781-7258
Fax. ++44-121-781-7229

Theme 3:Mercedes-Benz AG

Dr. Roland Springer
Michael Göpfarth
Arbeitsorganisation/Grundlagen Arbeitspolitik
Abt. F 404
D-70322 Stuttgart
Tel. ++49-71 1-17-55562
Fax. ++49-71 1-17-23359

Theme 4:Renault

Mr. Jean-Claude Monnet
Head of the socio-economics research group
Research Department
9 - 11, av. du 18 juin 1940
92500 Rueil Malmaison France
Tel ++33-1 4777-9300
Fax ++33-1-4777-9204

Mr. Emmanuel Couvreur
Teamwork expert
Human Resources Department
Place Bir-Hakeim
92100 Boulogne-Billancourt
Tel ++33-1-4103-1067

Theme 5: PSA Peugeot Citroen

Dr. Annie Beretti
PSA Peugeot Citroen
Direction des Etudes et Techniques Automobiles
Service PRH/RCF
18, rue des Fauvelles
92200 La Garerme Colombes
Tel. ++33-1-47-69-33-89
Fax, ++33-1-47-69-21-12

Bertrand Ciavaldini
PSA Peugeot Citroen
Direction des Etudes et Techniques Automobiles
Service PRH/RCF
18, rue des Fauvelles
92200 La Garenne Colombes
Tel. -H-33-147-69-25-73
Fax, ++33-1-47-69-21-12

Theme 6: Daimler-Benz AG

Joachim Reske
Forschung Gesellschaft und Technik
Alt-Moabit 96A
D-10559 Berlin
Tel: **49-30-39982-332
Fax: **49-3 O-39982-1O8
e-mail: reske@DBresearch-berlin. de

Marion Diehr
Forschung Gesellschaft und Technik
Alt-Moabit 96A
D-10559 Berlin
Tel.: **49-30-39982-333
Fax: **49-3 O-39982-1O8
e-mail: diehr@DBresearch-berlin. de

2. Abstract: Objective and Results

The working structures, as they usually present themselves in today's automobile companies, are the result of the division of labour in the 20th century. The European automobile industry is under considerable competitive pressure from Japanese and US manufacturers. Because of this, the question of working structures plays a key role in competitiveness.

The FWS-project intended to investigate the links between increased efficiency and changes in working structures in production today and in the future. The innovative aspect of FWS is the linkage of working structures with human resource management, organisational change and technological change.

The project aimed to support companies to incorporate current social, technological and competitive changes in the development of their new working structures. FWS considered that different factors across Europe have an impact on the present productivity of the automobile industry.

The FWS-project started in October 1992 in the Brite EuRam II framework and has industrial partners and scientific institutes from England, France and Germany and is carried out in eleven automobile plants across Europe.

These partners were: BMW AG, Daimler-Benz AG, Mercedes-Benz AG, Rover Group Ltd., Renault S. A., PSA-Peugeot-Citroën, AZB Dr. Hoff & Partner, Cardiff Business School, Technische Universität Chemnitz-Zwickau, Technische Universität Berlin, University of Warwick, Wissenschaftszentrum Berlin and GhK Universität Kassel.

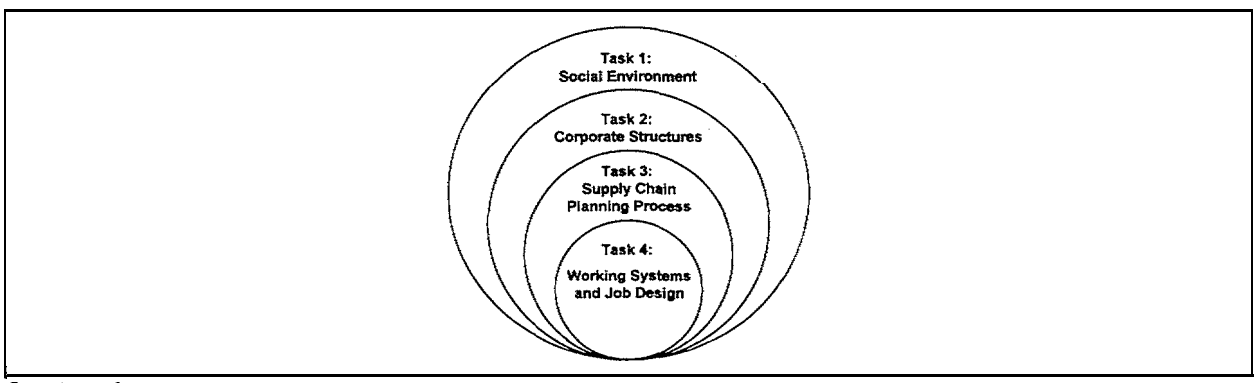
The activities of the project have been divided into four tasks, which covered different aspects of new working structures:

Task 1 aims to describe the social environment of European automotive sites and investigates the following areas: the socio-economic and socio-political environment, time structures and social values.

Task 2 is focused on the organisational aspects and benchmarks the participating engine plants.

Task 3 aims to determine the impact of the single European market and the relationship with the manufacturer, on the supply chains and their ability to deliver value.

Task 4 examines which working structures are present, as well as conceptions of group work and quality management.



Structure of the FWS-Reject

In addition to this, there is a task 5, where an integration of results under the leadership of the automotive partners which is integrating the results focusing across all four tasks. **Task 5** integrates the different scientific results, the different interests of the industrial partners for industrial application and their individual strategies concerning new work organisation.

Following the results of these four tasks are described in short summaries.

2.1 Task 1

Task 1 describes the *social environments* and the *infernal social systems* of different automobile company sites in Europe. The four subtasks with their research subjects define four different perspectives of the Task 1 issues. The main emphasis of the different research perspectives are allocated differently in the social environment as well as in the company's social system: Subtask A: Social-economic and Socio-political Environment, Subtask B: Human Resource Management, Subtask C: Time Structures and Subtask D: Social Values.

2.1.1 Subtask A: „Socio-economic and Socio-political Environment"

Socio-economic Environment: The Labour Market

The labour market and its structure as a facilitator or barrier to organisational change does matter, but not as much as one might think because management strategies have to cope „with what they have" and are adept at doing so. However, it should be clear that some labour market structures are more compatible than others with future working structures. Labour markets composed of a rather balanced mix of ages (and especially of some reserve young and trainable workers) are better suited than labour markets composed of too large a share of older workers. Skilled workers are an advantage also, but comparisons of skill levels are extremely difficult because some firms have a lot of experience in on-the-job-training which does not appear in statistical classifications. While human resource development processes on internal labour markets are important but they are difficult to measure by labour market statistics.

Too high a share of temporary agency workers or those employed on fixed term might be detrimental to the introduction of future working structures because those workers can not be integrated well into internal human resource development or into teams.

However, the idea that „elite" teams of young, highly trained and multiskilled workers correspond to the ideal labour market environment of future working structures does not at all correspond to the actual labour market structures in -or outside- the plants. Plants must increasingly cope with the problem of an ageing workforce in rapidly changing technological and organisational environments. As demographic ageing (less young entering the labour market) will continue firms have to address these problems.

While learning capacity, for example, does not stop with age, special „practical" learning enviromnents are important for older workers. „Learning organisations", such as teams, are in fact an ideal practical learning environment for older workers.

While early retirement as an exit option is valued by workers and firms alike it is a costly option both for firms and public budgets and more efforts of firms have to be made in keeping workers longer in the plants, Some alternatives do already exist but are not yet very popular: part-time retirement is one of these solutions.

In general, it appears that an active policy towards the older population on internal labour markets will be part of future working structures and enhance their efficiency.

Socio-political Environment

Investigating the influence of the Socio-political environment on the European vehicle producers has led to the general conclusion, that besides from differences, in all countries the restructuring of work organisation, particularly the introduction of team work, and the adaptation of Lean-Production principles has led to the formation of non regulated spaces.

Regulations on the level of the European Union have neither impulses nor barriers for Future Working Structures on company and site levels. In this context national collective work laws, which establish the rights and duties of unions or other workers representations, have more influence, as they lay down the information-, consultation-, negotiation- and participation rights of the representatives.

In the problem perception of the practitioners in the plant the socio-political environment currently has a minor influence. Nevertheless the socio-political environment must be considered to be a major influencing factor. If the FWS process is to be deepened and if it is intended to achieve a basis for the acceptance and social sustainability of FWS, minimum regulations should be available to save the new structures on the long run and to solve conflicts. What appears to be feasible and accepted today under the pressure of high unemployment could lead to the following problems in a long term perspective.

Mechanisms which hand over a „capability for self-control" to the group generate problems at the level of wage and performance control which raise the question of how and by whom conflicts can be conciliated in the long term. These insecurities could undermine the acceptance of FWS.

The universal realisation of group work concepts requires work systems which are capable of being integrated. They must be able to take into account both the increasing average age and the problems of reduced usage (percentage of disabled people) which are connected with it.

The conceptual expansion of collective work systems which are close to production to include indirect areas raises the question of the importance of status barriers - especially where (blue-collar) workers in temporary groups (project groups) carry out temporary limited tasks which, according to their profile, would belong to the category of white collar employees.

The adaptation of age-appropriate of group work places (reduction of physical strains) offers at the same time the opportunity for defusing the realisation problems which result from outsourcing strategies.

Another general trend which can be observed in the survey is that with implementation of team work the influence of the individual worker and the team is strengthened. This leads to latent conflicts with the rights of the elected workers representatives.

2.4.2 Subtask B: „ Human Resource Management"

The analysis of Human Resource Management (HRM) in the European automobile industry focused on the dimensions work organisation, leadership, incentive policies and employment and training policies. The results show a variety of company based and/or country based HRM practices.

With regard to the work organisation the plants show a more or less similarity with the Toyota production system: teams working in assembly lines with short cycle times and rather low degree of self-organisation. This assembly work organisation provides a rather low need for craft skills. Nevertheless, there are some differences with regard to the discretion of work groups and a precise distinction between the actual group or team concepts is necessary. Certainly future research is needed in order to analyse these partly subtle differences. Qualification based group concepts are only implemented at one plant as a niche strategy for assembly areas with high variety of pieces and products. Qualification based work organisation concepts can not be regarded as dominant pattern. They can be regarded as niche strategies in addition to team concepts in assembly lines.

There are considerable differences with regard to questions of leadership. Both British plants have a plant-wide team concept that could improve communication processes, both French plants rely on traditional hierarchy and four out of five German plants have a rather team based shop floor and a somewhat traditional hierarchical management system. Especially first-line-managers have to deal with this case because they are at the intersection between hierarchy and team. This has led us to point out a mismatch resulting from two different concepts on management and operational level.

The incentive policy of both the German and French sites focus on a support of new work organisation concepts by wage incentives. Here bonuses for group performance and/or individual performance, quality improvement or time savings are granted. At the British sites economic incentives are combined with post-material incentives such as single-status, no demarcation and "jobs for life"-philosophy. Moreover British sites are currently considering a qualification-oriented payment. Group work itself or job enrichment policies have surprisingly enough not been mentioned as incentives by plant managers. It can be pointed out that intrinsic incentives are neglected in the HRM policies.

German plants on the one hand have a highly skilled work-force and tend to cut training spendings, British and French sites on the other hand have a rather low skilled work-force and try to increase employees skills by training measures. A highly skilled work-force is considered as advantageous by all plants. Nevertheless, social skills and workers attitudes are weighted higher than craft-skills and the actual solutions in work organisation do not provide a high need for craft skills, Therefore, an underutilization of workers skills can be identified at four German sites.

The results seem to indicate environmental as well as company independent developments with respect to work organisation because all analysed plants are developing similarly. In other fields of HRM such as leadership, incentive policies and training and personnel employment policies country based differences seem to dominate, Nevertheless, plant managers seldoml y perceive their daily practices of HRM as influenced by environments. Only if new plant buildings or even transplants are planned the importance or impact of the social environment on HRM policies is emphasised. This is important to note because it gives evidence to national and regional differences in Europe that play a major role at least when new plants are constructed, Therefore the results of the FWS project are especially important for strategies of globalization. Global strategies provide the necessity to deal with international differences in social environments and to look for competitive advantages in high wage regions resulting from Human Resource Management practices.

2.1.3 Subtask C: „ Time Structures"

„European diversity" in the field of organizing working and operating hours consists of two fundamentally different working hour strategies as well as of two different working hour „cultures":

- British and French companies can be characterised by keeping a strong connection between operating and working hours mostly in „split shift systems" with various different working hour schemes which cover different segments of operating hours.
- For companies in German-speaking countries working and operating hours are disconnected (to different degrees). Mostly operating hours are organised in „split systems", too.

None of these working hour strategies has a clearly higher potential for future working time structures since future demands will stress flexibility even stronger than in the past. However, from our point of view, there are still some advantages to (partially) disconnected systems, because they allow a higher sophistication of operating hour volumes. Additionally, there are indications that employees working in partially disconnected systems are better qualified than their colleagues in strongly connected systems. Furthermore, partially disconnected systems offer a broader spectrum of job rotations. The reason for this phenomenon can be found in the requirement for a more systematic organisation of stand-ins in (partially) disconnected systems.

In none of the examined car plants *were* companies completely successful in implementing new standards for flexibility. It is not so much the question of lengthening operating hours but instead the search for more flexibility that can be defined as the most severe problem in regard to future working time structures in the European automotive industry.

Employees will possibly derive benefit from an increased potential for flexibility of working hours in the car industry: Firstly, employment will become more long-term based. Secondly, „Taylorism" in the field of production will be minimised. And thirdly, a higher amount of team work will increase individual responsibility and creative power.

A seasonal variation of working hours („annual working hours") in the automotive industry would be advantageous in comparison to the current situation for most car producers. However, annual working hours alone would not be the best solution, as seasonal variations in car sales are outweighed by more important changes to the need for operating hours evoked by other cyclical influences like business or production cycles. In most cases these longer-termed cyclical effects, though, cannot be „caught" by annual working hours.

There is, however, a disadvantage to balance contractual working hours in long-term periods. It could very well happen that, over long periods, time accounts accumulate to such an extent that it is impossible to balance them within the given time frame. Problems for employees may arise if negative balances cannot be neutralised before the employee leaves his or her job: Then he or she might be obliged to refund money already spent. Therefore, adjusting contractual weekly working hours seems to be more appropriate.

The necessity to extend operating hours ultimately leads to specific strains for employees, for example through shift and night work. There are two widespread working and operating time systems in the automotive industry on which we focused in the second phase of our project-part: „split systems" with permanent night shifts and ,,extended two-shift systems" with extended daily working hours.

When assessing the constraints for employees, „split shift systems" with permanent night shifts, which play an important role in both European working hour strategies, seem to be a rather positive solution according to our survey. It is especially the option to change from a permanent night shift

pattern to the regular two-shift system which seems favorable to employees doing permanent night work. In most examined companies this option was given any time, thus strengthening the employees' notion of „keeping control" over their work situation.

The evaluation of „extended two-shift systems" results in a much more cautious conclusion. It is primarily the restricted or even missing opportunity for employees to change their working time pattern in comparison to employees working permanent night shifts in „split systems'< which seems to make the ,,extended two-shift system" less favorable. Furthermore, it was not possible for us to define the „critical borderline" in terms of the extension of daily working hours.

2.1.4 Subtask D: „ Social Values"

The objective of the subtask "Social Values" is a stock-taking and an analysis of aspects of social values and social indicators, which are relevant for the development of new production technologies and working structures in the automotive industry. The components general value orientation, work related values, leisure activities, participation at work, and attitudes towards further training were included as important aspects of social values. Primary analyses were conducted in eleven European automotive plants (micro level); in total more than 1200 employees were involved in the survey. For further comparison existing national and international data bases (macro level) were analysed.

With respect to the ascertained social value orientations differences have been found on country, company and plant level as well as with respect to biographical features and job categories. In general the country effect exerts the strongest influence; clear country-specific differences emerged with respect to most of the value components.

In country-comparison the French employees are characterised by a more materialistic value orientation and a significantly higher centrality of work than the British and the German employees. On the other hand, the French respondents have clearly the lowest degrees of both actual and desired participation. Furthermore they are less interested in further training than the British and the German respondents.

The British employees, in contrast, show the significantly lowest centrality of work of all respondents. Apart from this, the British profile is marked by the significantly strongest economic orientation - including aspects like job security or payment - and the significant lowest intrinsic orientation - covering aspects as interesting work, autonomy and variety. Furthermore the obligation orientation representing a societal norm concerning duty-related aspects of work has turned out to be strongest at the British plants.

The German employees can be described, on the one hand, by the lowest materialistic orientation and the clearly lowest economic orientation; on the other hand, they have the significantly highest intrinsic orientation as well as the highest degrees of actual and desired participation. In country-comparison the obligation orientation has to be considered as relatively low; centrality of work as medium. Apart from this the German respondents are clearly more interested in further training than the French and the British respondents.

Results of secondary analyses revealed that employees of the involved automotive plants are characterised in comparison to the respective national representative samples by a significantly higher centrality of work and a significantly stronger economic orientation.

Apart from country-specific effects some clear differences between plants and companies have been found which may be due to the respective plant-or company-specific culture.

Furthermore some substantial relationships between value orientations, on the one hand, and biographical features and job categories, on the other hand, emerged. There are clear differences between job categories with respect to their value orientations. However, the strength of differences varies both with regard to the respective value orientations and between the separate job categories.

The location of plants respectively the rural vs. urban community situation of respondents does, in contrast, not exert a consistent influence on value orientations. Between the level of formal education and value orientations a significant relationship emerged with respect to the economic/intrinsic orientation: the larger the proportion of skilled workers the higher is the intrinsic orientation and the lower is the economic orientation of the respective plant.

The increasing age of employees often discussed as a crucial development in the automotive industry has not been found to exert a relevant influence on value orientations, which are regarded as relevant for the successful implementation of new working structures.

Teamwork, an essential element of future working structures, is in general supported by the observed profiles of value orientations, particularly by the common and moderate desire for an extension of participation and the comparatively high importance of intrinsic work goals. Although the economic motives job security and payment are assessed as very important at all plants, intrinsic motives of work are considered as fundamental as well by the respondents.

2.2 Task 2

Plant scale, capacity utilisation and product complexity (mix and part count) all influence plant performance. It would appear that those plants with faster cycle, multi-station, automated and integrated (no WIP) processes have an advantage over others.

It would also appear that the existence of team structures involving a large part of the workforce are not necessarily correlated with performance, if Plant D is representative of other plants in France. The Andersen Parts Supplier study came to the same conclusion, namely that team structures were hardly present in French plants whereas they were in lower performing plants in the UK. Many high performing plants in Japan have a majority of employees actively involved in teams and continuous improvement activities and suggestion schemes. This is being slowly replicated in their plants in North America and Europe as they settle down and gain experience. What is the explanation for this puzzling conclusion?

Looking back at all the benchmarking evidence that has accumulated over the last 6 years there seem to be three important macro levels of activity that contribute to achieving world class levels of performance. The first is design for manufacture, the second is the design, layout and management of the production process itself and the third is the involvement of shop floor operatives in team based continuous improvement activities. IMVP concluded that broadly each of these three levels contributed to world class performance. In the West there has been some confusion between the importance of process organisation and continuous improvement through team working.

It would also appear that firms in different countries have placed more effort on one of these three levels than others. French firms have placed more emphasis on design for manufacture, simplification of the production process and the elimination of the possibility of making mistakes (Poka Yoke), rather than shop floor based Kaizen teams. British and American firms have on the

other hand placed more emphasis initially on shop floor involvement and then design for production, with least effort going into process and layout improvements.

The conclusion from the discussion is that to understand the relative significance of new shop floor team based structures one has to see this in relation to both the contribution of design for manufacture and the process logic being used. Without these two elements team working can make only a limited contribution. Team working can not in itself create a high performing plant - it can only be a means to improve the processes that have been laid down and the product that has been designed.

Finally there is still a lot of confusion about different team working structures. Toyota for example have small teams of 4/5 people with a team leader, and 4/5 of these team leaders report to a Group Leader, who in turn reports to a Section Manager, who in turn reports to the Plant Manager. Nissan has larger teams and one fewer layers. Honda on the other hand has a greater degree of involvement and parallel quality circles. In each case more of the responsibility falls on the team or group leader than on the team member. Some Western firms have pushed the responsibility for quality in particular down to the operative, without placing him or her in a process from which most of the chaos has already been removed. Not surprisingly although operators may feel more involved and motivated there is little evidence so far of world class quality as a result.

Continuous improvement activities take several forms - day to day activities to improve the work of the teams by the teams themselves, including suggestion schemes and special Kaizen teams supporting the shop floor to redesign processes to over come problems identified by the teams or by employees suggestions. These Kaizen teams are often composed of a mixture of process engineers and shop floor personnel on temporary assignments.

Clearly the appropriate form of team structure depends on corporate and national cultures. World Class performance depends on the appropriate form of process organisation and attention to design for manufacture. The challenge is to find suitable working structures to support and improve the process, while being compatible with the local social environment.

2.3 Task 3

Abstract of *results*

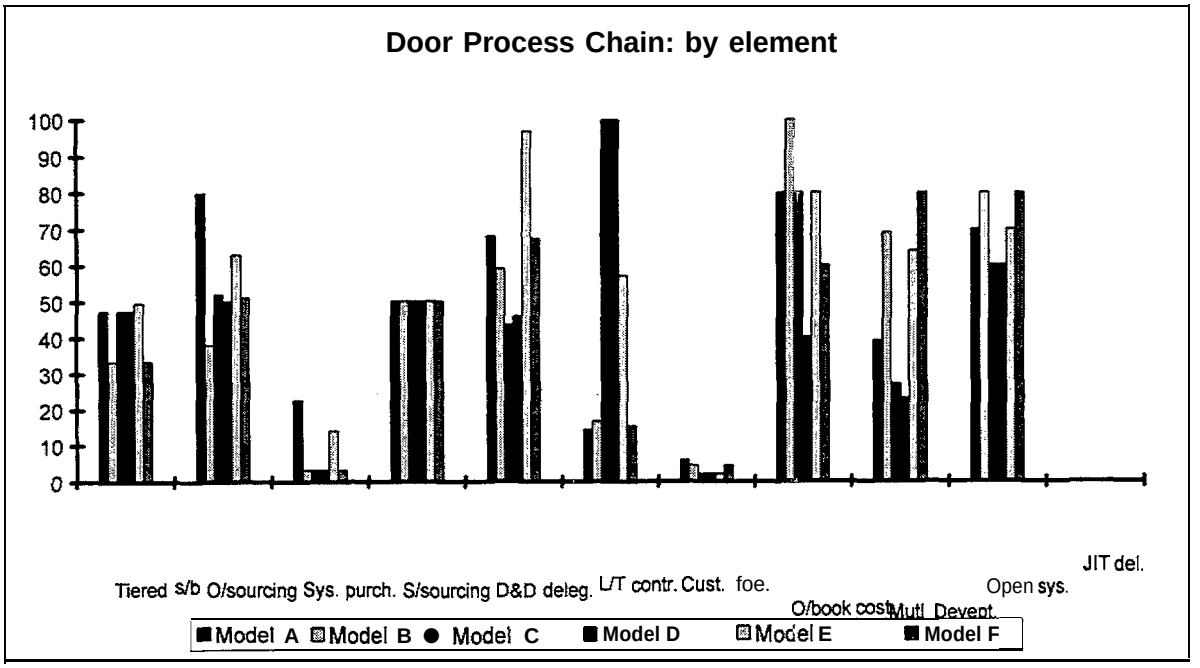


Figure 2.1 Door **Process** *Chain* **results** - *element-to-element comparison*

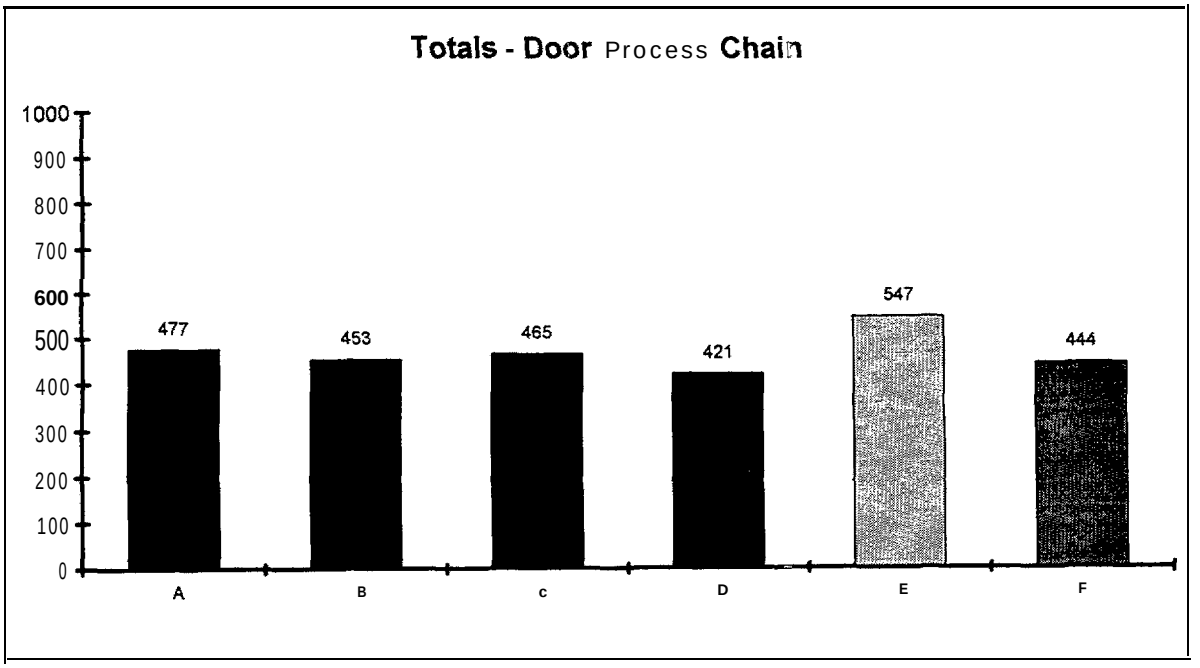


Figure **2.2** *Door* **Process Chain** *results - model aggregate ratings*

- **The** major trends in supply chain engineering which we have observed may be clustered according to the opportunities and threats of the market, although there is some overlap:

- Over capacity in the world is making cost reduction a particularly urgent priority. Global sourcing is a response primarily to reduce unit cost, and single sourcing a response to remove redundancy. Open-book costing is a monitoring and minimisation device. Over capacity in the market also increases the exposure of proprietors to risk. OutSourcing is also a method of risk sharing, by involving new populations of shareholders in the success or failure of the business.
- Quick response is demanded by the market. JIT addresses it operationally, design and development delegation (and hence concurrent engineering) address it strategically. Open systems are an enabler.
- Demand for increased variety , particularly when coupled to quick response, gives rise to ever increasing complexity. Complexity management is the main driver for a higher proportion of outsourced work, for the development of large specialised suppliers, for the trend to systems sourcing and consequent fragmentation of the knowledge base. Longer term contracts, mutual development and open systems are all counter measures to the fragmentation. Renewed vertical integration is unlikely precisely because it is a poor route to complexity management.

2.4 Task 4

The primary objective of task No. 4 is an analysis of the current situation regarding working systems and work tasks in assemblies of automobile companies. For this purpose, both selected operating departments and work stations within these operating areas (departments) were analysed. An operating department is a local and organisational unit in which a component is produced or assembled. The press shop, the welding department or the engine or final assembly departments are operating areas of this kind. In contrary to the MIT-study the focus of analysis lies in the evaluation of concrete components.

The second objective is the description and design of the company and the various possibilities for implementation of working structure models in practice. The preceding analysis is “one of the methods of achieving this objective.

The third objective is the classification and assessment of various models of work organisation. and their rating regarding technical and organisational performance.

It was tried to give the answers to the following questions:

1. Is it possible to distinguish different pronunciations of team work?
2. Can the differences between team work patterns be linked to performance data?
3. Which indicators can be used to define successful team work?
4. Is it possible to define „one best way” for the work organisation for assembly departments?

The results show that the efforts were successful. Firstly it was possible to present a classification pattern with the help of a precisely defined list of criteria which highlights differences and similarities of the analysed team concepts. The value of these comparing analyses is not only of scientific but also practical relevance. For the first time it is possible to benchmark the „soft“ data of work organisation, to relate the data to „hard“ technical

performance benchmarks and to identify changes and similarities between team work on a quantitative scale.

Secondly the results of the analyses show that the degree of implementation of team work according to our criteria can actually be linked to performance data in technical performance aspects as well as in aspects of human resource developments. The analyses showed also that it is extremely difficult to compare the companies cross-sectional across regional, national and even company-cultural boundaries. Without taking these differences into account the cross-sectional comparison leads to no clear evidence for the success of team work. For instance can it not be precisely explained why the French companies have a higher degree of job satisfaction in comparison to the German or English companies. Therefore this data can only be taken as a spot-light to describe the actual work situation but it does not help to assess the quality of work across the companies. It is also not allowed to compare performance data in view of the work organisation without taking into account the in-house production depth and the production system. As soon as performance data is linked to longitudinal changes of the work organisation, the superior opportunities of team work to improve the performance and to influence cost-relevant issues positively can be proved.

Since longitudinal studies show that the development of team work structures go along with substantial savings for the company these figures can serve as indicators for successful team work. According to our list of criteria and the raised performance data it seems to be clear that the success of team work in assembly departments is very much dependent on the degree of participation and autonomy for the team and on the possibility for integration of secondary tasks into the team. A decisive factor for successful team work is the support from the lower and middle management, who have to create the space of manouvre for the teams. Target agreements between management levels and teams are a necessary prerequisite which leads to strong commitment of the team and to the implementation of continuous improvement processes into team work.

From these explanations it becomes clear that due to national, regional differences and even due to various company cultures „one best way" can not be defined. It is on the other hand possible to precisely describe fields of action for each department with the help of the analysis. For the identification of targets and means a broad analysis is necessary and the results and development have to be re-evaluated regularly and systematically.

The results led to the design of three small projects in one of the companies:

From the analysis of the different manufacturing systems of the door resulted the idea to develop a new modular door concept. The aim is to optimise assembly processes to improve efficiency. To achieve this it is necessary to design first the product assembly-friendly and then the production system according to the requirements of future working structures as they result from the analyses and according to ergonomic needs. This concept for the door is contrary to the usual development process, where the design is made without consideration of the production process which in practice causes afterwards many problems for the assembly workers.

One plant was chosen for the documentation of the status of work organisation not only for the assembly but also for the other technologies paint shop and welding department. The results show that the analysis instruments can be used for all production areas and that they are independent from the production technology or technical variance.

It is also planned to empower one department with full autonomy and responsibility for the production process and simultaneously withdrawing all hierarchical levels from the department

so that the team is completely responsible for the department. This experiment will be accompanied by members of task 4 who will support the team,

2.5 Task 5

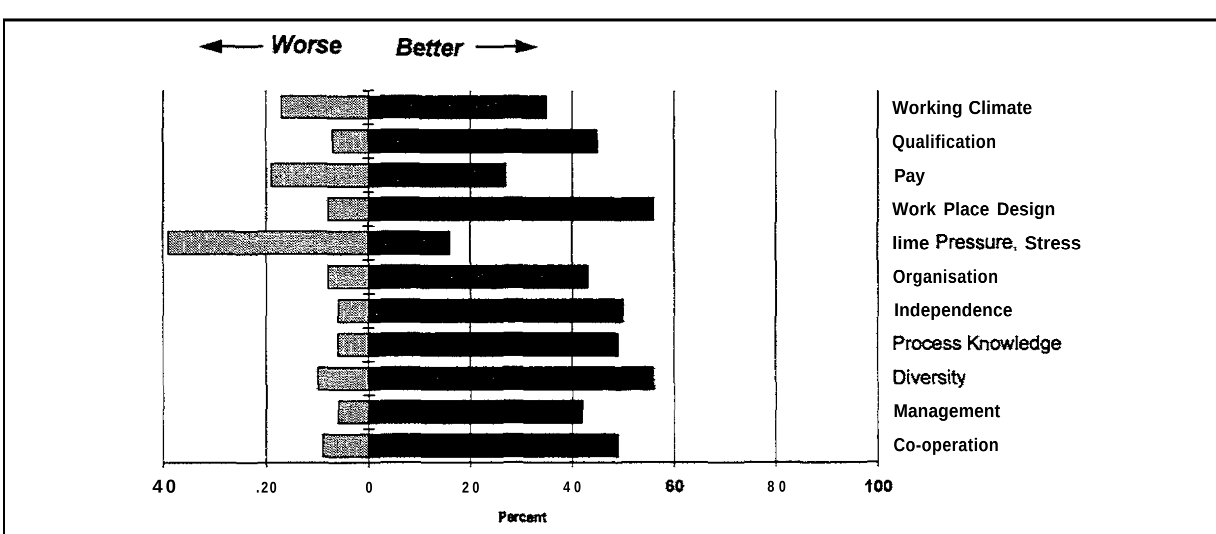
Task 5 in the FWS Project Plan was the objective to integrate the results from Task 1 to 4 in order to come to a holistic view of the subject. Therefore the results that have been provided by the seven scientific institutes have been structured to six „FWS-Themes". Each of these themes have been discussed under the leadership of one industrial partners with the FWS-Experts and the institutes.

The themes are:
Theme 1: Teamwork
Theme 2: Management
Theme 3: Production System
Theme 4: Supporting and Measuring System
Theme 5: Relationship with the suppliers
Theme 6: Social Environment and Enterprises

The Theme Reports in the Final Technical Report contain all information about the relating theme from the project. These Reports are 20 pages long each. Following short summaries about the Theme Reports are given.

2.5.1 Theme 1: Teamwork

The teamwork with its visible structures (e.g. team leader) and new processes (e.g. Continuous Improvement Processes) has dominated the change in the production processes since almost 10 years and therefore this part of the new working structures had a great importance for the whole FWS-Project. We now have reached a level in the automotive industry, where the share of employees in teamwork is traditionally high, that we can evaluate the pros and cons and we can start to improve the structures and assisting elements of Teamwork.



Comparison of Team Working [illegible] Working (n=339); source: [illegible] University Kassel

The results showed, that the employees evaluate the change from traditional, tayloristic-oriented work to team work positively in general. Only a higher time pressure *is seen* after the implementation on the negative side. This can be explained with new tasks and responsibilities which are delegated to the production worker.

As the most important fields of action with regard to teamwork the following points have been identified in the project:

- *Composition of the team* in terms of size, functions, qualification etc.: The questions in this field are mostly solved by all companies, which have found their specific optimum respecting their preconditions as assembly requirements and Human Resources potentials
- *Self-steering elements:* Here a major differences between the vehicle manufacturers and even more between the single plants of one manufacturer. The differences between the nominated and the elected team leader on the one hand and the differences in tasks and responsibilities fully given to the team on the other hand are very wide. In the sample „tayloristic" systems as well as systems near to the „Volvo"-Model have been identified.
- *Efficiency of the implementation process:* It has been showed that there are different interpretations about the implementation level (this means how many employees work in team structures today). Often only a one day team training and the election of a team speaker are seen as prerequisites for „implemented" team work. As soon as team work is introduced into all departments the positive effects are expected withoutthe intensive support. This mismatch of expectations and the lack of financial and training commitment leads to frustrations on the shop floor level because the workers only experience the pressure to reach higher productivity goals without the support for their new role.
- *Requirements to the technical and formal system of the company:* In the analyses it has been showed, what are the preconditions in the technical system to support team work (e.g. question of buffering, cycle time, product structure). These preconditions must be defined and transferred better to the R&D departments. The same is true for the requirements towards the formal system (pay, work time, career paths), which have been changed very positively only in a few companies,

The experiences in the participating companies to these points and the alternatives which have been tested during the last years showed, why we do not have „one best way" in the design of team work, neither on company level, nor on pkmt level. But the basic concepts, such as higher autonomy for the team members, support of the CIP-processes, redesign of the production process for team work are the same.

In one of the participating vehicle manufacturers also a evaluation of economic efficiency has been made at the end of the FWS-Project. This evaluation showed that the expenditures for the implementation of team work are quite high in the first year, but they flow back in the second and third year on a much higher level.

2.5.2 Theme 2: Management

The organisation of work in the European automotive industry until very recently has been based on conceptions put into place early this century. European automotive producers are now faced with competitive challenges from Japan and the USA and as part of the response are changing the working structures. Many changes have taken place and employees have generally accepted

the changes and feel their working situation has improved. Employees are now more involved and many secondary functions have been integrated.

The limits however have not been reached and employees have indicated a desire for even more involvement in the future. Organisations now set new targets for managers and the teams to achieve greater involvement, flexibility and integration of indirect activities. This can only be achieved if the targets for the organisation and employees are compatible. The role of the first line manager is different throughout Europe and it is difficult to compare directly.

Despite this, the role is changing and a common thread can be seen. There is a sharp focus on the importance of leadership and managers are expected to take on more strategic tasks, push reactive tasks down, and to act as advisors for their teams. The trend towards flattening the hierarchies has improved communication and has been welcomed by the shop floor. However, the restructuring has also been a source of tension in the organisation and has had a significant impact on the possibilities for traditional career development.

Unless alternatives are investigated organisations may be faced with motivational problems. Possible solutions include horizontal promotion, team concepts, and project groups and these can be applied both to employees and managers.

The possibility to apply the same solutions to employees and managers is important as there are often differences between the structures used on the factory floor and in management. Employees can view the same situation in a very different way from their managers and unless the information is collected in an objective way misunderstandings can be the result.

The importance of communication in new working structures cannot be underestimated because a common understanding is necessary when it comes to changing an organisation. Studies on organisational change have shown that older organisations with an established culture are more difficult to change than new organisations. An organisation can be changed in stages and different working structures can be employed in different departments without a negative impact. The important factor is a solid link is must be put into place so different working structures can function effectively.

Finally, if these challenges can be overcome, today's managers can make a substantial contribution to the future of the European automotive industry.

2.5.3 Theme 3: Production System

There is a dominating tendency in European car industry to install again short cycled line-systems with a low level of automation. In some cases systems without cycle-binding are realised in assemblies with high time-spreadings, which are caused by the increasing number of variants. These alternative assembly systems are installed because of economical decisions and not because of humanisation of work. New forms of work organisation can be implemented successfully in box- and in line-systems. Because of the rigid cycle-binding and the reduced possibilities to design work organisation, the expense in line-systems is much higher. Further a dramatical reduction of buffer size since the end of the 80ths is recognizable. This tendency will be continued, but buffers will not disappear completely.

With the increasing number of variants space for material disposition nearby the assembly line runs short. This is strengthen the tendency of outsourcing assembly steps. The design of

components and moduls, which are assembled complete into the car after a pre-assembly, also supports these outsourcing strategies.

New final-assembly plants will be realised in regions with structural weakness and a high level of unemployment. Because of the deficient possibility to change the workplace workers in this plants have less demands to the attractivity of their working places. But also in this new assembly plants arises after some years problems with older workers. This increasing level of older workers leads to an assimilation of ergonomic standards to prevent sickness (e.g. aching back).

The disjunction between working time of workers and plant requires a higher flexibility of personnel in future. This condition has to be fulfilled with the design of production systems (e.g. possibility for job rotation).

2.5.4 Theme 4: Supporting and Measuring System

Objectives

The effectiveness of the work organisation for an efficient manufacturing of the product implies both co-operation and sharing of the indirect activities between the team and the supports.

From this point of view, the integration of indirect activities by the team is a strategic key-point to the extent that it's a major dimension of the development of an efficient teamwork for continuous improvement.

More widely, the improvement of working groups implies a change and a clarification of the contribution of supports to the continuous progress and to the industrial projects.

Beyond, it implies an effective co-operation with the departments in charge of the engineering of both the product and the process for new projects : this co-operation was not specifically included in the FWS project.

The integration of indirect activities by production teams - in particular at the workers level -, and a stronger co-operation between production teams and supports, imply changes in the measuring systems and steering processes.

Results

At first sight, the data show, that the level of **integration of indirect activities** generally seem to be rather high, in particular regarding quality. When indirect activities such as quality and maintenance or service are integrated, it is mostly at the highly skilled workers or at the first line manager levels. But at the same time, the support which is given to the assembly groups remains very important in all plants, with very light differences : there is a very low level of independence of the assembly groups from supports in all cases.

Two conclusions could be drawn from those three points:

- the process and the production system have a strong effect on the integration of indirect tasks: when they are integrated, indirect activities are more often the responsibility of teamworkers "offthe line",
- there is a relative integration of indirect activities by the teams and, at the same time, help given to the teams by the supports : this could be related to the fact that, in most cases,

teamwork dynamic is at an introduction stage, setting up an intermediate situation, between traditional work organisation and new working structures.

More widely, we can say that at the shopfloor workers level, enriched activities are weakly advanced, except for two cases regarding quality responsibilities, and that the workers job has not changed very much from this point of view and remains a pure assembly work.

Those conclusions could be reinforced if we refer to the measuring system : appearing as a strong brake, it usually emphasises direct activities in performance assessment, to the extent that the assembly performance is often measured by the productivity of the direct workforce, and indirect labour in this case is considered as non added value.

One perspective of improvement of the co-operation between production teams and supports, is, defining a customer/supplier relationship between them , to create a contractualized co-operation process.

According to the perspectives indicated regarding the improvement of the coherence between means and targets, **changes in the measuring system and new performance criteria** have to be carried out in order to solve some main contradictions such as :

- As we saw above, the development of the integration of indirect activities at the workers level is in contradiction with the measuring system which emphasises the direct productivity of the workforce to assess performance.
- The measuring system is focused more on short run results (output in expected volumes and quality levels), to the detriment of long run benefits (investment in training, individual and collective skills, organisational development, co-operation improvement).
- There may be contradictions and the necessity to arbitrate between different performance targets such as to increase the workforce productivity by staff reducing and to increase product quality:
- lacks of resources - time, staff, skills, co-operation - to solve quality or reliability problems may cause higher costs to obtain quality or process reliability the measuring system emphasises results to the detriment of processes.

Some tracks can be indicated such as:

- to develop team self-assessment processes and tools,
- to assess team performance not only through results but also through processes (to take into account time for animation and meetings in the team performance)
- to assess supports performance on the basis of the effectiveness of their co-operation with the teams ; in other words : the performance of the supports must be measured by the performance of the production team (tools like performance contracts between supports and teams)
- to improve feedbacks on targets and means gaps, and on successive action plans,
- to improve reporting processes, not only through putting figures and measures to the activity, but also through qualitative ways, paying attention both to the results and to the concrete working processes,
- to assess team-performance through the ability and effective presence of the plant in upstream stages of the product/process design of new projects : the efficiency of the work organisation is widely dependent on the product/process design.

Development conditions are stated in different domains : training, management, animation (team meetings), information processes, incentives, new working structures assessment by the employees. A key condition is emphasised : the simultaneous and integrated design of teamwork at the upstream stage of the product/process design of a new project.

Indeed, as long as teamwork will not be simultaneously designed and integrated upstream, it will only be possible to optimise teamwork at the downstream steps, after that the main technico-economic choices have already been made.

So, considering work organisation and human resources as one of the strategic dimensions of a new project to the same extent as technico-economic parameters, the main track to follow is :

- to forecast, as far and precisely as possible, since the starting point of a new project, the future manufacturing conditions, according to the socio-economic and organisational targets and to the actual and future characteristics of the staff,
- on those basis, to build and to negotiate necessary compromises with product and process design ("design for assembly"), in order to guarantee the achievement of the expected performance goals of the project (quality, costs, leading time), showing risk points and identifying gaps.

That means to elaborate :

- organisational targets (e.g. relevant degree of integration of indirect activities and of co-operation between production teams and supports),
- employment frames, both, at the qualitative and quantitative levels (necessary individual and collective skills and qualification needs, staff number),
- internal mobility, recruitment and training plans.

That means too, that the plant(s) which will be in charge of the manufacturing of the future vehicle/component is able to delegate participants to product/process design teams, with product/process engineers, purchasing people, commercial network representatives aso.

As we have already noticed, the measuring systems must change and take into account this ability of the plant to anticipate future manufacturing conditions and to spend time" for future projects : to assess plant and manufacturing people, not only in the short, but in the long run.

2.5.5 **Theme 5: Relationship with the suppliers**

Several studies have shown that the European automotive industry's efficiency is affected by excessive structural costs. In addition of standards of living or social protection, with consequences on work cost, there is further important factor, which is analysed in this report : European production can improve its industrial efficiency, particularly by :

- reducing losses of efficiency due to unnecessarily repeated tasks,
- favouring more rigour in the work of each partner,

Three categories of redundancy and lost efficiency were brought out :

(i)- Redundancy in the manufacturers/suppliers structure : SINGLE/DUAL SOURCING
- overall workload, consistency and confidentiality in design
- duplication of tooling and lower effects of scale in manufacturing

(ii)- Redundancy in product and procedures: STANDARDISATION/DIFFERENTIATION
- insufficient y standardised products : non-optimised differentiation
- in-house procedures (VM/supplier): wastes of time an investment

(iii)- Organisational redundancy : INTERFACES/RELATIONSHIP
- definition and management of interfaces : duplicated work
- working practices : efficiency impaired by insufficient rigour

The optimisation of these redundancies, together with the elimination of non-added value work, would lessen the effects of the growing cost pressure caused by increasing competition between both VMS and suppliers. Care should however be taken not to favour short-term efficiency, which prefers a reduction in capital investment, over long-term efficiency, for which investment can give results, particularly in terms of costs and innovation.

Globally speaking, the core problem in VMs/suppliers relationships is that of overlapping organisational boundaries, and therefore that of the amount of players involved. Furthermore, the European system, with multi-client suppliers, should not be called into question as it enhances know-how in the industry as a whole, while allowing for appropriate product differentiation between VMS. In addition, product differentiation can be achieved at a competitive cost if redundancy observed is minimised. Reducing the number of players involved means continuing to structure the supply side, with suppliers handling an increasingly wide scope of function within the final product. At the same time, this structural evolution has to take two key criteria into account : the choice of who is in the "best position" to produce (VM/supplier) and the avoidance of production over-capacities.

The various proposals put forward basically consist of : avoiding redundancy of any sort whatsever; ***achieving*** economies of scale ; training VMS and suppliers and preserving European automotive know-how in its entirety. Particular objectives are as follows :

- greater standardisation between Vms
- closer early contact between VMS and their suppliers
- greater orientation of the supply chain towards the end customer
- harmonisation of procedures, systems and working practices of VMs and suppliers
- more rigour of each player towards its partners

As the next step of this work, an application of these conclusions has been proposed by the group of experts, which will continue to meet regularly. In parallel, a new research project is suggested to analyse the reality of the 'extended firm' and the evolution of the role of the buyer in Europe.

2.5.6 **Theme 6: Social Environment and Enterprises**

Recent studies on the future of the automobile industry stress that the enterprises are becoming more and more challenged by the increasing competitive requirements in international markets. It is assumed that one solution lies in the rationalisation and optirnatization of performance in internal production processes viewed upon the background of the prevailing technological. Advanced human resource management-approaches overcome this perspective and also take into consideration the ***social environment (external*** framework) and the *social system* (organisation, personnel) because people have to deal with changes and these individuals are important transmitters of information and knowledge, necessary to manage organisational learning processes.

From the political point of view no specific legislation is required for designing new working structures, particularly the shaping of teamwork. Additionally the formal influence of trade unions to structure work organisation is low in most cases, including an European Works Council which could only contribute to translational company-internal communication. Traditional problems concerning work conditions, ergonomics, safety and working times will subsist. New problem areas for collective agreements result from a shift of individual performance control to team control; manning levels will become a point of dispute in the future. On company level too much formalization could hinder the specific adaptations on site levels, whereas on shopfloor level the role of the teamspeaker is likely to destabilise the role of the elected representatives (works councils) as well as the first line supervisors.

It is informative to examine the actual *Japanese experiences* where numerous societal and organisational problems made it necessary to modify the lean-production system. In order to reduce the negative effects of the „lean production" model for production and for the workforce a „lean on balance"-model was attempted which took into account societal and socio-economic impacts to a greater degree. Similar experiences are shown in the American case, where various adapted production concepts stress the importance of organisational change and a motivated workforce.

The expansion of working concepts such as job enrichment or teamwork, the extension of participative structures, transition to flexible working hours etc. cannot only be considered as an answer to competition requirements, but also as adaptation processes to *changing value orientations. An* example for the practical relevance of values is the change in personal policies during the last years as a result of an *increased desire for participation and self-development.* Generally, it can be stated that the implementation of FWS is mostly supported by the found profile of value orientations. But it has often been mentioned that implementation problems of FWS are rather more *„software problems" than structural* problems: managers, workers and workers representatives have problems changing their minds and finding new roles.

Working time models have to be adjusted to specific situations and constraints can be found not only in company needs but also in attitudes or in demographic or regional reasons. Working time models as well as any kind of organisational structure have no „one best way" but only a specifically adjusted concept. Not the extension of operating time, but *flexibility is the central problem* for future working structures. In the case of new work organisation, particularly teamwork, and flexible time models effects can be contradicting or neutralizing to each other, i. e. team stability vs. individualisation of work time.

Moreover the mutual interdependencies between decisions on the *micro-level* (managerial decisions) and the *macro-level (society,* labour market conditions, social policy) should be taken into account. The *increasing age of employees* and status of the external labour market is assumed to be crucial for future development in the automotive industry. By introducing FWS the consequences of management decisions for the social environment must also be taken into consideration. The actual organisational change which appears to be a cure for enterprises can turn out to be a reason for the deterioration of the general economic situation and social atmosphere (sequence of effects: losses of workplaces, decreasing social security contributions, increasing needs of social services, lack of financing the welfare state). However, isolated policies at the micro- and the macro-level which count in each case on the other side, do not lead to optimal solutions.

3. Summary

In the FWS-Project a lot of differences between the three participating countries England, France and Germany have been identified. Only through the intensive discussion of all partners it is now clear what are the advantages and disadvantages for the single alternatives (e.g. role and competencies of the team leader). This is possible, because we made a lot of analyses on a highly scientific level. The data that have been produced by the comparisons support the company internal discussion and the discussion in the European public very well.

The objective, to describe „Future Working Structures" for the automotive industry, has been achieved. In our view Future Working Structures is not a static, but a dynamic model. We did not find one best way for their design in Europe, but we showed the differences that are necessary for high and low volume manufacturers. A simple transfer of the Japanese model, which has been described in 1991 can be transferred to the European Manufacturers, is not possible. We have now a better understanding of group work, national distinctions in strategies, implementation processes and core teams of F WS. And last but not least the significance of soft facts and interrelations between them an the long term success of working structures are described more detailed. This is also true for topics like the better integration of older and disabled employees in the production process.

We showed, that FWS is a important factor for the improvement of competitiveness. For every Automotive Partner it was and remains a field of action. No general change in the further development is seen for the near future.

On the final meeting the project partners showed their willingness to cooperate also in the future on the defined fieldsaction. The next steps in development are seen in the integration of the next hierarchical levels above the teamwork on shop floor level, where different concepts are tested at the moment.